

# Regulation of the aeronautical meteorological services

**CAP 782**

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## **CAP 782**

# **Regulation of the aeronautical meteorological services**

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## CHAPTER 1

# Introduction

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## State Obligations

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- 1.1 In accordance with the directions given by the Secretary of State for Transport under Section 66 (1) of the Transport Act 2000, (the CAA Air Navigation Directions), the Civil Aviation Authority (CAA) is responsible for "discharging the responsibilities of the UK Meteorological Authority in accordance with Annex 3 to the Chicago Convention (1944) and other international obligations and any other additional requirements the CAA may determine from time to time".
- 1.2 The Secretary of State for Transport has additionally given the CAA the Civil Aviation Authority (Chicago Convention) Directions 2007, in order to ensure that the CAA, when exercising its statutory functions, acts consistently with the obligations placed on the United Kingdom (UK) under the Chicago Convention.
- 1.3 The CAA's Safety and Airspace Regulation Group (SARG) carries out the CAA's functions under the Directions as well as the function of Aeronautical Meteorological (Met) oversight.
- 1.4 Within International Civil Aviation Organisation (ICAO) terminology, the term Meteorological Authority has a specific meaning. ICAO Annex 3, Meteorological Service for International Air Navigation, defines the term as 'providing or arranging for the provision of the Met Service for international air navigation on behalf of a Contracting State.'
- 1.5 The objective of the Met service is to provide users with the Met information necessary for the performance of their respective functions necessary for the safety, regularity and efficiency of air navigation.
- 1.6 Article 86 of the Air Navigation Order (ANO) requires the commander of an aircraft to take reasonable steps to satisfy himself before take-off that the flight can safely be made, taking into account the latest information available as to the route and aerodrome to be used, the weather reports and forecasts available and any alternative course of action which can be adopted in case the flight cannot be completed as planned.
- 1.7 The Met services provided in the UK are described in the UK Aeronautical Information Publication (AIP) and are defined in the Met

Office Designation for the provision of Met services under the Single European Sky Service Provision Regulation (see paragraph 1.15). The Met information provided enables operators and flight crew to pre-flight plan as well as re-plan in-flight. The primary means of pre-flight briefing in the UK is self-briefing.

- 1.8 The Secretary of State has granted a licence to NATS (En Route) plc under Section 6(1) of the Transport Act 2000 authorising NATS to provide Air Traffic Services (ATS) in the United Kingdom and certain other international airspace, including the Shanwick Oceanic area. The licence also requires NATS to make available Met information to:
1. users;
  2. air traffic service providers for their own use or for onward dissemination to civil aviation users (including NATS); and
  3. persons authorised by the United Kingdom Meteorological Authority.

## Single European Sky Legislation

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- 1.9 The UK joined the European Union (EU) in 1973, and thereafter, European law, except in certain circumstances, takes precedence over UK law. European Commission (EC) regulations are automatically binding in the UK, and if relevant, will supersede any inconsistencies within UK law. In 2004, the European Parliament adopted 4 high level regulations for the Single European Sky (SES) and the Framework, Airspace, Service Provision and Interoperability regulations came into force during that year. These regulations are supported by a number of Implementing Rules (IR).
- 1.10 Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009 amended Regulation (EC) No 216/2008 extended the European Aviation Safety Agency's (EASA) competence to develop implementing rules in the field of Aerodromes, Air Traffic Management (ATM) and Air Navigation Services (ANS). Commission Regulation (EC) No. 1035/2011 (Common Requirements for the Provision of Air Navigation Services) sets out detailed requirements for the certification of an Air Navigation Service Provider (ANSP), including Met providers.
- 1.11 The Common Requirements (CR) regulation requires, among others, providers of Met services to be certified by a National Supervisory Authority (NSA). In the UK the CAA has been nominated to act as



the NSA, as described in Statutory Instrument 2620/2013 (The Single European Sky (National Supervisory Authority) Regulations 2013).

- 1.12 Certification of an ANSP under the CRs provides a mutually recognised document within the States of the Single European Sky area (the ICAO EUR and AFI regions). However, it does not of itself confer a right to provide services anywhere in that region, which may depend on national laws in a given State.
- 1.13 Certification of aerodrome-based providers of Meteorological Aerodrome Report (METAR), usually will form part of a single service provider's certificate, incorporating all CR-related aspects of the provider's functions, for example ATS and Met. The EASA CR certification process is described in Chapter 5.
- 1.14 At present, the only Met organisations that are required to be certified under the applicable EASA requirements are the providers of Aeronautical Met Services on behalf of the State, in order for the State to meet its obligations with respect to ICAO Annex 3 to the Chicago Convention.
- 1.15 Regulation (EC) No 550/2004 on the provision of air navigation services in the Single European sky, allows a State to designate one or more providers of meteorological services in all or part of the airspace under their responsibility, taking into account safety considerations and without the need to organise a call for tenders. Details of the arrangements for the provision of meteorological services in the UK are given in the UK AIP, including any organisations that have been designated by the CAA.

## Commercial Service Providers

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- 1.16 Within the UK there are a number of commercial organisations that create Met products outside the scope of ICAO Annex 3 or repackage Met information already produced and supply to industry as, or within, 'value added' services. Under current UK legislation there are no regulatory requirements in place for these commercial providers.

## Institutional Arrangements

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### World Meteorological Organisation (WMO)

- 1.17 The WMO is a specialised agency of the United Nations. The World Meteorological Convention, by which the WMO was created, was

adopted at the Twelfth Conference of Directors of the International Meteorological Organisation, which met in Washington in 1947.

- 1.18 The purposes of WMO are to facilitate international cooperation in the setting up of networks of stations for making meteorological, hydrological and other observations; and to promote the rapid exchange of meteorological information, the standardization of meteorological observations and the uniform publication of observations and statistics. It also furthers the application of meteorology to aviation, shipping, water problems, agriculture and other human activities, promotes operational hydrology and encourages research and training in meteorology.
- 1.19 There are around 185 members of WMO, all of whom maintain their own Met and Hydrological Services. Members are grouped in six regional associations (Africa, Asia, South America, North and Central America, South-West Pacific and Europe). Each of them meets every four years to coordinate meteorological and operational hydrological activities within their Region and to examine questions referred to them by the WMO Executive Council (made up of thirty-six members).
- 1.20 WMO has eight technical commissions responsible for: aeronautical meteorology; agricultural meteorology; atmospheric sciences; basic systems; climatology; hydrology; instruments and methods of observation; and marine meteorology. Each of them meets every four years.
- 1.21 WMO Resolutions and Recommendations relating to aviation once they have been adopted by the WMO (Congress or Executive Committee) and agreed by ICAO (see below), are published in WMO Technical Regulations (WMO Publication No. 49) Volume II (Meteorological Service for International Air Navigation).
- 1.22 Codes and specifications agreed internationally are published in an Annex to the Technical Regulations (WMO-No. 306 Manual on Codes). Education and Training standards are published in Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology (WMO-No. 1083).

### **The International Civil Aviation Organisation (ICAO)**

- 1.23 ICAO is also a specialised agency of the United Nations. It came into being in 1947, 3 years after 52 nations had drawn up a Convention of International Civil Aviation. Co-operation with the WMO is carried

out under a Working Agreement between the two agencies. The Department for Transport is the UK Government signatory to the Chicago Convention.

- 1.24 ICAO Standards and Recommended Practices (SARPs) relating to meteorology have been given the status of an Annex to the ICAO Convention and were first adopted in 1948. These are applicable on a worldwide basis. Contracting states are required to notify ICAO of differences between their national regulations and practices and the International Standards contained in each Annex.
- 1.25 Details of the SARPs are contained in ICAO Annex 3 and ICAO Doc 7030, Regional Supplementary Procedures.
- 1.26 Air Navigation Plans further define the requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. These are amended periodically to reflect changes in needs and in the status of implementation of recommended facilities and services, including meteorology. The UK has, in this respect, obligations to provide or to arrange for the provision of meteorological services specified in the North Atlantic (NAT) and EUR Regional Air Navigation Plans.
- 1.27 Technical manuals furnish guidance and amplification of the SARPS to both providers and users. One such manual, based primarily on the contents of ICAO Annex 3, which it summarises and enlarges upon where necessary, is ICAO Doc 8896, Manual of Aeronautical Meteorological Practice.
- 1.28 ICAO classifies meteorological offices according to their function:
  1. World Area Forecast Centre (WAFC): A Met centre designated by ICAO to prepare and issue global forecasts in digital grid point form for all required levels and in a standard format, to meet the needs of meteorological authorities and other users
  2. Met Watch Office (MWO): An office specially designated to maintain a watch over Met conditions affecting flight operations within its area of responsibility and to prepare and disseminate SIGMET information as necessary.
  3. Meteorological Office: A Met office designated to provide Met services for international air navigation.

4. Aeronautical Met Stations: Stations responsible for making routine observations at fixed times, supplemented by special reports whenever specified changes occur.

## Working Arrangements between ICAO and WMO

- 1.29 Under the agreed working arrangements between the ICAO and WMO detailed in ICAO Doc 7475, ICAO has the responsibility for examining existing observational networks from the standpoint of their adequacy to provide Met services to international aviation, whilst WMO is responsible for planning synoptic surface and upper-air observational networks to meet all Met requirements. The exchange of operational Met data specifically for civil aviation purposes is a special ICAO requirement and aeronautical telecommunication facilities are typically used for this purpose.

## Terminology Used

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- 1.30 The following terms are used throughout this publication with specific meaning:
  - Meteorological authority – the entity that regulates provision of aeronautical meteorological services to ensure that it meets the needs of users.
  - Service Provider – the entity that provides the service specified.
  - Provide – used only in connection with the provision of service.
  - Issue – used only in connection with cases where the obligation specifically extends to sending the information out to a user.
  - Make available – used only in connection with cases where the obligation ends with making the information accessible to a user.
  - Supply – used only in connection with cases where ‘issue’ or ‘make available’ applies.

## CHAPTER 2

# Scope of the Document

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## General

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2.1 CAP 782 defines the scope of services provided by the regulated providers of Met, and explains how the regulatory process is implemented. This document describes the UK regulatory requirements and those elements of the EASA certification process that fall under the Met Authority's responsibilities.

### 2.2 **Reference Documents**

1. Transport Act 2000
2. The Civil Aviation Authority (Air Navigation) Directions 2001
3. The Civil Aviation Authority (Chicago Convention) Directions 2007
4. ICAO Annex 3 to the Chicago Convention – Meteorological Service for International Air Navigation
5. The NATS (En Route) PLC (NERL) Licence
6. UK Aeronautical Information Publication
7. CAP 168, Licensing of Aerodromes
8. CAP 393, Air Navigation Order
9. CAP 493, Manual of Air Traffic Services Part 1
10. CAP 670, Air Traffic Services Safety Requirements
11. CAP 746, Requirements for Meteorological Observations at Aerodromes
12. CAP 779, Regulation of Aeronautical Information Management Services
13. ICAO Document 7192, Training Manual
14. ICAO Document 7030, Regional Supplementary Procedures
15. ICAO Document 7475, Working Arrangements between ICAO and WMO

16. ICAO Document 7754, European Air Navigation Plan, Volume I, Basic ANP and Volume II, Facilities and Service Implementation Document
17. ICAO Document 8896, (Manual of Aeronautical Meteorological Practice)
18. ICAO Document 9873, Manual on the Quality Management System for the Provision of Meteorological Service to International Air Navigation
19. ICAO Document 9377, Manual on the Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services
20. ICAO Document 9750, Global Air Navigation Plan
21. ICAO Document 9161, Manual on Air Navigation Services Economics
22. ICAO Document 9766, Handbook on the International Airways Volcano Watch
23. WMO Publication No. 49, Technical Regulations, Volume 1 (General meteorological standards and recommended practices) and Volume 2 (Meteorological service for international air navigation)
24. WMO Publication No. 306, Manual on Codes
25. WMO Publication No. 1083, Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology
26. EC Regulation No 216/2008, the EASA Basic Regulation
27. EC Regulation No 550/2004, on the Provision of Air Navigation Services in the Single European Sky
28. EC Regulation No 552/2004, on the interoperability of the European Air Traffic Management network
29. EC Regulation No 1035/2011, laying down Common Requirements for the Provision of Air Navigation Services
30. EC Regulation No 1034/2011, on Safety Oversight in ATM and Air Navigation Services
31. EC Regulation No 1108/2009, on the extension of the European Aviation Safety Agency's (EASA) competence in the field of

Aerodromes, Air Traffic Management (ATM) and Air Navigation Services (ANS)

32. Statutory Instrument 2620/2013, The Single European Sky (National Supervisory Authority) Regulations 2013

## CHAPTER 3

# Aeronautical Meteorology in the United Kingdom

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## Introduction

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- 3.1 Aeronautical meteorological data can be divided into three main categories:
1. A report of actual conditions for a particular given moment by a ground-based observation at, or in the immediate vicinity of an aerodrome;
  2. A forecast or warning of a future event;
  3. A report from an aircraft in flight.
- 3.2 For the purpose of this document these will be regarded as observations, forecasts and aircraft reports respectively.
- 3.3 Additionally, production of aeronautical forecasts requires suitable underpinning infrastructure including atmospheric models, computing and a variety of communications facilities, in particular connections to the Aeronautical Fixed Service (AFS) and ATS providers, inter-office connections as well as provision of services via the public internet.
- 3.4 The following sections outline the requirements for the provision and use of observations, forecasts and aircraft reports, in the context of the UK's international obligations.

## Availability of Meteorological Information to Operators and Flight Crew

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- 3.5 Meteorological information available for use by operators and flight crew must be kept under review and up to date. The following information must be made available, as necessary, to facilitate pre-flight briefing and in-flight re-planning:
1. Upper level information
    - Forecasts of upper wind and upper-air temperature, upper-air humidity, geopotential altitude of flight levels, flight level and temperature of tropopause, direction, speed and flight level of maximum wind, significant weather (SIGWX) phenomena;



2. Low level area forecasts
  - Spot wind and temperature charts and SIGWX for the UK and Northwest Europe. Regional forecasts of wind and temperature and SIGWX;
3. Aerodrome observations and forecasts
  - METAR (including trend forecasts where appended), aerodrome forecast (TAF) including amendments and corrections, for the aerodromes of departure and intended landing, as well as for en-route and destination alternate aerodromes; forecasts for take-off;
4. Air reports and warnings to aircraft in flight
5. SIGMET information and appropriate special air-reports.
  - **NOTE 1:** ICAO Document 7754, EUR Air Navigation Plan states that ICAO AIRMET information messages (providing forecasts of specific meteorological conditions and weather types) should be issued by a MWO, if agreed on between users and the Met authority concerned. However, after consultation with users, the UK issues detailed regional forecasts of wind, temperature and SIGWX that contain this information.
  - **NOTE 2:** Automated flight briefing systems that contain both Met and Aeronautical Information Services (AIS), for example NOTAM NOTAM, must comply with the relevant requirements of this CAP and CAP 779, Regulation of Aeronautical Information Management Services.

## Observations

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- 3.6 Each aerodrome licence holder must arrange for the provision of aerodrome weather reports and other meteorological information to users, taking into account the requirements of CAP 746, Requirements for Meteorological Observations at Aerodromes
- 3.7 The CAA's role is to ensure that the aeronautical Met observations provided for civil aviation are accurate, timely and coded correctly, in line with international standards. We also ensure that Met observers at UK aerodromes are trained to a high standard and show ongoing competence at observing, including updates to coding and observing practice.

- 3.8 Met equipment should be sited in accordance with international requirements and guidelines, taking account of obstacle limitation surfaces. Further information is given in CAP 746 and CAP 168, Licensing of Aerodromes.
- 3.9 Requirements for meteorological displays that present dynamic meteorological information to ATS, their use by ATS, as well as the calibration and maintenance of the displays is subject to the requirements contained in CAP 670, ATS Safety Requirements. Additionally, the action to be taken in respect of meteorological information obtained from aircraft (for example, wind shear during take-off or landing) is detailed in CAP 493, Manual of Air Traffic Services, Part 1.

## Forecasting Services

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- 3.10 In accordance with UK Statutory Instrument 2620/2013, The Single European Sky (National Supervisory Authority) Regulations 2013, the CAA has designated the UK Met Office to provide forecasts to meet the UK's obligations under the Chicago Convention.
- 3.11 There are a number of forecast products and services produced for pre-flight briefing within the UK as well as for international flights. The products are designed to meet the requirements of the wide range of aeronautical activities. The Met Authority determines the specification of these products, in consultation with industry, including update frequency and amendment criteria, taking into account ICAO Annex 3 and the Regional Air Navigation Plans. The Met Authority determines also the most effective cost recovery mechanism for these products and set challenging performance indicator targets on the service provider for a number of these products, with actual performance reviewed on a quarterly basis. The Met Authority may commission aeronautical meteorological research and development with the objective of driving improvements to the safety, efficiency and regularity of air navigation, improve the accuracy of forecasts or increase the efficiency of forecast production.
- 3.12 Full details of the services provided are provided in the UK AIP General section. Operators or flight crew requiring new products and services, or changes to current requirements, should address these requirements to the Met Authority, as detailed in the AIP.

## International Obligations

- 3.13 The UK has accepted responsibility for providing global meteorological data and products that support the World Area Forecast System (WAFS). The UK has also accepted responsibility for the Satellite Distribution Service for information relating to air navigation (SADIS) and Volcanic Ash Advisory Centre (VAAC) London.

## World Area Forecast System (WAFS)

- 3.14 The objective of the ICAO WAFS is to supply States, airline operators and flight crew with global aeronautical meteorological en-route forecasts. This is achieved by the two WAFCs, one based in the United Kingdom (WAFC London) and one in the United States (WAFC Washington), providing, via dissemination mechanisms such as the AFS, a wide range of forecast meteorological data. This includes global upper wind, temperature, humidity and SIGWX phenomena, updated four times per day. The majority of these data are ingested automatically into flight planning systems, to assist with the selection of safe and efficient routes to be flown. Each WAFC is required to provide backup capabilities for the other WAFC, in the event of a service outage. The WAFC London products are disseminated directly to States and users worldwide using the SADIS service.
- 3.15 En-route forecast products for use by flight crew must be generated from the WAFS data and supplied as soon as the forecast becomes available. No modification to the meteorological content must be made when forecasts are identified as being provided as part of WAFS. Where such information is provided in chart form, upper wind and temperature must be provided in the form of fixed time forecast charts for appropriate flight levels, whilst SIGWX must be fixed time forecast charts between specific flight levels. The format and layout of these charts must be based on the areas given in ICAO Annex 3.

## Volcanic Ash Advisory Centre (VAAC)

- 3.16 A VAAC provides specialist information to meteorological centres, air traffic control centres, operators and flight crew regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions. VAAC London is one of nine centres around the globe that monitor relevant weather satellite data to detect the existence and extent of volcanic ash in the atmosphere in their area of responsibility and operate a specialist numerical trajectory/dispersion model in order to forecast the movement of ash that has

been detected or reported. VAAC London must maintain a continuous watch for, and forecast as necessary, the movement of volcanic ash over the United Kingdom, Iceland and the north-eastern part of the North Atlantic Ocean.

- 3.17 Met observers and pilots must report the occurrence of volcanic ash cloud without delay. Pilots must issue a special air report to the appropriate ATS unit when a volcanic eruption or volcanic ash cloud is observed or encountered as well as when, in the opinion of the flight crew, pre-eruption volcanic activity (such as unusual or increasing volcanic activity) occurring. This must be recorded also on a special air-report of volcanic activity form, a pro-forma for which can be found in the UK AIP Gen 3.5. On arrival of a flight at an aerodrome, the completed report of volcanic activity is required to be delivered by the aircraft operator or flight crew member, without delay, to the aerodrome meteorological office. In the situation of flights arriving at UK aerodromes, the completed form should be e-mailed to [emarc@metoffice.gov.uk](mailto:emarc@metoffice.gov.uk).
- 3.18 A difficult set of decisions may need to be taken by aircraft operators, air traffic services providers and national authorities in order to maximise the opportunity for flights to operate safely when volcanic ash is a potential hazard. Such decisions must take account of VAAC information such as the Volcanic Ash Advisory and Volcanic Ash Graphic, other information such as volcanic ash SIGMET and NOTAM as well as any supplementary information provided in support of the ICAO European and North Atlantic Regions Volcanic Ash Contingency Plan. Annex A details the coordination requirements between UK area control centres (ACC), the MWO and other VAACs for the provision and exchange of information relevant to volcanic ash, which is based on ICAO Document 9766, Handbook on the International Airways Volcano Watch.

### Met Watch Office

- 3.19 The MWO continuously monitors the Met conditions affecting flight operations within its area of responsibility and issues warnings concerning the occurrence or expected occurrence of specified weather phenomena with the potential to affect en route operations. The UK MWO is responsible for the issuance of SIGMET to the London, Scottish Flight Information Regions (FIR) as well as the Shanwick Oceanic Control Area (OCA). Volcanic Ash SIGMET will be based on information from VAAC London. The content of Volcanic Ash NOTAM is determined by the Civil Aviation Authority, based on all available and

relevant observations and forecasts and published by NATS, to meet the obligations set out in ICAO Annex 15, Chapter 5. Close coordination is maintained between the MWO and the CAA to ensure that information on volcanic ash is consistent between the SIGMET and NOTAM messages issued.

## Meteorological Office

- 3.20 The meteorological office must organise the appropriate accommodation, equipment and adequately trained staff to:
1. prepare and/or obtain forecasts and other relevant information for flights with which it is concerned;
  2. prepare forecasts for the aerodromes that they are responsible for;
  3. maintain a continuous survey of meteorological conditions over the aerodromes that they are responsible for;
  4. prepare warnings, as necessary, for the aerodromes that they are responsible for; and
  5. exchange meteorological information with other meteorological offices.

## SADIS

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- 3.21 The Met Office must provide, operate and maintain the SADIS and do so in conformity with all relevant ICAO standards and recommended practices and in accordance with relevant recommendations and decisions approved by ICAO.
- 3.22 In particular, the Met Office should ensure that SADIS broadcasts Met information on the 'C-band' frequency with a rate of not less than 38400 bits per second, a bit error rate of better than 1 in 10 million, forward error correction and an overall availability of 99.95%, in accordance with ICAO Annex 10, Volume III, Chapter 10.

## Aircraft observations

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- 3.23 Upper air observations support both the development of meteorological forecasts and the issuance of Met warnings to aircraft in flight. Upper air observations must be taken, recorded and reported by UK operators flying on international routes.
- 3.24 The following aircraft observations must be made:

1. routine aircraft observations during en-route and climb-out phases of the flight; and
  2. special and other non-routine aircraft observations during any phase of the flight.
- 3.25 For UK helicopter operations to and from offshore structures, routine observations from helicopters are not required, as enough meteorological information exists from other sources (for example radiosonde) on conditions at the heights operated by such aircraft.

### Special aircraft observations

- 3.26 Special observations must be made by all aircraft whenever the following conditions are encountered or observed:
1. moderate or severe turbulence;
  2. moderate or severe icing;
  3. severe mountain wave;
  4. thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines;
  5. thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines;
  6. heavy duststorm or heavy sandstorm;
  7. volcanic ash cloud;
  8. pre-eruption volcanic activity or a volcanic eruption (unusual and/or increasing volcanic activity).

### Other non-routine aircraft observations

- 3.27 When meteorological conditions not required under special aircraft observations e.g. wind shear, are encountered and which, in the opinion of the flight crew, may affect the safety or markedly affect the efficiency of other aircraft operations, the appropriate air traffic services unit must be advised as soon as practicable.

### Reporting of aircraft observations during flight

- 3.28 Aircraft observations must be reported by air-ground data link, such as Automatic Dependent Surveillance – Broadcast, ADS-B, or through the WMO Aircraft Meteorological Data Relay (AMDAR) programme. Where

air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight must be reported by voice communications.

- 3.29 Aircraft observations must be reported during flight at the time the observation is made or as soon thereafter as is practicable and be reported as air-reports.
- 3.30 The elements contained in special air-reports must be:
1. Message type designator
  2. Section 1 (Position information)
    - i) Aircraft identification
    - ii) Position or latitude and longitude
    - iii) Time
    - iv) Level or range of levels
  3. Section 3 (Meteorological information)
    - i) Condition prompting the issuance of a special air-report, in accordance with 3.26 above
- 3.31 When reporting aircraft observations of wind shear encountered during approach and climb-out, the aircraft type is required to be included, as this forms part of the information provided by the ATS unit to other aircraft.
- 3.32 Where wind shear conditions in the approach or climb-out were reported or forecast but not encountered, the flight crew is expected to advise the ATS unit as soon as practicable unless the flight crew are aware that the ATS unit has been advised already by a preceding aircraft.

### Exemptions

- 3.33 When voice communications are used, an aircraft is exempted from making routine observations when:
1. the aircraft is not equipped with Area Navigation (RNAV) equipment;  
or
  2. the flight duration is 2 hours or less; or
  3. the aircraft is at a distance equivalent to less than one hour of flying time from the next intended point of landing; or

4. the altitude of the flight path is below 5 000 ft.

## Core

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- 3.34 Core is defined as the programme of work necessary to generate and make available centrally the underpinning weather forecasting and climatological services which form the basis for the services specified under designation.
- 3.35 The Met Authority provides input into the annual programme planning phase, through the Public Weather Service Customer Group (PWSCG), in order to ensure that key underlying meteorological phenomena that affect civil aviation (for example poor visibility, en-route winds) are taken into account in development plans.
- 3.36 The Met Authority ensures that the Core programme continues to support the essential requirements of provision of an aeronautical met service. It monitors the ongoing programme of work, milestones, outcomes and apportionment of costs, to ensure that civil aviation users obtain value for money.

## Education and Training

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- 3.37 ICAO Annex 3 requires a State to ensure that Met service providers comply with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation. Such requirements are given in WMO Publication No. 49, Technical Regulations, Volume I (General Meteorological Standards and Recommended Practices), Chapter B.4 (Education and Training); in particular, personnel providing meteorological services to civil aviation in order to fulfil national and international responsibilities are required to be trained to the standards recognised by WMO for their respective duties.
- 3.38 WMO Publication No. 1083 (Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology) provides guidelines on the desirable standards for the education and training of personnel working in aeronautical meteorology.
- 3.39 The Met Authority ensures that all UK personnel engaged in Met observing and forecasting for civil aviation meet the appropriate requirements of WMO Publication No. 1083 through its oversight activities.



- 3.40 All providers of meteorological information to civil aviation in the UK must ensure they have implemented a process of competence assessment and continual professional development, to maintain and improve their knowledge and skills in the appropriate meteorological discipline.
- 3.41 Organisations that provide training to personnel employed in the provision of ICAO Annex 3 products and services are approved by the Met Authority prior to training taking place and are subject to periodic review.

## Quality Management

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- 3.42 The aim of a quality system for Met service provision is to provide the user with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurement, observation and forecasts.
- 3.43 A Meteorological Service Provider must implement a quality system that conforms to the International Organisation for Standardisation (ISO) 9000 series of quality assurance standards. Such a system is expected to contain the relevant procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to users. The quality system must be regularly reviewed and certified by an approved organisation. Demonstration of compliance of the quality system applied is required through audit. Action must be initiated to determine and correct any non-conformity of the system identified. All audit observations must be evidenced.
- 3.44 Where meteorological information is disseminated for operational purposes, the quality system must include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedule for individual messages required to be exchanged, and the times of their filing for transmission.
- 3.45 The meteorological information supplied to users must be consistent with Human Factors principles and must be in forms that require a minimum of interpretation by users. This may be achieved through the development and regular review of documented processes and procedures, as well as adherence to formats specified in ICAO Annex 3 that minimises the need for additional training beyond that described

in ICAO Document 7192, Training Manual – Part F-1 Meteorology for Air Traffic Controllers and Pilots.

- 3.46 When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, such information should not be supplied to users.

## Safety Management

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- 3.47 The existing Annex 3 requirement for a quality system and quality management of the Met information supplied to the users can be considered as the Met contribution to the safety management systems, where required.
- 3.48 However, within Europe, with regards to EC Regulation 1034/2011, on safety oversight in air traffic management and air navigation services, a Met service provider must ensure that they meet certain safety requirements to help manage safety by:
1. The implementation of safety requirements and other safety-related conditions identified in EC declarations of verification of technical systems, including any relevant EC declarations of conformity or suitability for use of constituents of technical systems
  2. Ensuring appropriate contingency procedures and equipment are in place, kept up to date and regularly tested
  3. Carrying out risk assessment and mitigation procedures for the introduction of new operational systems and related software changes.
  4. Carrying out health and safety assessments for personnel
  5. Ensuring that the latest available Met data is available and used
  6. Using equipment and instrumentation as prescribed by the manufacturer and maintaining it according to the recommended maintenance schedule.
  7. Ensuring safety and incident reports are prepared, reviewed and actioned as necessary.

# Annex A

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## Coordination Requirements between UK ACCs, MWO and VAACs for the provision/exchange of information relevant to volcanic ash

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### Introduction

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1. The UK does not have any active volcanoes within the area of airspace under its responsibility and does not maintain a State volcanic observatory or agency. However, an active volcanic area associated with the Mid-Atlantic Ridge lies close to the north and western edge of Shanwick Oceanic Control Area. It is therefore necessary to ensure that there are coordination requirements set up between the UK Met Authority, the UK ATS ACC and the UK MWO.
2. The CAA is responsible for discharging the obligations of the UK Met Authority, NATS is responsible for the UK ACC and the Met Office is responsible for the UK MWO.

### Objective

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3. The objective of setting coordination requirements between the UK Met Authority, the UK ATS ACC and the UK MWO is to ensure the provision of specific information on pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud required for civil (international and national) air navigation, in accordance with international agreements and the ANO.
4. These requirements set out the responsibilities of Area Control Centres and meteorological watch offices in relation to the mutual exchange of information related to volcanic ash.
5. These requirements are in accordance with the SARPs of ICAO, as well as the provisions contained in the relevant regional air navigation plan publications and in the UK AIP. The requirements are also based on the guidance material in ICAO Doc 9377, Manual on Coordination between ATS, AIS and Aeronautical Meteorological Services and ICAO Doc 9766, Handbook on the International Airways Volcano Watch.

## General

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6. In order to contribute to the efficiency and safety of international air navigation in the UK, the Met Authority, ACCs and MWO must collaborate to ensure fast and efficient coordination to minimise the impact of the presence of volcanic ash in the atmosphere.
7. The ACCs and MWO must maintain suitable contact lists to facilitate consultations and set up reliable communications to enable appropriate coordination.

## Responsibilities

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8. The Met Office, through the Exeter MWO is responsible for issuing SIGMET on volcanic ash, i.e. providing up-to-date information on existing and forecast volcanic ash clouds, and forecast trajectories at different flight levels based on the latest information received from vulcanological observatories or from the corresponding VAAC to those area control centres that need it in order to carry out their functions. The provision of any information related to volcanic activity and the presence of volcanic ash clouds in the atmosphere should be in accordance with these requirements.

### Responsibilities of NATS, including ACCs

9. NATS is responsible for disseminating up-to-date information on existing volcanic ash clouds and trajectory forecasts at different flight levels to pilots and airline operation centres. This information should be based on the latest information received from:
  1. VAAC London; or
  2. Exeter MWOand passed immediately to aircraft in flight that could be affected by the volcanic ash, and to the adjacent ACCs.
10. The CAA also issues a NOTAM through the UK AIS NOTAM Office in accordance with Annex 15, Chapter 5, giving details of the volcanic eruption and ash cloud, including name and geographical coordinates of the volcano, date and time of eruption, as well as flight levels and regions affected.

## Testing

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11. Regular and ad hoc testing of the actions to be taken by the UK Met Authority, the UK ATS ACC and the UK MWO are carried out.

## Training

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12. Appropriate on-the-job training for meteorological and ATS personnel is required to be organised periodically with the objective of familiarising or updating personnel with their respective functions, as well as processes and procedures to be followed, in the event of a volcanic eruption resulting in volcanic ash affecting aeronautical operations.

## Aeronautical information dissemination of information relating to volcanic activity

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### Action to be taken by the ACC

13. On the reception of special air-reports for volcanic ash by an ACC, the following action should be taken:
  1. the information should be transmitted immediately to all aircraft concerned; and
  2. the information should be forwarded to the associated MWO.
14. The special air reports for volcanic ash should be disseminated to aircraft for a period of 60 minutes after their issuance or until the issuance of a SIGMET from the associated MWO. The ACC must verify that a SIGMET has been issued before discontinuing the transmission of the special air report.
15. The ACC concerned should consider contingency arrangements, including implementation of alternative routes.
16. The ACC must transmit special air reports for volcanic ash received by voice communications and those received by data link communication to the associated MWO, and WAFCs London and Washington.

**CHAPTER 4****Regulation Policy**

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**Regulatory Oversight Mechanism**

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- 4.1 Through the Director of SARG, the CAA exercises regulatory oversight of the UK Met domain, in accordance with its responsibilities under Section 66 of the Transport Act and the Directions, and SES certification requirements, taking account of the needs of all interested parties in meteorological information to civil aviation.

**Regulated Areas**

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- 4.2 Regulated areas fall into four main categories; Met observing at aerodromes, Met forecasting, dissemination of Met information and aircraft observations.
- 4.3 For Met observing and Met forecasting, the following aspects are examined:
1. Conformity to ICAO Annex 3 –compliance against the SARPs in Annex 3
  2. SES – compliance against the relevant requirements of EU legislation, in particular EC Regulation No 1035/2011
  3. Quality of information – the accuracy, integrity, completeness, timeliness and reliability of the information disseminated.
  4. Training and competence checking.
  5. Charging – in accordance with ICAO Annex 3 and ICAO Doc 9161, Manual on Air Navigation Services Economics.
  6. Customer satisfaction – addressing the quality and relevance of the service to the customer.
  7. Quality assurance – the necessary systems and processes in place that support all aspects of Met service provision.
  8. Contingency arrangements.

- 4.4 The dissemination of Met information is regulated under the NATS En-route Licence, whilst the end-to-end regulation of aircraft observations is under development.

## ICAO Compliance

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- 4.5 CAA regulatory policy is to ensure compliance with each ICAO SARP. Where UK arrangements for the provision of Met differ from ICAO, these 'differences' will be notified by the CAA to ICAO and published within the UK AIP.
- 4.6 The Met Authority will direct the service providers to address the UK 'differences' filed against ICAO Annex 3, to enable the UK to eradicate them wherever possible.

## Oversight of Aerodrome Met Providers

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- 4.1 Regulatory oversight of the Met observing domain will be achieved through an annual audit of all aerodromes in the UK that produce METAR. A biennial audit is carried out at aerodromes that are certificated under the CR to provide ATS but who distribute weather observations locally and do not provide METAR.

## Quarterly Regulation Meetings

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- 4.7 Formal interface meetings (at quarterly intervals) will be held between the Met Office and the Met Authority. These meetings will address any operational difficulties or other issues that may have arisen in relation to the UK Met forecast provision. The outcome of these meetings will be documented.

## Annual Audits

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- 4.8 Audits of the Met Office will be carried out on an annual basis in addition to the activities described in paragraphs 4 and 5. Audits will be held on predetermined dates agreed in advance and reasonable notice will be given by the Met Authority. More frequent audits may be instigated as determined by the Met Authority, CAA.
- 4.9 The annual audits will be, in part, to address SES Common Requirements conformance but also to review specific aspects of the service provision in detail. Items to be addressed during each audit may include the following;

1. Human Resources and Training Issues;
2. Annual reporting;
3. Traceability of Information;
4. Service Availability;
5. Contingency;
6. Efficiency and Cost Effectiveness;
7. Safety and Regularity of Information;
8. User Consultation;
9. Compliance with Quality Management system;
10. Security.

## Customer Forum

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- 4.10 The Met Office is expected to hold an annual forum with its customers in order to determine the quality of the service provided and to ascertain whether or not it meets their requirements. The CAA Met Authority will attend these meetings as an observer.
- 4.11 The Met Authority may, from time to time, attend CAA's working groups and committees to address specific user met issues.

## Customer Feedback

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- 4.12 Service providers are expected to address and respond to all customer feedback. Customers will have the right to address the Met Authority, CAA, on issues when a resolution cannot be found through the processes described above.



## CHAPTER 5

# SES Certification

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### Certification Process

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- 5.1 Certification of ANSPs in accordance with the EASA CRs is mandatory under European law, and the CAA has in place a certification process to capture the specific requirements laid down in the regulations. The full details of the certification process can be obtained online at [www.caa.co.uk](http://www.caa.co.uk) (under About the CAA/European Matters/SES).

### Initial Certification

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- 5.2 Applicants for certification under the EC CR Regulation are required to submit to the CAA a completed application form and responses to each question in the appropriate compliance matrix questionnaire. The compliance matrices are arranged according to the categories of services to be provided; all applicants are required to complete Annex 1 as well as any other Annex relevant to the specific ANSP:
- Annex I – General Requirements for the Provision of Air Navigation Services, including: Technical and Operational Competence and Capability, Organisational Structure, Safety and quality management, Security, Human Resources, Financial Strength, Liability and Insurance cover, Quality of Services, Contingency Plans and Reporting Requirements.
  - Annex II – Specific Requirements for the Provision of Air Traffic Services
  - Annex III – Specific Requirements for the Provision of Meteorological Services,
  - Annex IV – Specific Requirements for the Provision of Aeronautical Information Services,
  - Annex V – Specific Requirements for the provision of Communications, Navigation and Surveillance Services.
- 5.3 Application forms and blank Annex templates are available at the CAA web site listed above in 1.1.

- 5.4 Applicants for certification will be subject to an audit by the CAA in order to assess compliance with the CRs. The ANSP Certification Section, within the CAA Safety and Airspace Regulation Group (SARG), manages the application process, and will arrange for the issue of certificates at the appropriate time.
- 5.5 The CAA Certification and Designation Sub-Group is comprised of members of the CAA's ANSP Certification Section and other subject matter experts from within the CAA including legal, financial and insurance oversight, Met and AIM. This Sub-Group is responsible for the assessment of completed questionnaires, any additional supporting documentation requested and outcomes of audits and will recommend ANSPs for certification, once satisfied that all requirements have been met.

## Compliance monitoring

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- 5.6 The Certification and Designation Sub-Group will monitor ANSPs continued compliance with the regulations.
- 5.7 For State providers (including aerodromes producing METAR), a review of Annex III of the questionnaire will take place during the annual audit, the report of which will be delivered to the Certification and Designation Sub-Group. For the Met Office, Certification and Designation issues may also be raised at the Quarterly Regulation Meetings and the Annual Audit, and any issues identified here will be reported back to the Sub-Group.
- 5.8 For non-State providers, an annual review of Annex III will take place at a date agreed in advance and with appropriate notice given. This review will be conducted in conjunction with any compliance monitoring review schedule set out by the Certification and Designation Sub-Group.

**CHAPTER 6****Glossary of Definitions and Abbreviations****Defintions**

Accuracy	A degree of conformance between the estimated or measured value and the true value
Aerodrome climatological summary	Concise summary of specified meteorological elements at an aerodrome, based on statistical data
Aerodrome climatological table	Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome
Aircraft observation	The evaluation of one or more meteorological elements made from an aircraft in flight
AIRMET information	Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof
Air-report	A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting

Automatic dependent surveillance (ADS)	A surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position and additional data as appropriate
Briefing	Oral commentary on existing and/or expected meteorological conditions
Consultation	Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions
Flight information region	An airspace of defined dimensions within which flight information service and alerting service are provided
Flight documentation	Written or printed documents, including charts or forms, containing meteorological information for a flight
Forecast	A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace
Grid point data in digital form	Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use
Human Factors principles	Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance

International airways volcano watch (IAVW)	International arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere
Meteorological authority	The authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State
Meteorological bulletin	A text comprising meteorological information preceded by an appropriate heading
Meteorological information	Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions
Meteorological office	An office designated to provide meteorological service for international air navigation
Meteorological satellite	An artificial Earth satellite making meteorological observations and transmitting these observations to Earth
Operational control	The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight
Operational planning	The planning of flight operations by an operator
Operator	A person, organization or enterprise engaged in or offering to engage in an aircraft operation
Pressure Altitude	An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere, as defined in ICAO Annex 8, Part 1

Prognostic Chart	A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart
Quality Assurance	Part of quality management focused on providing confidence that quality requirements will be fulfilled
Quality Control	Part of quality management focused on fulfilling quality requirements
Quality Management	Coordinated activities to direct and control an organization with regard to quality
Search and Rescue Services Unit	A generic term meaning, as the case may be, rescue coordination centre, rescue subcentre or alerting post
SIGMET Information	Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations
Standard isobaric surface	An isobaric surface used on a worldwide basis for representing and analysing the conditions in the atmosphere
Tropical cyclone	Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation
Upper-air chart	A meteorological chart relating to a specified upper-air surface or layer of the atmosphere

Volcanic Ash Advisory Centre	A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions
World Area Forecast Centre	A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States by appropriate means as part of the aeronautical fixed service
World Area Forecast System	A worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats

## Abbreviations

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ACC	Area Control Centre
ADS-B	Automatic Dependent Surveillance - Broadcast
AFI	Africa
AFS	Aeronautical Fixed Service
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Services
AMDAR	Aircraft Meteorological Data Relay
ANO	Air Navigation Order
ANSP	Air Navigation Service provider
ATM	Air Traffic Management

ATS	Air Traffic Services
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CNS	Communications, Navigation and Surveillance
CR	Common Requirements
EASA	European Aviation Safety Agency
EC	The European Commission
EU	The European Union
EUR	Europe
FIR	Flight Information Region
ICAO	International Civil Aviation Organisation
IR	Implementing Rule
ISO	International Organisation for Standardisation
Met	Meteorological
METAR	Meteorological Aerodrome Report
MWO	Met Watch Office
NAT	North Atlantic
NERL	NATS (En-Route) plc
NOTAM	Notice to Airmen
NSA	National Supervisory Authority
OCA	Oceanic Control Area
OPMET	Operational Meteorological Information (METAR, TAF, SIGMET etc.)
PWSCG	Public Weather Service Customer Group
RNAV	Area Navigation
SADIS	Satellite Distribution System for Information Relating to Air Navigation
SARG	Safety and Airspace Regulation Group



SARP	Standards and Recommended Practices
SES	Single European Sky
SIGMET	Significant Meteorological Report
SIGWX	Significant Weather
SARG	Safety and Airspace Regulation Group
TAF	Aerodrome Forecast
UK	United Kingdom
WAFC	World Area Forecast Centre
WAFS	World Area Forecast System
WMO	World Meteorological Organisation
VAAC	Volcanic Ash Advisory Centre

