Singapore Accreditation Council

ACCREDITATION SCHEME FOR INSPECTION BODIES

TECHNICAL NOTE: FI 01

SPECIFIC REQUIREMENTS FOR THE ACCREDITATION OF INSPECTION BODIES IN BUILDING FAÇADE INSPECTION USING UNMANNED AIRCRAFT SYSTEMS (UAS)

Technical Note FI 01, 12 July 2023
The SAC Accreditation Programme is managed by Enterprise Singapore

1. INTRODUCTION

1.1 The purpose of accreditation of inspections of façade inspection using UAS (Unmanned Aircraft Systems) is to ensure the inspection process conforms with ISO/IEC 17020 or other standards, normative documents and/or general requirements.

1.2 The field of building facade inspection using UAS covers the visual inspection of the building façade and the assessment team shall assess the inspection body according to the following technical references:

a) TR 78-1 – Building facade inspection using unmanned aircraft systems (UAS)

b) TR 78-2 – Specification for quality management and application of artificial intelligence (AI)

1.3 This Technical Note (FI 01) should be read in conjunction with documents listed in the Reference section and government regulations when applicable.

1.4 Supplementary information for specific areas of inspection may be published as other Technical Notes.

1.5 The inspection report produced by an accredited inspection body for the scope of accredited inspection activities shall be an SAC-endorsed report.

2. EQUIPMENT

2.1 The inspection body shall demonstrate that equipment is handled and maintained as required in TR78-2 Section 4.3.

2.2 Influential equipment (Refer to TR78-2 Section 4.3.5) which affect results that are critical to the conclusion of the inspection shall be suitable for the particular inspection to be performed. Examples of influential equipment include but not limited to the following:

a. High-resolution digital cameras
b. GNSS (Global Navigation Satellite System) positioning devices
c. AI-based defect detection software
d. IR-sensors for obstacle avoidance
e. Data storage and transfer devices, such as hard drives or cloud storage solutions

2.3 The inspection body shall ensure that there is always at least a set of airworthy UAS suitable for façade inspection activities under its inventory.

2.4 The inspection body shall ensure that all equipment, including equipment not under the charge of the inspection body, used during inspection work are traceable.

3. IMAGES/VIDEO ANALYTICS

3.1 For façade inspections, images/video analytics includes defect detection and privacy masking.

3.2 The inspection body shall have in-place an Artificial Intelligence (AI) system capable of performing images/video analytics as described in Section 3.1. Images captured by the UAS shall be subjected to images/video analytics performed by the AI system. The inspection body shall maintain records of the inference files. Where the images are found to be unsuitable for AI scanning, such images shall be recorded and inspected separately.

3.3 Images captured by the UAS shall be traceable to the location from where it was captured. The type of defects identified via the AI system on the images shall also be classified and geo-tagged.

3.4 The performance of the AI system shall be initial verified (at 1st year) by the assessment team (which includes the AI assessor mentioned in TR78-2 Annex B) prior to award of accreditation. Subsequent verification shall be during the 2nd year surveillance and 4th year renewal assessment cycle. The performance criteria shall refer to the requirements in TR78-2 Section 5.

3.5 If the AI system is provided by a third party provider, the inspection body shall show there is a license or contract agreement between the inspection body and third-party AI system provider.

4 INSPECTION PERSONNEL

4.1 QUALIFICATION CATEGORIES FOR INSPECTION TEAM

4.1.1 The inspection team of the inspection body shall comprise of the personnel as mentioned in Section 4.1.2, 4.1.3 and 4.1.4. The qualifications of the personnel shall meet the minimum requirements as specified in TR78-2 Annex A or Section 4.1.2, 4.1.3 and 4.1.4.

4.1.2 Technical Manager

Shall possess:

(a) a certificate of the course called the “Certificate in Façade Inspection” conducted by training bodies recognised by the building regulatory authority;
(b) a minimum diploma level qualification;
(c) ability to converse in English
(d) at least 2 years of experience in drone-related infrastructure inspection activities

4.1.3 UAS Pilot

Shall possess:

(a) a UAPL according to the category of the UAS being operated
(b) at least 40 hours of operational experience in drone-related infrastructure inspection activities.

4.1.4 Approved Signatories

(a) shall be appointed as the technical managers of the company having met the requirements in Section 4.1.2.

(b) have been full-time employee.

4.2 APPROVED SIGNATORIES

4.2.1 All approved signatories shall be assessed by the assessment team prior to award of accreditation. Subsequent assessments will consist of sampling of approved signatories.

4.2.2 The assessment team will assess the nominated signatories. Those assessed to be competent in their area of inspection will be submitted to the Council Committee for Inspection for endorsement as approved signatories.

5. FORMAT OF REPORT

5.1 The inspection report shall be an SAC-endorsed report that contains at least all information attached in TR78-1 Section 8 where applicable.

5.2 The information is not exhaustive and may include requirements as specified by the customer. Non-accredited visual inspection procedures/methods/products (e.g. binoculars, digital camera, infrared scanning) are to be clearly shown or identified in the inspection report.

5.3 Where another service provider is engaged by the inspection body to carry out the façade inspection using UAS, the service provider shall be a SAC accredited inspection body under the same accreditation programme. For special cases (e.g. use of special UAS) where the service provider is not accredited, the inspection body shall demonstrate justification for using the service provider. This information is also to be clearly shown in the inspection report.

6 INSPECTION METHODS AND PROCEDURES

6.1 The inspection body shall have detailed procedures and instructions for the application of the appropriate regulations, codes of practice, standards, specifications, guidance documents and customer requirements.

6.2 Standards and codes, and other technical literature applicable to the operation and inspection of building façade and their components within the accredited scope shall be maintained up to date and be readily available to the staff.

6.3 Inspection body shall maintain records of the Façade Inspectors[1] who supervised the building façade inspection works. Inspection bodies shall note that this requirement may be superseded or limited by the regulatory requirements of countries outside Singapore where the façade inspection is carried out, hence may not be applicable.

6.4 The inspection body shall ensure all UAS operations comply to the provisions of the Air Navigation (101 – Unmanned Aircraft Operations) Regulations 2019.

Explanatory notes on Façade Inspectors[1]:

a) Façade inspectors shall be either registered with IES (Institution of Engineers Singapore) as registered Façade Inspectors or as a Competent Person with the Building and Construction Authority.

b) Under Building Control (Periodic Inspection of Buildings and Building Façades) Regulations 2021 Section 16, Façade Inspectors may be appointed by the Competent Person to carry out visual inspection of the building façade. The appointed Façade Inspectors shall be directly supervised and controlled by the Competent Person.

c) Where the Façade Inspectors are under the employment of the inspection body, they shall be appointed at the Competent Person's discretion before commencing the building façade inspection works.

7 FORMAT OF ACCREDITATION SCOPE

7.1 The scope of accreditation is granted only for specific items, materials or systems being inspected. An example of the accreditation scope is attached in Appendix 1.

8 REFERENCE

a) ISO/IEC 17020:2012 – Conformity Assessment-Requirements for the operation of various types of bodies performing inspection
b) ILAC P15:06/2012 – Application of ISO/IEC 17020:2012 for the Accreditation of Inspection Bodies SAC-SINGLAS 006: Traceability of Measurement
c) TR 78-1:2020 - Building facade inspection using unmanned aircraft systems (UAS)
d) TR 78-2:2021 - Building facade inspection using unmanned aircraft systems (UAS) – Part 2 : Specification for quality management and application of artificial intelligence (AI)
e) Air Navigation Act 1966
f) Air Navigation (101 – Unmanned Aircraft Operations) Regulations 2019.

Appendix 1
Inspection body: Type A or B or C

Type of Product	Type and Range of Inspection	Inspection Method, Codes or Standards Used
Building Façade Inspection	a) Unmanned Aircraft Systems b) AI system Software version xxx Defect detection: a) Concrete/plaster crack b) Spalling concrete / plaster c) Metal corrosion d) No defect scenario e) …. Anonymisation: a) Human and vehicle anonymisation	TR 78-1 TR 78-2

Approved signatories
[Signatory A]
[Signatory B]

NOTE :
Type A inspection body
The inspection body providing “third party” services.

Type B inspection body
The inspection body which forms a separate and identifiable part of an organisation involved in the design, manufacture, supply, installation, use or maintenance of the item it inspects and has been established to supply inspection services to its parent organisation.

Type C inspection body
The inspection body which is involved in the design, manufacture, supply, installation, use or maintenance of the items it inspects or of similar competitive items and may supply inspection services to other parties not being its parent organisation.