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Standard Specification for Performance for Weather Information Reports, Data Interfaces, and Weather Information Providers (WIPs)[1]

This standard is issued under the fixed designation F3673; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 In this specification, the standard of performance for weather information reports, analyses, and services performed by a weather information provider (WIP) in support of extensible traffic management (xTM) systems, unmanned aircraft systems (UAS) and vertical takeoff and landing (VTOL) systems operating from the surface to 5000 ft (1524 m) above ground level (AGL) are addressed.

1.2 This specification does not define how to report a meteorological aerodrome report (METAR). This specification supports evolving international and the sovereign civil aviation authority (CAA) and air navigation service provider (ANSP) regulations.

1.3 *Relationship to International WIP Standards*—One objective of this specification is to harmonize the standard across CAAs internationally to enable subject matter compatibility across standards developed by other standards development organizations (SDOs). The existence of multiple standards for the same subject matter can occur when a region's regulator requires that a necessary standard be developed by a particular SDO. In these cases, ASTM International may seek to establish a cooperative arrangement with the applicable SDO to ensure consistency between the related standards.

1.4 This specification provides an initial version to provide guidance to commercial aviation operations including, but not limited to, UAS and VTOL users, for weather measurements and analyses. Research and development activities will continue to inform and lead to modifications to this specification.

1.5 This specification will not cover the standard of performance for weather forecasts.

1.6 *Units*—The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F3060 Terminology for Aircraft

F3341/F3341M Terminology for Unmanned Aircraft Systems

2.2 *IETF Standard:*[3]

IETF RFC 5905 Network Time Protocol Version 4: Protocol and Algorithms Specification

2.3 *ISO/IEC Standard:*[4]

ISO/IEC 27001 Information Security Management Systems

3. Terminology

3.1 *Definitions*—Terminology used in multiple standards is defined in Terminologies F3341/F3341M and F3060.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *application programming interface, API, n*—inputs and outputs for operations intended for use by two or more software modules.

3.2.2 *derived weather data, n*—data from non-weather measurement systems translated into a weather data element, for example, generating wind reports derived from flight control systems and telemetry.

[1] This specification is under the jurisdiction of ASTM Committee F38 on Unmanned Aircraft Systems and is the direct responsibility of Subcommittee F38.02 on Flight Operations.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from the Internet Engineering Task Force (IETF), 1000 N West Street, Suite 1200, Wilmington, DE 19801, https://www.ietf.org/.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

3.2.3 *K-index, n*—K-index and, by extension, the planetary K-index are used to characterize the magnitude of geomagnetic storms.

3.2.3.1 *Discussion*—*K*P is an indicator of disturbances in the Earth's magnetic field rated 0 to 9. Geomagnetic storms can affect communications and global positioning system (GPS) accuracy with a K-index greater than 3 indicating potential impacts are possible.

3.2.4 *OpenAPI, n*—open-source format and initiative for designing and creating machine-readable interface files that are used in producing, describing, consuming, and visualizing RESTful APIs and web services.

3.2.5 *present weather, n*—any weather or obstructions (obscurations) to vision occurring at an observation location and includes precipitation, obscurations, well-developed dust/sand whirls, squalls, tornadic activity, sandstorms, and dust storms occurring at the time the present weather was observed and time stamped.

3.2.5.1 *Discussion*—Present weather may be evaluated instrumentally, manually, or through a combination of instrumental, camera optical, and manual methods.

3.2.6 *qualified weather information provider, WIP, n*—WIP that satisfies the civil aviation authority (CAA) requirements to provide weather information.

3.2.6.1 *Discussion*—This standard is foreseen to be one possible means of compliance to support WIP qualification.

3.2.7 *shall, should, may, and will, v*—shall indicates a mandatory requirement, should indicates a recommended requirement, may indicates an optional requirement, and will indicates futurity and it is not a requirement.

3.2.8 *space weather, n*—phenomena that lie wholly or in part outside the Earth's atmosphere.

3.2.8.1 *Discussion*—Space weather can disrupt GPS guidance, RF signal, compass, and the ability to communicate with an unmanned aircraft system (UAS). The potential impact of space weather will be provided by the K-index.

3.2.9 *weather, n*—state of the atmosphere at a given time and place.[5]

3.2.9.1 *Discussion*—This will refer to weather as the following phenomena: visibility, clouds, cloud height, winds, temperature, dew point, pressure altitude, precipitation, thunderstorms, turbulence, icing, and present weather. It encompasses phenomena produced from non-atmospheric sources that cause impacts to aviation (for example, smoke or pollution impacts on visibility and so forth).

3.2.10 *weather alert, n*—proactive notification disseminated by a WIP for specific airworthiness or operationally impactful weather provided for specific thresholds requested by the user for weather that is occurring or may occur.

3.2.11 *weather analysis, n*—enhanced depiction or interpretation of observed weather data, or both, conducted objectively by machine analysis and subjectively by humans.

3.2.12 *weather analysis data, n*—weather data elements, such as precipitation, wind, temperature, and so forth, that meet the applicable performance tiers in this specification.

3.2.12.1 *Discussion*—Analyses of weather phenomena are an enhanced depiction or interpretation, or both, of observed weather data, generally combining a set of observations, weather model analysis, remotely sensed data, or data derived from non-weather sensor sources.

3.2.13 *weather area data, n*—weather data on a horizontal or vertical plane in a specified space and time with three or more points connected to depict a weather data element area; examples include cloud ceiling height, two-dimensional (2-D) depictions of weather radar reflectivity, and 2-D weather analysis of a weather element.

3.2.14 *weather data sets, n*—collection of data that may be obtained from in situ sensors, remote sensors, or be derived from other data sources.

3.2.15 *weather data tier, n*—category of weather information reports and analyses based on the performance of the sensor and the quality of the data produced by the sensor and modeled after instrument landing system (ILS) categories with Weather Data Tier 3 being the most precise followed by Weather Data Tier 2 and then Weather Data Tier 1.

3.2.16 *weather information provider, WIP, n*—provider of one or more essential or enhanced weather-related services.

3.2.17 *weather line data, n*—weather data on a horizontal or vertical line connected by two or more measurements of a weather data element during a specified time; examples include a line of thunderstorms, thunderstorm gust front, and atmospheric profile measurement.

3.2.18 *weather point data, n*—weather data element at a specific point and time; examples include temperature, dewpoint, wind speed and direction, and so forth.

3.2.18.1 *Discussion*—Generally, the data become increasingly unrepresentative further from the point of measurement.

3.2.19 *weather volume analysis, n*—weather data element represented by horizontal, vertical, and perpendicular planes (x, y, z) with eight or more points to depict a volumetric weather region at a specific time.

3.2.19.1 *Discussion*—Analyses of weather phenomena are an enhanced depiction or interpretation, or both, of observed weather data generally combining a set of observations, weather model analysis, remotely sensed data, or data derived from non-weather sensor sources.

3.3 *Acronyms:*

3.3.1 *AGL*—above ground level

3.3.2 *ANSP*—air navigation service provider

3.3.3 *API*—application programming interface

3.3.4 *ASOS*—automated surface observing system

3.3.5 *AWOS*—automated weather observing system

3.3.6 *CAA*—civil aviation authority

[5] Glossary of Meteorology, https://glossary.ametsoc.org, and *Pilot's Handbook of Aeronautical Knowledge*, FAA-H 8083 25B, Chapter 12, Weather Theory, https://www.faa.gov/aviation/phak/pilots-handbook-aeronautical-knowledge-faa-h-8083-25b, (blend of definition from two sources).