

Annex II

Non-binding guidance and reference documents for the technical assessment of UAS/C-UAS solutions

This Annex provides non-binding guidance and reference documents to support the preparation and technical assessment of the applications. Only technical standards established under Articles 16 and 64 of Regulation (EU) 2019/1896 (where applicable) are mandatory. Any tender specifications, Terms of Reference, or “rules of contest” referenced below are provided for background/examples only and do not constitute mandatory standards for this call.

Part 1

The Commission has promoted the implementation of several actions planned under the October 2023 Communication on countering threats posed by drones¹, in the framework of the 2022 Communication on Drone Strategy 2.0.²

These actions include, but not limit to: a dedicated group of Member States experts on drone incidents; a database on drone incidents; the upgrade of the Commission’s Joint Research Centre’s Living Lab for testing counter-drone systems; regular technical reports on available C-UAS technologies for drone detection, tracking, identification, and neutralization; counter-drone training for law enforcement authorities; mapping of Member States’ laws and procedures regarding the use of C-UAS; and **common counter-drone testing harmonised methodologies and voluntary standards**.³

Regarding this last action, the EU is promoting, through the EU-funded COURAGEOUS (“Building a common understanding of the effectiveness of counter-UAS solutions”) Consortium, the development of harmonised C-UAS standards, testing methodology and voluntary performance requirements. These include **C-UAS system performance requirements and metrics** in a range of civil security use case scenarios (including the protection of land borders,

¹ COM(2023) 659 final

² COM(2022) 652 final

³ Several of these actions were developed also through projects COURAGEOUS and COURAGEOUS2 (Building a common understanding of the effectiveness of counter-UAS solutions), co-funded by the EU through the Internal Security Fund-Police and the Internal Security Fund under Grants 101034655 and 101190646, see <https://courageous-isf.eu/>

maritime borders and airports); and the **CEN Workshop Agreement (CWA) 18150:2024 “Unmanned aircraft systems – Counter UAS – Testing Methodology”**.⁴

Under the current call, MS are invited to refer to the following standards: **C-UAS system performance requirements and metrics⁵ from the EU-funded COURAGEOUS (“Building a common understanding of the effectiveness of counter-UAS solutions”)**, that can be found here <https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/ICT/cwa-18150.pdf>

Part 2

1. Frontex guidance/reference documents

For any UAS that are not covered by Annex I to this call and all C-UAS⁽⁶⁾ capabilities this guidance - could be considered when preparing the application.

Applicants may consult the following Frontex reference documents and examples of past pilots/procurements to support the drafting of technical specifications as a source of inspiration.

- **Frontex: Reference Architecture for European Border Surveillance**
[25.0178 European Border Surveillance v3.pdf](https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/fb3d33fd-fb15-43f3-8b10-82353d6a002d-CN)

2. Examples of past Frontex tenders/pilots

- **Shipborne VTOL UAS deployment with data fusion and integration services**
FRONTEX/2025/OP/0050
Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/fb3d33fd-fb15-43f3-8b10-82353d6a002d-CN>
Source: [EU Funding & Tenders Portal](https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/fb3d33fd-fb15-43f3-8b10-82353d6a002d-CN)
- **Trial of remotely piloted aircraft system (RPAS) for long endurance maritime aerial surveillance.**
Frontex/OP/800/2017/JL.
Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/2945>

⁴ <https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/ICT/cwa-18150.pdf>

⁵ [extracted from] Deliverable 3.2.2 of project COURAGEOUS, funded by the European Union’s Internal Security Fund Police under Grant Agreement 101034655

⁶ Interceptor drones are considered only as a part of C-UAS capability and these do not need to meet mandatory requirements listed in the Annex I, only Annex II apply.

Source: [EU Funding & Tenders Portal](#)

- **Trial of Vertical Take-Off and Landing (VTOL) Remotely Piloted Aircraft System (RPAS) for Multi-domain Aerial Surveillance**

Frontex/2022/OP/1050/JL

Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/12447>

Source: [EU Funding & Tenders Portal](#)

- **Remotely Piloted Aircraft Systems (RPAS) for Medium Altitude Long Endurance Maritime Aerial Surveillance**

FRONTEX/OP/888/2019/JL/CG

Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/5444>

Source: [EU Funding & Tenders Portal](#)

- **The new FWC Remotely Piloted Aircraft System (Medium Altitude Long Endurance) for Maritime Surveillance Services**

FRONTEX/2024/OP/0009

Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/acc779af-00e9-4487-a475-2578220559ab-CN%2523anchorDocuments=>

Source: [EU Funding & Tenders Portal \(europa.eu\)](#)

- **Pilot Project for services of tactical land border and coastal surveillance with Remotely Piloted Aircraft Systems (RPAS), long endurance and reduced logistic footprint – Bulgaria, May - July 2025**

Where to find: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/6b620333-dd23-4a7b-91fe-896955d88bdc-CN?order=DESC&pageNumber=1&pageSize=50&sortBy=startDate&keywords=land%20border&isExactMatch=true&cftPartyLegalEntityId=FRONTEX>

Source: [EU Funding & Tenders Portal](#) | [EU Funding & Tenders Portal](#) | [EU Funding & Tenders Portal](#)...

- **C-UAS Prize Contest:** <https://www.frontex.europa.eu/innovation/research-and-innovation/prize-contests/c-uas-prize-contest-sFXJdl>

C-UAS Adversarial Testing and Analysis Services [EU Funding & Tenders Portal](#):
<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/tender-details/513ade28-34eb-4b3a-8523-915df6df4ddd-CN#anchorDocuments>

Rules of Contest:

https://www.frontex.europa.eu/assets/Prize_Award_Contest/Prize_award_C_UAS/Rules_of_contest_C-UAS_Prize_Contest.pdf

From the Rules of the Frontex Prize Contest on Counter-Unmanned Aircraft Systems we would highlight for your kind attention particularly the below part on *Metrics (3.3.2. Phase 2 award criteria) for Evaluation of the C-UAS solution effectiveness:*

- **Neutralisation Capability:** The ability of the solution to neutralize the UAV threat. This includes disrupting its flight or its ability to perform unauthorized missions (e.g., simulated surveillance or smuggling scenarios) or completely disabling its flight electronics, software, or physical components (in part or in total).
- **Neutralization Range:** The maximum effective range for neutralizing a target UAV, tested at various altitudes and speeds.
- **Precision:** The ability to neutralize only the designated target UAV without affecting friendly UAVs, decoy UAVs in a swarm, or interfering with local infrastructure (such as critical communications). The solution must operate in ISM frequency bands for UAV control, telemetry, video feed and GNSS positioning, with configurable power output and direction.
- **Single and Multi-Target Neutralization:** The ability to neutralize multiple UAVs simultaneously.
- **UAV Compatibility:** The solution's effectiveness against various UAV types, including off-the-shelf (e.g., DJI) and custom-made models. It should demonstrate effectiveness against UAVs equipped with:
 - Electromagnetic shielding
 - Resistance to high energy effector systems
 - Low or no electromagnetic emissions
 - Capabilities to function in GNSS-denied environments using alternative navigation methods (e.g., visual odometry or inertial navigation systems).
- **Deployment mobility:** Classification of the solution as portable, mobile, deployable, or fixed, and its adaptability for various deployment scenarios.

Metrics for Evaluation of the solution efficiency:

- **Operational Readiness:** Time required to set up the system, manpower needs, including calibration, and bring it to full operational state.
- **Readiness Time:** Time taken for a deployed solution to transition from an off state to an operational state.
- **Response Time:** Time required to neutralize a UAV target within the system's effective range (measured from target acquisition to the disruption or neutralization effect).

- **Logistical Footprint and Power Requirements:** Assessment of the solution's power autonomy (e.g., battery life or local power dependency), and dependence on local infrastructure.
- **Operational Efficiency:** The number of operators and support staff required, the operational workload, and ease of use. Fully autonomous solutions will receive higher ratings.
- **Human-Machine Interface:** The user-friendliness of the interface, including visibility of equipment status and ease of adjusting frequencies, power output, direction, and neutralization modes.

Metrics for Evaluation of the solution reliability and resilience:

- **Reliability:** The solution's consistency in achieving the same results under identical scenarios. Each scenario will be repeated at least twice to assess consistent performance under similar test conditions.
- **Resilience:** The solution's ability to perform reliably without downtimes or interruptions under challenging environmental conditions (e.g., rain, fog, or high wind).

Technical Capabilities and Functional Requirements

C-UAS solution's core functional capabilities:

- **Threat Mitigation and Neutralization:** Description of mechanisms for detecting (detecting, tracking and identifying) UAS and neutralising (controlling or neutralizing) uncooperative UAVs.
- **Methods:** Specific methods (e.g., jamming, spoofing, directed energy, cyber-based neutralization, kinetic actions, or other novel techniques) and how they operate against single or swarm targets with various characteristics.
- **Range and Effectiveness:** Operational range (e.g. up to 5 km) and altitude capabilities (e.g. up to 300m).
- **Response Time:** C-UAS time to neutralize different types of targets (e.g. 1 minute for an off the shelf small UAV model x).
- **C-UAS solution effect on the UAV:** what effect will the C-UAS solution will have on the UAV (e.g. disabling UAV flight controller, communication link, kinetic impact on rotors)
- **Precision, power output and direction:** Ability to select specific frequencies, power output and direction of the effector (e.g. jammer beam shape and angle description)
- **Scalability:** Ability to handle single or multiple (swarm) UAVs and level of effectiveness across various scenarios (e.g. capability of multiple detections and neutralisations at the same time)

System Composition and Technical Specifications

- **Components and Integration:** Description of each core component (hardware and software), including make, model, manufacturer, power output, weight, mobility, and interconnectivity.
- **Performance Metrics:** Specific performance details, including frequency ranges, power outputs, and control interface options.
- **System Automation:** Degree of automation, from detection (optional; flight track and take-off position will be provided in advance before the testing scenario starts) to neutralization, and level of operator involvement.
- **Mitigation and Neutralisation Options:** Type of mitigation and neutralisation options available, capability to target individual UAVs within a swarm, and capacity for simultaneous neutralization of multiple UAVs with varying builds.

Operational Requirements and Deployment Feasibility

- **Mobility Categories:** Capability of the solution for portable, mobile, deployable, and fixed configurations.
- **Setup and Deployment Time:** Estimated time and manpower required to deploy the C-UAS solution and initiate operations.
- **Operator Needs:** Number of operators needed, supporting staff requirements, maintenance and troubleshooting support, and operator display/interface specifics.
- **Sustainment and Support:** Maintenance needs, sustainability plan, autonomy of the C-UAS solution, time of operation in off-grid environment (detection and neutralisation modes) and operating power requirements.

Data Management, Reporting, and Systems Integration

- **Data Collection:** Methods for monitoring performance metrics, feedback on mitigation/neutralization effectiveness, and adaptability in varied environmental settings.
- **Data Output and Sharing:** Types of data generated, available formats for ingestion into other systems (e.g., manned C-UAS ground stations). Each Applicant will provide logs for each scenario in an open geospatial format (such as shapefile, geopackage or kml, which can be opened in GIS software) containing timestamp, location of detected aircraft, distance to aircraft, type of detection/neutralisation method used will include effector power output, frequency and direction. For each log, a short description is to be provided.
- **Reporting Capabilities:** Capability to provide daily reports to Frontex, detailing methods used per UAV threat scenario, outcome, and observed effectiveness.
- **System Compatibility:** Ability to integrate and communicate with existing border management technologies, interoperability with secure communication networks, use of open standards.

Safety, Vulnerabilities, and Limitations

- **Safety Compliance:** Assurance of safe use by operators and around bystanders, within near vicinity of critical infrastructure (e.g., airports, hospitals, highways), and sensitive environments.
- **Environmental Constraints:** Operational limitations (weather, terrain, etc.) and potential vulnerabilities (e.g., susceptibility to counter-countermeasures from custom built UAVs).
- **Lifespan and Maintenance:** Estimated product lifespan, maintenance frequency, support requirements, and safety protocols for standard and emergency scenarios.

Product Lifecycle and Cost Estimation

- **Cost Structure:** Rough Order of Magnitude (ROM) estimation covering acquisition, operational, maintenance and training costs.
- **Lifecycle Management:** Estimated costs for sustaining operations throughout the designed lifespan and any anticipated major upgrades.