EASA	COMMENT RESPONSE DOCUMENT
	Proposed Equivalent Safety Finding on CS29.1587(b)(6) – Height-Velocity diagram and RFM charts **Applicable to AgustaWestland AW 189** **Issue 1**

Commentor: UK CAA

Comment # 1

Page: All – Paragraph: All

Comment: The AW proposal is welcomed as a good move forward in providing more useable information to the crew for Cat B operations compared to the traditional "nose" style chart.

Justification: The traditional presentation does not provide the crew with the best information regarding whether a flyaway is possible or a landing has to be carried out.

EASA response: *EASA agrees with UK CAA position*

Comment # 2

Page: 2 – Paragraph: Applicant proposal last paragraph

Comment: "The indicated airspeed is either unreadable or not functioning..." However the proposal (on page 3) includes fly-away data from only 20 KIAS which appears contradictory.

EASA response: *On the AW189 the indicated airspeed becomes reliable and consistent from 20 Kts.*

Comment # 3

Page: 2 and 3 – Paragraph: Applicable Equivalent Safety Demonstration

Comment: Without seeing sample charts supporting the proposal it is difficult to fully appreciate the exact nature of the likely RFM presentation but will it clearly state/show 'areas' where neither a safe vertical reject **nor** a fly-away can be carried out? Otherwise it

would be rather like a Category A procedure.

Justification: To claim equivalent safety the actual areas which should be avoided must be clear with the new style of presentation.

EASA response: *The RFM charts will clearly define what is the envelope where a safe vertical reject and a safe fly-away is possible. This is achieved with two different set of charts. The safe vertical reject envelope is defined by a WAT type chart. The fly-away chart provides the actual height loss (in function of WAT parameters) experienced when a correct fly-away procedure is carried out after an engine failure in HOGE. The fly-away procedure is indicated as preferred escape manoeuvre hence if this procedure is not achievable and a suitable landing area for a safe vertical reject is not available (providing the WAT parameters would allow it), the resulting flight envelope is defined as the envelope where a safe landing is not possible.*

Comment # 4

Page: 3 – Paragraph: Applicable Equivalent Safety Demonstration

Comment: It *appears* that only vertical rejects will be presented below 20 KIAS*, if a fly-away was possible from a high hover could this be presented as an alternative to the crew?
*****However the preceding paragraph states "...within a vertical reject weight envelope that is a portion of the fly-away procedure weight envelope" Does this mean that fly-aways *will* be presented below 20 KIAS?

Justification: A flyaway would generally be preferred to a reject (which may be an unsuitable surface, e.g. rough ground or the sea). Without seeing sample charts supporting the proposal it is difficult to fully appreciate the exact nature of the likely RFM presentation.

EASA response: *The fly-away procedure is presented for zero speed and for speeds at or above 20 KIAS.*

Comment # 5

Page: 3 – Paragraph: Applicable Equivalent Safety Demonstration Climb Performance

Comment: "These charts will also guarantee the minimum OEI climb performance established by CS29.67 (a)(2)" Will the fly-away data (minimum dip height) be based on achieving Vy? If yes, then no comment. If a lower speed, will it be possible to accelerate to Vy without further loss of height or climb out in accordance with 26.67 (a)(1) and then accelerate to Vy?

EASA response: *Yes, the fly-away manoeuver is based on achieving V_Y and a minimum rate of climb compliant with CS29.67 (a) (2).*

Commentor: Mr. Jim Lyons

Comment # 1

Page: All – Paragraph: All

Comment: The submission by AW for equivalent safety findings is supported 'in principle' because, for twin-engine helicopters certificated in Category A, the H-V Diagram is restrictive and, in the presence of a Code of Performance - established in compliance with Annex 6 Part II, Section II and Section III, Chapter 3 and its associated Attachment, it is not considered to be a limitation that is necessary in the interest of safety.
The proposal adds important graphs, permitting a helicopter certificated in Category B (in compliance with CS-29.1(d) and (f)) and operating in the utility configuration – which almost always requires operation within the (traditionally derived) H-V curve – to be at a mass, and in a flight condition, which permits either a fly-away or rejected landing.

EASA response: *The aim of the ESF is not to waive the manufacturer to establish the H-V envelope but to accept the proposed RFM data format for Category B.*

Comment # 2

Comment: In the 'Statement of Issue', the list of requirements is set out together with their interpretation and comments – here is one example:

> "CS29.1517 requires for Category A rotorcraft, that if a range of heights exists at any speed, including zero, within which it is not possible to make a safe landing following power failure, the range of heights and its variation with forward speed must be established, together with any other pertinent information, such as the kind of landing surface.
>
> CS29.1583 requires that enough information be furnished as limitations in the Flight Manual to allow compliance with CS29.1517.
>
> However, as the Category A take-off and landing profiles ensure that the H-V Diagram is not entered, AC29.1583 allows the publication of Category A profiles, procedures and WAT limitations as a means to demonstrate compliance with CS29.1583 for Category A aircraft."

With respect to the conditions of CS-29.1517; if <u>no range</u> of heights exist at any speed including zero, within which it is not possible to make a safe landing following power failure, then no H-V Diagram is required – a statement of fact would suffice. However from the submission, it is not clear whether this is the case or not.

EASA response: *The aim of the ESF is not to define whether a <u>no range</u> of heights exists at any speed including zero, within which it is not*

possible to make a safe landing following power failure. This ESF addresses Category B helicopters and it is relevant to RFM H-V format.

Comment # 3

Comment: However, what is not thought to be correct is the statement following, which appears to imply that "…publication of Category A profiles, procedures and WAT limitations as [is] a means to demonstrate compliance with CS29.1583 for Category A aircraft".

Although this appears to be permitted under AC 29.1583, it does not take existing operations into account and, specifically, when those operations are conducted in Performance Class 2 (PC2). AC 29.1583 does make quite clear, in the final sentence of section (b)(8)(i), conditions under which an H-V Diagram can be omitted from the limitations section:

> "Therefore, if the Category A take-off and landing profiles, procedures, and WAT limitations are adequately and clearly defined in the RFM, this information is considered sufficient for compliance with the requirements of § 29.1583(f) without the inclusion of an actual HV diagram. The Category A procedures and profile definitions may be presented in the normal procedures or performance sections of the RFM but should be referenced as being mandatory requirements in the limitations section unless an HV diagram valid for Category A operations is presented."

EASA response: *The ESF is intended as an alternate means of finding compliance with CS29 requirements for RFM presentation of the H-V, not to address the specifics of PC2 take-off and landing operations.*

Comment #4

Helicopters that are certificated in Category A are not required by the Flight Manual, Certification or Operating Regulations (other than in AC 29.1583(b)(8)(i), or under specific operating conditions requiring operations in Performance Class 1 (PC1)) to apply the Category A procedures or profiles. In fact the ICAO/European definition of Category A makes clear that the procedures and graphs are established to provide only a capability.

> Category A, with respect to rotorcraft, means a multi-engine rotorcraft designed with engine and system isolation features specified in CS–27 / CS–29 and capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off in the event of engine failure.

Operations within PC2 require a helicopter to be certificated in Category A; however, the main reason for this requirement is ensure the provision of 'CS-29.1(c) and (e)' - other than that of Subpart B of CS-29 - in order to permit operations over a hostile environment such as the North Sea or Atlantic. The application of Category A performance data to PC 2 is to ensure that operations above 200ft (the transition level from PC2 to PC1 under existing, and future regulations) are conducted in accordance with the PC1 requirements. All aircraft operating offshore in the North Sea (and other hostile environments) are required to operate within Performance Class 2

and, with an approval, can do so with exposure to an engine failure within the H-V Diagram.

It is questioned therefore whether the statement "for Category A, compliance with CS29.1583 will be demonstrated by publication of the relevant profiles, procedures and WAT limitation" will actually provide compliance unless it can be shown that the relevant profiles, procedures and WAT limitations will encompass the complete range of profiles that could be flown in accordance with PC2 (which currently includes operations with exposure) or are mandated.

EASA response: *The need for category A certification for PC 2 operations is to address the requirement for the aircraft to be capable of coping with an engine failure in the en-route phase of the flight. PC2 take-off and landing operations do not meet Cat A airworthiness standards. The CS29.1583 H-V exemption is, thus, not valid and an H-V curve is required. This ESF presents an alternate means of addressing the H-V requirement in the RFM.*

Comment #5

It is also not entirely clear from the paper how compliance with 'CS-29.63 Take-off: Category B' will be shown because AC 29-2C states that:

"It must be possible to conduct a consistent take-off profile clear of the height-velocity diagram with normal pilot effort and skill."

However, this is a minor inconsistency because replacing the H-V Diagram with:

"the vertical reject envelope…presented in Weight Altitude Temperature (WAT) format charts."; and

"fly-away performance charts…for each weight, up to the maximum take-off weight, and ambient condition the height loss from hover OGE."

will have the potential for permitting any number of take-off profiles - other than one with an acceleration in ground cushion and below the H-V curve. This will considerably enhance the potential for safe operations within PC2 without exposure to an engine failure.

EASA response: *EASA acknowledge*

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However, it is not clear (without examining the flight test report or the graphs) whether the two 'types' of charts provide a continuum of operation or if there are 'gaps' – for example between the reject graph which, it is assumed, is based upon zero speed and the fly-away graph which operates from an airspeed of 20 kts. It is also assumed that a height of 200ft has been chosen because there is no exposure above that height.

EASA response: *The RFM charts will clearly define what is the envelope where a safe vertical reject and a safe fly-away is possible. This is achieved with two different set of charts. The safe vertical reject envelope is defined by a WAT type chart. The fly-away chart provides the actual height loss (in function of WAT parameters) experienced when a correct fly-away procedure is carried out after an engine failure in HOGE. The fly-away procedure is indicated as preferred escape manoeuvre hence if this procedure is not achievable and a suitable landing area for a safe vertical reject is not available (providing the WAT parameters would allow it), the resulting flight envelope is defined as the envelope where a safe landing is not possible. The 200 ft limitation for vertical safe reject is dictated by pilot view.*