Joint Authorities for Rulemaking on Unmanned Systems

CS-UAS, Annex B - Management of Multiple Simultaneous UA Flight Operation (MSO)

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Abstract

This Annex B is intended to be used for Multiple Simultaneous Flight Operation where:

The purpose of the flights is that the involved UAs operate relative to each other

The purpose of the flights is that the involved UAs operate independent of each other

It is assumed that MSO requires automation as it is not possible for humans:

To have sufficient Management over each individual UA participating in this operation.

To ensure safe operation for all participants in the operational environment without the support of systems performing automated and/or autonomous functions

Keywords

MSO

Operating relative to each other

operating relative to each other

Automated Functions and Human Intervention

Equipment and Interfaces for Data Exchange Between the UA and the Ground Segment

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Special thanks' to the WG-Airworthiness coming from all over the world.

Table of Content

1. PURPOSE AND HISTORY OF THIS DOCUMENT

CS-UAS contains a placeholder for Annex B, Management of Multiple Simultaneous UA Flight Operations (MSO). Due to industry demand, the Task Force 3 within WG-AW was set up to develop requirements required for MSO.

After a familiarization with the subject the question was raised if CS-UAS already contains the objective requirements for MSO and only GM and/or AMC is required.

It was therefore decided to do first a gap analysis to see what is already available or not and where GM/AMC is required.

This document is therefore the result of this Gap-Analysis and contains both the additional requirements and the GM/AMC for MSO.

2. TYPES OF OPERATION/SCENARIOS TO BE CONSIDERED

For this set of recommendations it is assumed that the Management of Multiple Simultaneous UA Flight Operations (MSO) requires automation as it is not possible for humans:

- To have sufficient Management over each individual UA participating in this operation.
- To ensure safe operation for all participants in the operational environment without the support of systems performing automated and/or autonomous functions

It is further expected that the individual UAs participating in the same MSO can be from different manufacturers having different Type Certificates with different levels of automation.

It is therefore another basic assumption for MSO, that in an operational environment with multiple different and parallel operation (manned/unmanned, MSO/non-MSO etc.) a superordinated system supports the controlling and supervision of the operational environment to ensure the continued safe flight and landing of all participating aircraft. This superordinate system may support an ATC Controlled Environment (ATCE) or Collaborative Controlled Environment (CCE) and will have Automated Functions and different control possibilities or levels of Human Intervention.

The JARUS Methodology for Evaluation of Autonomy for UAS Operations, issued by the JARUS Automation WG supports the classification and the evaluation of the dependencies of automated/autonomous functions which may result in additional equipment requirements and operational limitations. It is therefore recommended to use this methodology in conjunction with the additional requirements in this Annex B to CS-UAS.

This Annex B is intended to be used for Multiple Simultaneous Flight Operation where:

- The purpose of the flights is that the involved UAs operate relative to each other
- The purpose of the flights is that the involved UAs operate independent of each other

2.1. Possible use cases for operations with the purpose of operating relative to each other

- Formation swarm operation for displays (entertainment)
- Formation swarm operation to carry e.g. a heavy load together
- Formation swarm operation for monitoring/observation purpose
- Formation swarm for rescuing people e.g. human external cargo operations to evacuate people from a skyscraper

2.2. Possible use cases for operations with the purpose of operating independent to each other

- One remote crew (Consisting out of one or more people involved in the operation of the UAs) monitors multiple UAs in a e.g. delivery network with fixed routes
- One remote crew (Consisting out of one or more people involved in the operation of the UAs) monitors multiple UAs in a e.g. delivery network with free routes
- One remote crew (Consisting out of one or more people involved in the operation of the UAs) monitors multiple UAs independent of their geographical area, with different individual missions and different demand on monitoring/controlling

3. ADDITIONAL REQUIREMENTS FOR MSO

SUBPART A – GENERAL

B-UAS.2000 Applicability

(GM B-UAS.2000 Applicability)

(e) These additional requirements in Annex B cover the airworthiness requirements for the individual UAS participating in MSO.

B-UAS. 2005 Approved Operating Limitations

(GM B-UAS. 2005 Approved Operating Limitations)

No additional requirement to CS-UAS.2005 required

B-UAS.2007 Transportation, reconfiguration and storage

No additional requirement or GM to CS-UAS.2007 required

B-UAS.2010 Airworthiness Design Standards (ADS)

(c) For UAS involved in MSO Annex B applies in addition.

SUBPART B – UAS OPERATION

B-UAS.2100 Mass and Centre of gravity

(GM B-UAS.2100 Mass and Centre of gravity)

(d) Where the MSO has an influence on the loading of the individual UAs that could cause that one or more UA will operate out of certified limits, this influence must be considered for normal, abnormal and emergency operation, including failures of individual UAs.

B-UAS.2102 Approved Flight Envelope

(e) It must be ensured, that any normal, abnormal or emergency operation of an individual UA or the MSO in total does not lead to a conflict with the approved flight envelope of each individual UA participating on the MSO.

B-UAS.2105 Performance data

(GM B- UAS.2105 Performance data)

(c) Where the MSO has an influence on the performance of one or more individual UAs participating in this flight operation, this change in performance must be evaluated and considered.
(d) Where there is an influence on the structural envelope, this must be evaluated and considered under Subpart C of CS-UAS.

B-UAS.2110 Minimum speeds

No additional requirement or GM to CS-UAS.2110 required

B-UAS.2115 Take-Off and minimum performance

No additional requirement or GM to CS-UAS.2115 required

B-UAS.2120 Climb requirements

No additional requirement or GM to CS-UAS.2120 required

B-UAS.2125 Rate of descent performance

No additional requirement or GM to CS-UAS.2125 required

B-UAS.2130 Landing

No additional requirement or GM to CS-UAS.2130 required

B-UAS.2135 Controllability and stability

No additional requirement or GM to CS-UAS.2135 required

B-UAS.2160 Vibration and buffeting

No additional requirement or GM to CS-UAS.2160 required

B-UAS.2165 Performance and flight characteristics requirements for flight in icing conditions

No additional requirement or GM to CS-UAS.2165 required

SUBPART C – STRUCTURES

No additional Requirements required in CS-UAS Subpart C - Structures

SUBPART D – DESIGN AND CONSTRUCTION

B-UAS.2300 UA flight control systems (mechanical systems performing pilot functions)

No additional requirement or GM to CS-UAS.2300 required

B-UAS.2305 Take-Off and Landing device systems

No additional requirement or GM to CS-UAS.2305 required

B-UAS.2310 Buoyancy for UA for take-off and landing on water

No additional requirement or GM to CS-UAS.2310 required

B-UAS.2320 Ground Crew Protection.

No additional requirement or GM to CS-UAS.2320 required

B-UAS.2325 Fire protection

No additional requirement or GM to CS-UAS.2325 required

B-UAS.2330 Fire protection in designated fire zones

No additional requirement or GM to CS-UAS.2330 required

B-UAS.2335 Lightning protection

No additional requirement or GM to CS-UAS.2335 required

B-UAS.2340 Design and construction information

No additional requirement or GM to CS-UAS.2340 required

B-UAS.2350 Containment

No additional requirement or GM to CS-UAS.2350 required

B-UAS.2360 Non-essential systems, equipment and installation

No additional requirement or GM to CS-UAS.2360 required

B-UAS.2370 External Cargo Loads

(GM B-UAS.2370 External Cargo Loads)

No additional requirement to CS-UAS.2370 required

SUBPART E – POWER PLANT INSTALLATION

No additional Requirements required in CS-UAS, Subpart E – Power Plant Installation

SUBPART F – SYSTEMS AND EQUIPMENT

B-UAS 2500.UAS level system requirements

(GM B-UAS 2500.UAS level system requirements)

No additional requirement to CS-UAS.2500 required

B-UAS 2505.General requirements on equipment installation

No additional requirement or GM to CS-UAS.2505 required

B-UAS 2510.Equipment, systems and installations

CS-UAS.2510 a) must be interpreted for MSO Operation as:

The equipment and systems identified in CS-UAS.2500, considered separately and in relation to other systems and MSO, must be designed and installed such that [...]

B-UAS.2515 Electrical and electronic system lightning protection

No additional requirement or GM to CS-UAS.2515 required

B-UAS.2520 High-Intensity Radiated Fields (HIRF) Protection

No additional requirement or GM to CS-UAS.2520 required

B-UAS.2522 Cyber Security

CS-UAS.2522 a) must be interpreted for MSO Operation as:

UAS equipment, systems and networks, considered separately and in relation to other systems including MSO, must be protected [...]

B-UAS.2525 UAS power supply, generation, storage, and distribution

No additional requirement or GM to CS-UAS.2525 required

B-UAS.2529 UA Flight Control System

No additional requirement or GM to CS-UAS.2529 required

B-UAS.2530 UA External lights

No additional requirement or GM to CS-UAS.2530 required

B-UAS.2540 Flight in icing conditions

No additional requirement or GM to CS-UAS.2540 required

B-UAS.2545 Pressurised systems elements

No additional requirement or GM to CS-UAS.2545 required

B-UAS.2550 Equipment containing high energy rotating parts

CS-UAS.2550 b) must be interpreted for MSO Operation as:

They cannot damage other systems incl. other UAs involved in MSO, or structures

CS-UAS.2550(b) must be interpreted for MSO as: Equipment containing high energy rotating parts must be designed or installed to also protect other systems including other UAs involved in MSO, or structures not covered by CS-UAS.2550(b).

B-UAS.2555 Installation of recorders

No additional requirement or GM required

B-UAS.2570 Emergency Recovery Capability and Procedures (ERCP)

CS-UAS.2570 must be interpreted for MSO Operation as:

The UAS incl. MSO must have the capability to perform Emergency Procedures according to CS-UAS and operational rules, to prevent […]

B-UAS.2575 Command, Control and Communication Contingency

(GM B-UAS.2575 Command, Control and Communication Contingency)

CS-UAS.2575 a) must be interpreted for MSO Operation as:

Where the safe operation of the UAS incl. MSO requires command, control and communication functionality [...]

SUBPART G – CREW INTERFACE AND OTHER INFORMATION

The different levels of automation and different possibilities of human intervention require different crew interfaces, ranging from a simple Remote Pilot Station to a full Mission Control Center.

Different regulatory concepts regarding the safety requirements of the crew interface are currently under development.

Regardless of how safety is addressed, some basic requirements should be taken into account to enable the crew to fulfil their task.

Due to the varieties of crew interfaces, the different regulatory approaches and the basic requirements applicable regardless of regulatory concepts, this Subpart G in Annex B for MSO is separated in two sections:

- Section G1 for the UA segment of the interface and/or interfaces to other essential systems and equipment
- Section G2 for the remote segment of the interface and/or interfaces to other essential systems and equipment

SECTION G1 – CREW INTERFACE AND OTHER INFORMATION – UA-SEGMENT

Due to the particularities of MSO two new requirements were implemented, applicable for the UA segment involved in MSO.

- B-UAS.2602 Automated Functions and Human Intervention - UA
- B-UAS.2612 Equipment and Interfaces for Data Exchange Between the UA and the Remote Pilot Station

These two requirement apply instead of the requirements in Subpart G of CS-UAS for UAs involved in MSO.

B-UAS.2602 Automated Functions and Human Intervention – UA-Segment

(GM Automated Functions and Human Intervention – UA & Ground Segment (B-UAS.2602 & 2603))

(a) The safety requirements applicable to automated functions and related equipment depend on:
  (i) the level of automation regarding those specific functions
  (ii) the human intervention authority for those specific functions

(b) Where the MSO consists of different types of UAs with different levels of automation of functions, the evaluation according to B-UAS.2602 (a) must be performed for:
  (i) all levels of automation of this function for each type of UA
  (ii) all levels of crew authority to control this function for each type of UA.

B-UAS.2612 Equipment and Interfaces for Data Exchange Between the UA and the Ground Segment

(GM B-UAS.2612 Equipment and Interfaces for Data Exchange Between the UA and the Ground Segment)

(a) The individual or collective UAs involved in the MSO must be able to transmit:

(1) the status of the UA

(2) the performance related to the maneuverability

(3) Trajectory information to enable all participants in the operational environment to operate safely

(4) Any other information required by the relevant airspace authorities

(b) The data exchanged in (a) must have sufficient performance (e.g. range, data-rate, frequency) to support the fulfilment of requirements established by relevant authorities for airspace participants within and outside of the MSO

(c) Depending on the operational environment (e.g. the airspace and/or type of MSO), the individual or collective UAs involved in the MSO must be equipped to receive the data exchanged according to (a) and (b) to take appropriate action in a reasonable amount of time to ensure safe operations

SUBPART G2 – CREW INTERFACE AND OTHER INFORMATION – GROUND-SEGMENT

The remote segment, including the remote crew interfaces and/or interfaces to other essential remote segment systems and equipment ensuring the safe operation of all participants in the operational system may or may not receive airworthiness certification.

Nevertheless, the basic requirements in this Subpart G2 should be taken into account to enable the crew to fulfill their task. It was the idea to have these objectives sufficiently generalised to allow a potential integration in different regulatory concepts. Therefore, the requirements in this Section replace the requirements in Subpart G of CS-UAS. In this Section, reference is made to the Guidance Material in Subpart G of CS-UAS as it is still considered to be helpful.

Depending the regulatory authority, the crew interface can have a different naming convention, for example:

- SACAA uses Remote pilot station, the station at which the remote pilot manages the flight of an unmanned aircraft
- TCCA uses Control station which means the facilities or equipment that are remote from a remotely piloted aircraft and from which the aircraft is controlled and monitored
- EASA uses Command Unit which means the equipment or system of equipment to control unmanned aircraft remotely […], which supports the control or the monitoring of the unmanned aircraft during any phase of flight, with the exception of any infrastructure supporting the command and control (C2) link service
- ICAO uses Remote pilot station. The component of the remotely piloted aircraft system containing the equipment used to pilot the remotely piloted aircraft.
- For the time being, this Annex B to CS-UAS uses Remote Pilot Station (RPS) and the more general term Crew Interface

B-UAS.2600 Remote Pilot Station (Performance)

(see GM CS-UAS.2600 Remote Pilot Station (Performance))

(a) The Remote Pilot Station must be adequate to support the control and/or monitoring of the UAs involved in MSO by the remote crew for the intended operations

(b) The Remote Pilot Station and its installed equipment must be qualified for its expected environmental conditions required for safe operation.

B-UAS.2603 Automated Functions and Human Intervention – Ground-Segment

(GM Automated Functions and Human Intervention – UA & Ground Segment (B-UAS.2602 & 2603))

(a) The safety requirements applicable to the Remote Pilot Station depend on:
  (i) the level of automation and the human intervention authority integrated in the UA regarding those specific functions,
  (ii) the level of automation and the human intervention authority integrated in the Remote Pilot Station regarding those specific functions,

  and should consider CS-UAS.2500 - CS-UAS.2510 accordingly

(b) This evaluation according B-UAS.2603 (a) must be performed for:
  (i) all levels of automation of this function for each combination of UA and Remote Pilot Station
  (ii) all levels of crew authority to control this function for each combination of UA and Remote Pilot Station

B-UAS.2605 Remote Pilot Station (Human Factors)

(see GM B-UAS.2605 Remote Pilot Station (Human Factors))

(a) The remote pilot station arrangement and its equipment must allow the remote crew to perform their duties without excessive concentration, skill, alertness, or fatigue

(b) All controls and displays required for safe Operation of the UAs involved in the MSO must be designed so that a qualified remote crew can monitor and perform defined tasks associated with the intended functions of systems and equipment. The systems and equipment design must minimize remote crew errors, which could result in additional hazards

(c) Physical security requirements of the crew must be ensured

B-UAS.2616 Controls and Displays required for safe Operation

(see GM CS-UAS.2615 Flight, navigation, and powerplant instruments)

(a) This requirement replaces CS-UAS.2615 Flight, navigation, and powerplant instruments

(b) Installed systems must provide the information necessary during each phase of flight to the remote crew who monitor and, where applicable, control the parameters for the safe operation. This information must:

  (1) Present the parameters in a manner that the remote crew can monitor the parameters and trends as needed and, where applicable, control the UAs involved in the MSO; and

  (2) include limitations, unless the limitation cannot be exceeded in all intended operations

(c) Indication systems that integrate the display of parameters required to safely operate the UAs involved in MSO, or required by the operational rules, must:

  (1) Not be inhibited by other parameters not essential for the remote crew to safely operate the UAs involved in MSO in any normal mode of operation; and

(2) In combination with other systems, be designed and installed so information essential for safe operation or emergency recovery will be available to the remote crew in a timely manner after any single failure or probable combination of failures

SECTION G3 – CREW INTERFACE AND OTHER INFORMATION – MANUAL INFORMATION

B-UAS.2620 UAS Flight Manual

(see GM B-UAS.2620 UAS Flight Manual)

The applicant must provide a MSO flight manual to be delivered with each UA intended to participate in MSO which contains the information necessary for the safe operation in MSO, where these instructions are not already covered by the requirements in CS-UAS.2620

B-UAS.2625 Instructions for Continued Airworthiness (ICA)

(see GM CS-UAS.2625 Instructions for Continued Airworthiness)

The applicant must prepare Instructions for Continued Airworthiness dedicated for UAs intended to participate in MSO, where this instructions are not already covered by the requirements in CS-UAS.2625

SUBPART H – ANCILLARY SYSTEMS

B-UAS.2710 Systems for Launch and Recovery not permanently installed on the UA

Where recovery is foreseen in MSO, the specifics of this operations must be considered for the recovery

4. BOOK 2, ADDITIONAL GUIDANCE MATERIAL FOR MSO

SUBPART A – GENERAL

GM B-UAS.2000 Applicability

The assumption on which this Annex B is based, is that the UAs taking part in MSO are managed by the crew by setting the flight objectives and not by manually controlling the individual UA.

Annex B no longer applies to UAs under manual control, until they rejoin MSO and are no longer under manual control.

Related to MSO, CS-UAS.2000 (a) is to be interpreted that each individual UA remains within this MTOM range.

Depending on the configuration of the individual UAS and the UAs in MSO, the requirements in this Annex B may replace and/or complement the requirements in CS-UAS.2600 to 2615 where required.

GM B-UAS. 2005 Approved Operating Limitations

Related to MSO, CS-UAS.2005 (a) is to be interpreted that each individual UA remains within the approved operating limitations.

Where the MSO operation changes the risk to 3rd parties on ground or in the air compared to a single UA operation, the respective limitations apply to the individual UAs and to the MSO operation in total.

Where the individual UA is approved for MSO the resulting airworthiness limitations of the approved MSO must be listed in the Type Certificate

SUBPART B – UAS OPERATION

GM B-UAS.2100 Mass and center of gravity

(d) This may apply to connected lift operations, where multiple UAs carry a single load

GM B-UAS.2105 Performance data

(c) Within MSO operation, in particular in flight operation where the UAs operating relative to each other individual UAs may be influenced by weight changes, downwash, wake turbulences etc. from other UAs.

SUBPART C – STRUCTURES

No additional Guidance Material required in Subpart C - Structures

SUBPART D – DESIGN AND CONSTRUCTION

GM B-UAS.2370 External Cargo Loads

(e) The limitations and procedures in the flight manual must account for MSO and failures that effect the carriage of external loads.

SUBPART E – POWER PLANT INSTALLATION

No additional Guidance Material required in Subpart E - Power Plant Installation

SUBPART F – SYSTEMS AND EQUIPMENT

GM B-UAS 2500.UAS level system requirements

Where the MSO operation influences the systems and the equipment considered under CS-UAS.2500 this requirement is applicable to all influenced systems and equipment's

GM B-UAS.2575 Command, Control and Communication Contingency

Where the MSO utilizes inter-UA communication for safe flight operation, the requirements of CS-UAS.2575 resp. B-UAS.2575 are applicable to this communication as well and contingency is required in case of a loss or degradation of the communication.

SUBPART G – CREW INTERFACE AND OTHER INFORMATION

GM Automated Functions and Human Intervention – UA & Ground Segment (B-UAS.2602 & 2603)

MSO may require a high level of automation in the UAs and the required infrastructure on the ground to ensure continued safe flight's for all UAs involved in the MSO.

The rigor of certification depends on the criticality of the function, system or subsystem according to CS-UAS.2500 to CS-UAS.2510.

In general, a higher level of automation requires more stringent airworthiness requirements set to the automated function and potential different requirements on the Remote Pilot Station.

When all emergency conditions can be handled by automated functions themselves, no technical requirements are specified for the Remote Pilot Station.

When the crew is "in" or "on the loop" for contingencies from abnormal and emergency conditions, competency requirements should be developed by the operator of the MSO.

Guidance for levels of automation, crew authority to control the flight and corresponding safety consideration can be found in the JARUS Document "JARUS Methodology for Evaluation of Automation for UAS Operations"

Management of Multiple Simultaneous UA Flight Operations (MSO) requires automation to ensure sufficient Management over the operation.

It is assumed that:

- The different functions within a UA can have different levels of automation, and/or
- That UAs participating in MSO can have different levels of automated functions.
- The different levels of automated, interdependent functions may lead to different human intervention possibilities.

The Table below shows the Flight Control Authority at Different Levels of Automation. For the definition of the different levels of Autonomy, please refer to the JARUS Document "Methodology for Evaluation of Autonomy for UAS Operations"

	Flight Control Authority		
Level of Automation	Normal	Abnormal	Emergency
Level 0	Human		
Level 1	Human AND Machine[1]	Human	Human
Level 2	Human AND Machine		Human
Level 3	Machine	Human AND Machine[2]	Human[3]
Level 4	Machine		Human AND Machine[4]
Level 5	Machine[5]		

Note 1: This shared authority is design-dependent – the design will dictate to what degree authority is provided to the machine vs. the human and the degree may vary from function to function.

Note 2: This shared authority has the machine making the decision but allows the crew to override decisions.

Note 3: The human can always override the machine to manage the flight operations.

Note 4: Both the machine and human can manage the emergency. The machine will keep trying to recover the system, but the human has the ultimate decision to take over. Ultimate responsibility for the outcome lies with the human operator (as described above). The machine needs to declare the emergency as it has sole awareness of the system condition and authority to monitor and declare the emergency. The human has the authority (which may not be sole authority depending on the design of the system) to take any action within the bounds of the declared emergency (e.g., terminate flight, advise ATC and other airspace users of emergency procedures/manoeuvres).

Note 5: For cases where a superordinated authority (e.g., ATC) has responsibilities to ensure the safety of the airspace there may be emergencies which require them to provide direct or indirect commands to manage the emergency. The ability to do this will depend on the particular airspace design and the availability of supporting infrastructure.

As mentioned, it is assumed, that in an operational environment with multiple heterogeneous and simultaneous operation (manned/unmanned, MSO/non-MSO etc.) a superordinated system supports the controlling and supervision of the operational environment to ensure the continued safe flight and landing of all participants. This superordinate system itself may have automated functions and different possibilities or levels of human intervention as well.

The superordinate system may be under the responsibility of the UAS operators, used by their Fleet Management functions.

Safe operation depends to a large extent on the interdependent functions that make up the overall system working together as intended.

The different levels of automated interdependent functions combined with different human intervention possibilities may result in function and/or system dependencies. These dependencies must be evaluated. The JARUS Document "JARUS Methodology for Evaluation of Automation for UAS Operations" describes a path to a Capability Dependency Matrix, which can be utilized for this evaluation.

The rigor of certification depends on the criticality of the function, system or subsystem according to CS-UAS.2500 to CS-UAS.2510.

SECTION G1 – CREW INTERFACE AND OTHER INFORMATION – UA-SEGMENT

GM B-UAS.2612 Equipment and Interfaces for Data Exchange Between the UA and the Remote Pilot Station

(a) The information required in B-UAS.2612(a) should be transmitted by either:

(1) Individual messages transmitted by:

(i) One single UA involved in the MSO (assuming the single UA represents the other UA's involved in the MSO)

(ii) All individual UAs involved in the MSO

(2) A collective message representing all involved UAs transmitted by:

(i) One single UA involved in the MSO

(ii) All individual UAs involved in the MSO as a collective message

(3) Any combination of the above (1) and (2).

It may be sufficient for an MSO where the individual UAs are operating relative to each other that only one UA involved in the MSO transmits the actual data related to the maneuverability and the intended trajectory information for all involved UAs. For other types of operations it may be required that all participating UAs transmit this information individually.

(b) The transmission performance should consider the performance related to the maneuverability of the UAs involved in MSO and the needs driven by the operational environment. It is assumed that the operational environment is shared with other participants with potentially significant differences in velocity. Therefore, the safety distances (e.g. Remain Well Clear, RWC) that allow for safe operations should be time-based unless distance-based separation supports safer operations.

(c) The "appropriate action in a reasonable amount of time to ensure safe operations" should be understood to be initiated either:

(1) By an external superordinate system, such as ATC or U-Space

(2) By the participants in a collaborative controlled environment

(3) By the MSO segments themselves, where a superordinate system is:

(i) Not available, or

(ii) Failed or not working as intended

(4) A combination of (1), (2) and (3)

SECTION G2 – CREW INTERFACE AND OTHER INFORMATION GROUND-SEGMENT

GM B-UAS.2605 Remote Pilot Station (Human Factors)

(c) The intent of the physical security requirements is to provide access control and threat mitigation to the Remote Pilot Station. This to ensure that the crew can fulfill their duties without physical interference from uninvolved parties.

SECTION G3 – CREW INTERFACE AND OTHER INFORMATION – MANUAL INFORMATION

GM B-UAS.2620 UAS Flight Manual

The intent of this requirement is to provide the additional information from Subpart B of Annex B to CS-UAS.

SUBPART H – ANCILLARY SYSTEMS

No additional Guidance Material required in Subpart H - ANCILLARY SYSTEMS