

# European Aviation Safety Agency

## European Technical Standard Order

**Subject:** Airborne Weather Radar Equipment

### 1 - Applicability

This ETSO provides the requirements that airborne weather radar equipment that is designed and manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

This ETSO standard addresses weather detection and ground mapping, forward-looking wind shear detection, forward-looking turbulence detection, and atmospheric threat awareness capability. It does not include flight guidance system functionality in support of an approved wind shear detection and avoidance system.

### 2 - Procedures

#### 2.1 - General

Applicable procedures are detailed in CS-ETSO, Subpart A.

#### 2.2 - Specific

None.

### 3 - Technical Conditions

#### 3.1 - Basic

##### 3.1.1 - Minimum Performance Standard

Standards set forth in RTCA Document DO-220A, Minimum Operational Performance Standards (MOPS) for Airborne Weather Radar Systems, dated March 17, 2016, for the equipment classes defined in Table 1.

Equipment Class	Equipment Type	Minimum Performance Standards
A	Forward-Looking Wind shear Detection Capability	The following sections of RTCA DO-220A: Section 2.2, with the following exclusions: paragraphs 2.2.1.3.6, 2.2.1.3.7, 2.2.2, 2.2.4, and 2.2.5., and Sections 2.3 (performance under environmental conditions) and 2.4 (test requirements) as applicable to the class
B	Forward-Looking Turbulence Detection Capability	The following sections of RTCA DO-220A: Section 2.2, with the following exclusions: paragraphs 2.2.1.3.5, 2.2.1.3.7, 2.2.2, 2.2.3, and 2.2.5., and Sections 2.3 (performance under environmental conditions) and 2.4 (test requirements) as applicable to the class
C	Airborne Weather and Ground Mapping Pulsed Radar	The following sections of RTCA DO-220A: Section 2.2, with the following exclusions: paragraphs 2.2.1.3.5, 2.2.1.3.6, 2.2.1.3.7, 2.2.3, 2.2.4, and 2.2.5., and Sections 2.3 (performance under environmental conditions) and 2.4 (test requirements) as applicable to the class
D	Atmospheric Threat Awareness Capability	The following sections of RTCA DO-220A: Section 2.2, with the following exclusions: paragraphs 2.2.1.3.5, 2.2.1.3.6, 2.2.2, 2.2.3, and 2.2.4. Sections 2.3 (performance under environmental conditions) and 2.4 (test requirements) as applicable to the class

Table 1 - Airborne Weather Radar Equipment Classes and Applicable MPS

Any of these classes may be implemented individually or in combination. Therefore, a piece of equipment may be eligible for one or more classes.

### Functionality

This ETSO standard applies to equipment intended to:

- (1) Provide airborne wind shear detection (equipment Class A). Equipment Class A provides forward-looking wind shear detection functionality. However, this ETSO does not include flight guidance system functionality in support of an approved wind shear detection and avoidance system;
- (2) Provide advanced and advisory indication of potentially hazardous turbulence conditions detectable by weather radar, together with other flight information, to assist pilots with turbulence avoidance decisions (Equipment Class B);

- (3) Detect and display echoes from precipitation to assist in flight crew analysis of weather. Maintain contact with geographic features such as international shoreline boundaries as a supplement to navigational orientation (Equipment Class C); and
- (4) Provide timely and advisory information to pilots to enhance their situational awareness of atmospheric activity and assist with atmospheric threat avoidance decisions (Equipment Class D).

### **3.1.2 - Environmental Standard**

See CS-ETSO, Subpart A, paragraph 2.1

### **3.1.3 - Software**

See CS-ETSO, Subpart A, paragraph 2.2

### **3.1.4 - Electronic Hardware**

See CS-ETSO, Subpart A, paragraph 2.3

## **3.2 - Specific**

### **3.2.1 - Failure Condition Classification**

See CS-ETSO, Subpart A, paragraph 2.4.

Failure of the function defined in paragraphs 3.1.1(2) or 3.1.1(4) resulting in unannounced malfunction of the function is a minor failure condition.

Failure of the function defined in paragraph 3.1.1(1) or 3.1.1(3) resulting in unannounced malfunction of the function or missed detection is a major failure condition.

Loss of the functions defined in paragraph 3.1.1 is a minor failure condition.

### **3.2.2 - Installation Manual**

The applicant should provide a manual(s) containing the following items:

- (1) Operating instructions and equipment limitations sufficient to describe the equipment's operational capability;
- (2) For Equipment Class B, identify the installation instructions for the identified aircraft class selected from RTCA/DO-220A, paragraph 2.2.4.1, Table 2-4;
- (3) Expected radome performance for the electromagnetic signals passing through it (paragraph 2.2 of RTCA DO-213A, Minimum Operational Performance Standards for Nose-Mounted Radomes, dated March 17, 2016);
- (4) Weather performance index (range) in accordance with the requirements of RTCA DO-220A; and
- (5) Wind shear detection range in accordance with the requirements of RTCA DO-220A.

## **4 - Marking**

### **4.1 - General**

Marking is detailed in CS-ETSO, Subpart A, paragraph 1.2.

### **4.2 - Specific**

The marking must also include the equipment class, as defined in Table 1.

## **5 - Availability of Referenced Document**

See CS-ETSO, Subpart A, paragraph 3.