An Introduction to Drone Industry Standards and Regulations

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1 Introduction

The purpose of this document is to provide clarity on the use of the term 'Standards' in relation to Regulations and Industry Best Practice and an insight into the differences between - and need for different types - of standards.

1.1 Standards

Measurement and accredited conformity assessments are critical to the development of safe commercialisation in any sector. Developed through stakeholder-driven processes and based on varying principles of consensus, openness, and transparency in the early stages of the drone industry, standardisation are instrumental in establishing a common language, understanding, confidence and trust in this emerging technology.

In general terms, by codifying an agreed way of doing things, standards act as a means of leveraging research and development and facilitating adoption of technology, but their application is by no means standardised and the standards development landscape is confusing and contentious. To make matters worse, the term 'standard' is used by a plethora of organisations to refer to a range of different things.

The following paragraphs will set out the different uses of the term 'standard' and clarify the difference in each case.

1.2 Regulations

The term 'standards' or 'regulatory standards' is often used when referring to regulations which are written by Government departments such as the Department for Transport (DfT) to implement the specifics of a particular legislation (law). Regulations, which are mandatory, are then implemented and policed by regulators[1].

Regulations are created to ensure that manufacturers and operators comply with the law and are usually focused on ensuring safety. Regulations, by their very nature, are not designed to deliver a view of industry best practice which is often much wider reaching.

Due to the importance of regulations, they are subject to a high level of checks and balances, making them understandably complex and slow to develop. This leaves little time for wide-scale consensus and makes them extremely hard to change. In cases where technology evolves rapidly, this lack of flexibility can be damaging, especially if regulations are too deep or overly prescriptive[2].

1.3 Guidelines and Notices

Guidelines are usually created by Government departments to provide broad based, non-legally binding information to underpin regulations or by industry associations to provide the same to

[1] Examples include the International Civil Aviation Organisation (ICAO) at an international level, the European Union Aviation Safety Agency (EASA) at the European level and the Civil Aviation Authority (CAA) at the national level.

[2] Examples include the expanded the Air Navigation Order 2016 to include the legislation for flying unmanned air systems (UAS). There is no explicit legislation in place to allow for the operation of Maritime Autonomous Surface Ships (MASS) in the UK but this is under review following consultation to the 'Future of transport regulatory review: maritime autonomy and remote operations'.

specific industries or sectors[3]. In the case of guidelines, you will see reference to the term 'standards' in the text and they can indeed provide industry best practice advice, however, this is usually (and should be) restricted to advice on the application of relevant regulations and generally only changed if the regulation changes. Guidelines are extremely useful in achieving compliance.

Examples include:

- the Air Navigation Order is supported by CAP 722 which offers guidance to operators and pilots of UAS. CAP 722 is often mistaken for a regulation and is referred to extensively, but it is only guidance and, arguably, since the publication of ISO 21384-3 UAS Operations[4]
- CAP 722 could be significantly reduced and eventually removed in favour of a reference to the ISO safety and quality standard[5].
- The Maritime Autonomous Surface Ships (MASS) - UK Code of Practice[6] which currently has no equivalent standard.

Notices are usually legally binding instructions on specific aspects of law, drafted and issued by Government to provide additional clarity or remove ambiguity from regulations.

1.4 Foundation Standards

Foundation or 'General' standards provide industry with high level '**Safety and Quality**' or '**Management System**' best practice in support of, but not referring to, specific regulations. While Compliance with these standards is voluntary, they can enable businesses to demonstrate that their product and its operation is safe and compliant with requirements set out in legislation and are recognised and referred to by Government for that purpose. So unlike guidelines, which refer to and provide guidance on the application of regulations, foundation standards do not (and cannot) refer to regulations but are sometimes referred to by them.

If used correctly, foundation standards can provide regulators with the means of delivering thinner regulations while relying on industry to provide evolving best practice standards to underpin them.

Standards are adopted by industry voluntarily[7], developed with widescale industry and public consensus, regularly updated where required and delivered by a limited number of national and international bodies such as the British Standards Institution (BSI) and the International Organization for Standardization (ISO). An example of a foundation standard is ISO 21384-3 – UAS Operations, which provides international consensus for the safety and quality of operations of all UAS of all sizes and types.

1.5 Certification Standards

National and international standards bodies[8] develop certification standards to support compliance with product regulations such as UK Conformity Assessed (UKCA) and Conformité Européenne (CE) standards. These standards set out the conformity testing methodology and limits required to meet

[3] Industry Association guidelines for the use of drones are developed with varying degrees of relevant industry input and can quickly become outdated as the technology evolves so, while they can be useful for background, these should not be used in isolation.

[4] https://www.iso.org/standard/70853.html

[5] https://publicapps.caa.co.uk/docs/33/CAP722%20Edition8(p).pdf

[6] https://www.maritimeuk.org/priorities/innovation/maritime-uk-autonomous-systems-regulatory-working-group/mass-uk-industry-conduct-principles-and-code-practice-2021-v5

[7] While Foundation standards are voluntary, where they are referred to by regulations, they can become defacto required.

[8] Examples include the United Kingdom Accreditation Service (UKAS), Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN) and the European Committee for Standardization (CEN)

relevant product regulations and are critical for manufacturers who wish to sell products in areas where product certification is required.

Certification standards are developed purely to satisfy requirements set out in regulations but with extensive industry consensus in the development of conformity methodologies and testing methods.

An example of a certification standard is EN 4709 series — UAS product requirements, CE marking and operating rules for Open category aircraft. Maritime and underwater systems currently have no dedicated UKCA or CE certification standards but rather rely on compliance with sub-system standards such as IMCA R005, High Voltage Equipment - Safety procedures for working on remotely operated vehicles

1.6 Technical Standards

Technical standards are established norms or requirements for repeatable technical tasks which are applied to the development of products or related processes and production methods as well as related management systems. These standards are developed by a large range of national and international organisations[9] in support of and sponsored by individual companies or industry sectors. Technical standards are often developed to standardize a particular company's products or processes and then adopted by other companies to improve safety, efficiency, and costs.

These standards are extremely important for industry but are often developed with limited industry and no public consensus. There are a huge number of technical standards available across all environments, published by a large array of organisations such as the ASTM UAS Parachute Recovery Systems standard - ASTM F3322-18.

2 The Current International Landscape

There are a huge number of 'Standards' organisations in the market with differing but complimentary approaches to standards:

- ICAO, EASA & CAA set regulations – sometimes referred to as 'regulatory standards'
- Industry bodies such as IATA which write guidance for airlines which they call 'standards'
- National and international standards bodies such as BSI, EASA and ISO who primarily focus on 'Safety and Quality' standards in support of regulatory organisations
- National and international standards bodies such as ADS-STAN and CEN which focus on the development of certification standards to support compliance with product regulations
- Advisory organisations such as JARUS or EUROCAE who provide guidance (which they refer to as standards) in support of regulators
- Technical standards organisations such as ASTM in the USA who develop 'technical' standards for industry

There is also a huge disparity between the application or use of standards from country to country. For example, Japan does not use regulations but relies on ISO standards to set the requirements for industry, whereas EASA works closely with JARUS and EUROCAE to develop supporting standards and the UK uses standards in a mixed way according to the sector in question.

[9] Examples include the American Society for Testing and Materials (ASTM), the European Organisation for Civil Aviation Equipment (EUROCAE) and the International Electrotechnical Commission (IEC).

3 Conclusion

The standards landscape is complex and can be confusing but the concept of using standards as a basis for measurement and accredited conformity assessments is critical to the development of safe technology and operations. Using standards as a basis for commercial development is well-founded and viable providing that Regulators engage in their development and refer to them as an acceptable means of compliance. While regulators do not, and should not, be involved in their development, standards are an extremely useful tool for ensuring that industry bears the responsibility for setting best practice and detailing how compliance is assured so engagement in their development to ensure that they are appropriate is essential.

4 Supplementary Information

4.1 About the Author

Robert is a qualified aeronautical engineer who served as the senior engineer for Army Special Forces Helicopters and, later in his career, was responsible in the development of many of the tri-service policies for aircraft maintenance across all three services which included all military UAS. Later, as Airworthiness 1 for the Defence Logistics Agency (DLA) he had lead responsibility for the development and maintenance of the airworthiness policies for all British military aircraft including military UAS.

Since leaving the Army, Robert has been appointed to the following positions:

- **British Standards Institute (BSI) -** Chairman of ACE20 which is responsible for UK UAS and Counter UAS safety and quality standards.
- **International Standards Organisation (ISO) -** Convener of TC20/SC16 Working Group 3 responsible for the creation of the International Standards for the operation of UAS and member of the Committee Leadership Team.
- **European Committee for Standardization -** Committee member of the Aerospace and Defence Industries Association of Europe (ASD-STAN) Domain 5 responsible for the development of European Certification Standards for UAS.