

**TR 101:2022**  
(ICS 49.020)

TECHNICAL REFERENCE

**Guidelines on airworthiness of unmanned  
aircraft systems (UAS)**

**TR 101:2022**  
(ICS 49.020)

---

TECHNICAL REFERENCE

**Guidelines on airworthiness of unmanned aircraft  
systems (UAS)**

---

Published by Enterprise Singapore

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilised in any form or by any means, electronic or mechanical, including photocopying and microfilming, without permission in writing from Enterprise Singapore. Request for permission can be sent to: [standards@enterprisesg.gov.sg](mailto:standards@enterprisesg.gov.sg).

© Enterprise Singapore 2022

ISBN 978-981-5042-80-1

**Contents**

	<b>Page</b>
Foreword _____	3
0 Introduction _____	4
1 Scope _____	4
2 Normative references _____	5
3 Terms and definitions _____	5
4 Airworthiness verification guidelines _____	6
<b>Tables</b>	
1 Airworthiness criteria level _____	6
2 Airworthiness verification _____	7
Bibliography _____	16

## Foreword

This Technical Reference (TR) was prepared by the Working Group on Unmanned Aircraft Systems Manufacturing set up by the Technical Committee on Aerospace under the purview of the Manufacturing Standards Committee.

This TR is a provisional standard made available for application over a period of three years. The aim is to use the experience gained to update the TR so that it can be adopted as a Singapore Standard. Users of the TR are invited to provide feedback on its technical content, clarity and ease of use. Feedback can be submitted using the form provided in the TR. At the end of the three years, the TR will be reviewed, taking into account any feedback or other considerations, to further its development into a Singapore Standard if found suitable.

Permission has been sought from the following organisations for the reproduction of materials from their publications into this TR:

1. Intertek  
Acceptable means of compliance document, prepared by Intertek to coordinate with EASA notice of proposed amendment 2017-05 (A).
2. Underwriters Laboratories  
UL 3030:2018 Standard for Unmanned aircraft systems (Clauses 17.3, 32.6.2 and 32.6.3 adapted with permission from UL Copyright © 2018 Underwriters Laboratories Inc.)

Acknowledgement is made for the use of information from the above publications.

Attention is drawn to the possibility that some of the elements of this TR may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

### NOTE

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions. Where SSs are deemed to be stable, i.e. no foreseeable changes in them, they will be classified as "mature standards". Mature standards will not be subject to further review unless there are requests to review such standards.*
2. *An SS or TR is voluntary in nature except when it is made mandatory by a regulatory authority. It can also be cited in contracts making its application a business necessity. Users are advised to assess and determine whether the SS or TR is suitable for their intended use or purpose. If required, they should refer to the relevant professionals or experts for advice on the use of the document. Enterprise Singapore and the Singapore Standards Council shall not be liable for any damages whether directly or indirectly suffered by anyone or any organisation as a result of the use of any SS or TR. Although care has been taken to draft this standard, users are also advised to ensure that they apply the information after due diligence.*
3. *Compliance with a SS or TR does not exempt users from any legal obligations.*

# Guidelines on airworthiness of unmanned aircraft systems (UAS)

## 0 Introduction

With the increased popularity of unmanned aircraft systems (UAS) or drones in Singapore, the general public can purchase and pilot commercial UAS easily.

There are still airworthiness concerns in UAS operations.

These concerns are as follows:

- a) UAS licensed users may find the requirements for airworthiness non-prescriptive.
- b) UAS operations have diversified into many types of applications, i.e. from aerial surveillance to parcel deliveries. There is a growing need to develop a set of baseline UAS airworthiness guidelines to facilitate the complex UAS operations in Singapore's urban environment.

It is with this intent that this TR is developed to address these concerns.

The guidelines described in this TR should be conducted safely and with due consideration for the public.

## 1 Scope

This TR contains a set of technical guidelines intended primarily for the airworthiness verification of multi-rotor UAS with a maximum take-off mass (MTOM) between 1.5 kg and 25 kg that are operated outdoors under the following conditions:

- a) Within visual line-of-sight or extended visual line-of-sight;
- b) Within segregated airspace at an altitude not exceeding 200 ft (60 m). above ground level (AGL), and outside 5 km of aerodromes;
- c) During the daytime;
- d) Single operator to single UAS direct command and control only; and
- e) No over-flying of public or uninvolved personnel.

This TR does not cover unmanned aircraft (UA) with a MTOM of less than 1.5 kg because there is a consensus that UA below this mass generally pose lesser safety risk.

The following are not covered in this TR:

- a) Airworthiness verification guidelines for fixed-wing aeroplane and powered-lift UAS;
- b) Night-time operations;
- c) Fully autonomous operations;
- d) Beyond visual line-of-sight operations;
- e) Operations within non-segregated and controlled airspace;
- f) Cybersecurity requirements.