



## Terms of Reference

for a rulemaking task

### Prediction of wind shear for aeroplane CAT operations

RMT.0369 (OPS.077(a)) & RMT.0370 (OPS.077(b)) – Issue 1 – 28/10/2013

<b>Applicability</b>		<b>Process map</b>	
Affected regulations and decisions:	Part-CAT (IR/AMC/GM)	Rulemaking lead:	R3
Affected stakeholders:	Aeroplane CAT operators	Concept Paper:	No
Driver/origin:	SR ICAO Recommendation	Rulemaking group:	No
Reference:	FRAN-2009-012 ICAO Annex 6, Part I, 6.21.1 & 6.21.2	RIA type:	TBD
		Technical consultation during NPA drafting:	Yes
		Publication date of the NPA:	2015/Q1
		Duration of NPA consultation:	3 months
		Review group:	No
		Focussed consultation:	TBD
		Publication date of the Opinion:	2016/Q2
		Publication date of the Decision:	2017/Q2

## 1. Issue and reasoning for regulatory change

Wind shear represents a serious hazard for the operation of aeroplanes. Accidents and serious incidents have occurred during approach or landing while wind shear was present. Most of the time the flight crew can perform an emergency go-around procedure and start a new approach. However, in some cases (e.g. low level wind shear) the crew does not have time to properly counter the effect of such a phenomenon, thus only mitigating the effect of a subsequent loss of control.

In the last ten years accident investigation boards (AIBs) have been investigating accidents and serious incidents involving aeroplanes operated by European commercial air transport (CAT) operators where wind shear was a contributing factor. In some cases the aeroplane suffered substantial damages or was destroyed.

Wind shear incidents are regularly reported by European operators, mostly regarding aeroplanes having a maximum certified take-off mass in excess of 5 700 kg or authorised to carry more than 9 passengers. In the last few years around 500 occurrences were reported annually. It is estimated that 40 % of those events occurred outside Europe. Additionally, IATA established that adverse meteorological conditions, not limited to wind shear, were a causal factor in 40 % of runway excursions, which in turn accounted for 26 % of all accidents.

Wind shear events were also studied by the Flight Safety Foundation. One of its conclusions, also mentioned in the Airbus Flight Operations Briefing Notes, is that timely recognition of wind shear is vital for the successful implementation of a wind shear recovery procedure. As a matter of fact, even though modern large aeroplanes are equipped with reactive warning systems, these can only trigger a warning signal and subsequent crew action once the phenomenon has started, thus preventing the flight crew from anticipating such event. It is, therefore, advisable to assist flight crews of CAT operators with wind shear predictive systems, currently available in the market, to enable better management of the safety risks related to wind shear.

Acknowledging the issue, ICAO Annex 6 Part I contains the following recommended practice (6.21.1):

'All turbo-jet aeroplanes of a maximum certificated take-off mass in excess of 5 700 kg or authorized to carry more than nine passengers should be equipped with a forward-looking wind shear warning system.'

Furthermore, the Safety Recommendation FRAN-2009-012 was published by BEA after a serious incident and addressed to EASA in order to establish the regulatory conditions for installing predictive wind shear systems in accordance with the recommendations of paragraph 6.21 of ICAO Annex 6 Part I.

Future safety recommendations related to wind shear — which may be eventually published during this rulemaking task — will be taken into consideration, as appropriate.

## 2. Objectives

In order to respond to the Safety Recommendation and to address the issues described above, the objective of this rulemaking proposal is to reduce the number of accidents and serious incidents caused by wind shear in commercial air transport operations of aeroplanes by establishing the regulatory conditions to install and use predictive wind shear systems.

### 3. Specific tasks and deliverables

#### 3.1. Tasks

In order to achieve the objective the following tasks will be performed:

- Review of the existing predictive windshear systems for aeroplanes and their installations to identify current capabilities and availability of such products, costs and technical constraints that may limit their implementation on the concerned aeroplane types.
- Review of the existing regulations for commercial air transport (Part-CAT and related AMC/GM) and development of the new requirements.
- Decide on the implementation options (i.e. forward fit and retrofit of the system on the aeroplanes concerned) and timelines. In fact, neither ICAO nor BEA indicate timelines for the aeroplanes concerned to be equipped. Moreover, it is not clarified whether the safety improvement could be achieved by:
  - amendment to the appropriate certification specification which would affect applications for newly designed types or models;
  - amendment to Part-26 mandating 'forward fit' (i.e. implementation by manufacturers on newly produced aeroplanes based on existing TCs);
  - amendment to Part-CAT mandating operators the retrofit or forward fit all the aeroplanes concerned within an appropriate time frame.
- Development of a light RIA (in case of forward fit), or full RIA (in case of retrofit).

#### 3.2. Deliverables

The following will be the final products of this task:

- Light/full RIA depending on the chosen option;
- NPA containing the amendments to one or more of the following regulatory texts:
  - CS-25,
  - Part-26,
  - Part-CAT and related AMC/GM;
- Opinion containing the new/amended Implementing Rules;
- ED Decision containing the new/amended AMC/GM.

#### 3.3. Interface issues

The current European technical standard for weather radars is ETSO 2C63c (Airborne Weather and Ground Mapping Pulsed Radars) published by the Agency in 2003 and does not include the predictive function for wind shear since it was not mature at the time.

The predictive wind shear function is included in edition 'd' of the equivalent FAA TSO.

Update of such ETSO from edition 'c' to 'd' will be progressed through RMT.0457 'Regular update of EASA TSOs', for which a Decision is planned to be published in the first quarter of 2016 according to the Agency's Rulemaking Programme for 2013–2016.

#### 3.4. Technical and focussed consultation

Predictive wind shear warning systems are already available in most modern large aeroplanes; however, when not available, the retrofit cost of predictive wind shear warning systems is estimated to be significantly high.

Since those systems are normally a function of the weather radar, the cost of upgrading recent weather radars already fitted with an antenna of the appropriate size should be reasonable while the upgrading of other systems is likely to be onerous for operators.

On smaller aeroplanes, mostly used in regional transport, the installation of predictive windshear warning systems is less common due to cost reasons and technical limitations. The size of a radar antenna capable of detecting windshear and the dimensions of the aeroplane may be limiting factors, implying respectively higher costs for upgrade of the weather radar, when the antenna needs to be replaced, or technical difficulties for the installation.

For these reasons the timelines, the regulatory options for the implementation of the new requirements, the applicability criteria and the eventual requirements for retrofit need to be carefully evaluated in the context of this rulemaking task.

The aeroplane category, dimensions, weight threshold and passengers capacity threshold for which the new system will be required need also to be carefully evaluated.

These evaluations will be carried out firstly in the RIA, upon which the rulemaking proposal will be based, and secondly by means of a technical consultation with manufacturers, RAG/TAGs and SSCC before the publication of the NPA.

Further specific focussed consultation with the stakeholders may be considered, if needed, during the review of the comments received on the NPA.

#### **4. Profile and contribution of the rulemaking group**

Not applicable.

#### **5. Annex I: Reference documents**

##### **5.1. Affected regulations**

Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (Annex IV — Part-CAT) (OJ L 296, 25.10.2012, p. 1)

##### **5.2. Affected decisions**

Decision N° 2012/018/Directorate R of the Executive Director of the Agency of 24th October 2012 on Acceptable Means of Compliance and Guidance Material to Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council — Acceptable Means of Compliance and Guidance Material to Part-CAT (Annex IV)

##### **5.3. Reference documents**

- SR FRAN-2009-012 (Rapport du BEA sur l'incident survenu le 25 mai 2001 sur l'aérodrome de Cayenne-Rochambeau (Guyane) à l'Airbus A340-311 immatriculé F-GLZC exploité par Air France)
- ICAO Annex 6, Part I
- Bulletin sécurité n°7 on wind shear published by DGAC
- FSF ALAR Briefing Note 5.4: Wind Shear
- Airbus Flight Operations Briefing Notes – Adverse weather operations – Windshear awareness
- IATA Annual Report 2010.