

AMC1 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) Responsibilities of the UAS operator

THEORETICAL KNOWLEDGE SUBJECTS FOR THE TRAINING OF THE REMOTE PILOT AND ALL PERSONNEL IN CHARGE OF DUTIES ESSENTIAL TO THE UAS OPERATION IN THE 'SPECIFIC' CATEGORY

- (a) The 'specific' category may cover a wide range of UAS operations with different levels of risk and a wide range of UAS designs, in particular in terms of level of automation. The following guidelines may, therefore, have to be adapted considering the level of automation and the level of involvement of the remote pilot in the management of the flight. The UAS operator is, therefore, required to identify the competency required for the remote pilot according to the outcome of the risk assessment. This AMC covers the theoretical knowledge subjects while AMC2 UAS.SPEC.050(1)(d) covers the practical knowledge subjects applicable to all UAS operations in the 'specific' category. In addition, for both theoretical and practical knowledge subjects, the UAS operator should select the relevant additional modules from AMC3 UAS.SPEC.050(1)(d), as applicable to the type of the intended UAS operation. The UAS operator should achieve a level of robustness consistent with the assurance integrity level (e.g. SAIL) of the intended UAS operation.
- (b) Additional topics to cover areas under national competence, such as national regulations for security, privacy and data protection, may be added by the national competent authority. In case of operations conducted in a MS other the State of registration, these additional topics may be defined as local conditions required by the MS of operation.
- (c) When the UAS operation is conducted according to one of the STSs that are listed in Appendix 1 to the Annex of the UAS Regulation, the UAS operator should ensure that the remote pilot has the competency that is defined in the STSs. In all other cases, the UAS operator should propose to the competent authority, as part of the application, a theoretical knowledge training course for the remote pilot based on the elements that are listed in AMC1 UAS.OPEN.020(4)(b), in UAS.OPEN.040(3), in AMC1 UAS.OPEN.030(2)(c) and in Attachment A to the Annex of the UAS Regulation, which are relevant for the intended operation, complemented by the elements listed below. The UAS operator may use the same listed topics to propose also for the personnel in charge of duties essential to the UAS operation a theoretical knowledge training course with competency-based theoretical training specific to the duties of that personnel.
- (1) Aviation safety:
- (i) remote pilot records;
 - (ii) logbooks and associated documentation;
 - (iii) good airmanship principles;
 - (iv) aeronautical decision-making;
 - (v) ground safety;
 - (vi) air safety;
 - (vii) air proximity reporting; and
 - (viii) advanced airmanship:
 - (A) manoeuvres and emergency procedures; and
 - (B) general information on unusual conditions (e.g. stalls, spins, vertical lift limitations, autorotation, vortex ring states).
- (2) Aviation regulations:
- (i) introduction to the UAS Regulation with focus on the 'specific' category;
 - (ii) risk assessment, introduction to the SORA; and

- (iii) overview of the STSs and the PDRA.
- (3) Navigation:
 - (i) navigational aids (e.g. GNSS) and their limitations;
 - (ii) reading maps and aeronautical charts (e.g. 1:500 000 and 1:250 000, interpretation, specialised charts, helicopter routes, U-space service areas, and understanding of basic terms); and
 - (iii) vertical navigation (e.g. reference altitudes and heights, altimetry).
- (4) Human performance limitations:
 - (i) perception (situational awareness in BVLOS operations);
 - (ii) fatigue:
 - (A) flight duration within work hours;
 - (B) circadian rhythm;
 - (C) work stress;
 - (D) vision problems; and
 - (E) commercial pressure; and
 - (iii) attentiveness:
 - (A) eliminating distractions; and
 - (B) scan techniques;
 - (iv) medical fitness (health precautions, alcohol, drugs, medication, etc.); and
 - (v) environmental factors such as vision changes from orientation to the sun.
- (5) Airspace operating principles:
 - (i) airspace classifications and operating principles;
 - (ii) U-space;
 - (iii) procedures for airspace reservation;
 - (iv) aeronautical information publications (AIPs); and
 - (v) NOTAMs.
- (6) General knowledge of UASs and external systems that support the operation of UASs:
 - (i) differences between autonomy levels (e.g. automatic versus autonomous operations);
 - (ii) loss of signal and system failure protocols — understanding the condition and planning for programmed responses such as returning to home, loiter, landing immediately;
 - (iii) equipment to mitigate air and ground risks (e.g. flight termination systems); and
 - (iv) flight control modes;
 - (v) the means to monitor the UA (its position, height, speed, C2 link, systems status, etc.);
 - (vi) the means of communication with the VOs; and
 - (vii) the means to support air traffic awareness.
- (7) Meteorology:
 - (i) obtaining and interpreting advanced weather information:
 - (A) weather reporting resources;

- (B) reports;
 - (C) forecasts and meteorological conventions appropriate for typical UAS flight operations;
 - (D) local weather assessments (including sea breeze, sea breeze front, and urban heat island);
 - (E) low-level charts; and
 - (F) METAR, SPECI, TAF;
 - (ii) regional weather effects — standard weather patterns in coastal, mountain or desert terrains; and
 - (iii) weather effects on the UA (wind, storms, mist, variation of wind with altitude, windshear, etc.).
- (8) Technical and operational mitigation measures for air risks:
- (i) operations for which airspace observers (AOs) are employed; and
 - (ii) principles of detect and avoid (DAA).
- (9) Operational procedures:
- (i) mission planning, airspace considerations, and site risk assessment:
 - (A) measures to comply with the limitations and conditions applicable to the operational volume and to the ground risk buffer for the intended UAS operation;
 - (B) UAS operations over a controlled ground area;
 - (C) BVLOS operations;
 - (D) use of UA VOs;
 - (E) importance of on-site inspections, operation planning, pre-flight and operating procedures;
 - (ii) multi-crew cooperation (MCC):
 - (A) coordination between the remote pilot and other personnel (e.g. AOs) in charge of duties essential to the UAS operation;
 - (B) crew resource management (CRM):
 - (a) effective leadership;
 - (b) working with others.
- (10) Managing data sources regarding:
- (i) where to obtain the data from;
 - (ii) the security of the data;
 - (iii) the quantity of the data needed; and
 - (iv) the impact on the storage of data.
- (c) emergency response plan (ERP) — the UAS operator should provide its personnel with competency-based theoretical training covering the ERP that includes the related proficiency requirements and recurrent training.
- (d) Both the training and the assessment should be appropriate to the level of automation of the intended UAS operation.