
**Space systems — Spacecraft and launch
vehicle combined operation plan (COP)
at launch site — General format**

*Systèmes spatiaux — Plan d'opérations combinées (COP) des véhicules
spatiaux et des lanceurs sur le site de lancement — Format général*

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Introduction

The purpose of this document is to provide spacecraft (SC) and launch vehicle (LV) organizations with the general format for presenting the Combined Operation Plan (COP).

Currently, launch service providers have their own COP at each launch site. Standardization of COP will minimize cost and time to have the common baseline of the general operation requirements between SC and LV.

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Space systems — Spacecraft and launch vehicle combined operation plan (COP) at launch site — General format

1 Scope

This document provides general format for spacecraft and launch vehicle Combined Operation Plan (COP).

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at <http://www.electropedia.org/>

— ISO Online browsing platform: available at <http://www.iso.org/obp>

COP Combined Operation Plan

LV Launch Vehicle

[ISO 19971:2018](https://standards.iteh.ai/catalog/standards/sist/7be4104e-3315-40bf-a8fd-46ff29283799/iso-19971-2018)

ML Movable Launcher

<https://standards.iteh.ai/catalog/standards/sist/7be4104e-3315-40bf-a8fd-46ff29283799/iso-19971-2018>

PLA Payload Adapter

RF Radio Frequency

SC Spacecraft

4 General requirements

General requirements shall include:

- a) requirements for entering the COP;
- b) requirements applicable to all operations;
- c) launch site facilities; and
- d) range safety.

5 SC/PLA mating and fairing-encapsulation (operation plan at spacecraft processing facility)

The SC/PLA mating and fairing-encapsulation (operation plan at the SC processing facility) shall include:

- a) an overall description of the SC/PLA mating and fairing-encapsulation;
- b) the operation sequence and work allocation/responsibility;

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- c) the schedule; and
- d) details of the operation.

6 Encapsulated-fairing mating to core vehicle

The encapsulated-fairing mating to the core vehicle shall include:

- a) an overall description;
- b) the operation sequence and work allocation/responsibility;
- c) the schedule; and
- d) details of the operation.

7 Operations at the Vehicle Assembly Building (VAB)

The operations at the Vehicle Assembly Building (VAB) shall include:

- a) an overall description;
- b) the schedule; and
- c) details of the operation.

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8 Final RF dress rehearsal (standards.iteh.ai)

The final RF dress rehearsal shall include:

- a) an overall description, [ISO 19971:2018
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- b) the schedule; and
- c) details of the operation.

An example of the COP based on a general format is provided in [Annex A](#).

Annex A (informative)

Draft format — Example of a COP based on a general format

This annex provides an example of a SC and Launch Vehicle Combined Operation Plan (LV COP) at a launch site, based on a general format. Requirements are examples only.

Spacecraft and Launch Vehicle Combined Operation Plan at launch site, general format

1 Scope

This document provides a general format for a spacecraft and launch vehicle Combined Operation Plan (COP).

The COP defines requirements, procedures and the schedule for SC/LV-integrating operations conducted at a launch site by both the Spacecraft (SC) and the Launch Vehicle (LV) organization. The COP is applicable to the following operations that start from the mating of the SC and Payload Adapter (PLA) to launch (L-0):

- (1) SC/PLA mating(s);
- (2) Fairing-encapsulation;
- (3) SC/PLA(s) and fairing mating to core vehicle;
- (4) Operations at VAB (*1);
- (5) Launch preparation up to lift-off.

(*1) The following two facilities are assumed for spacecraft processing at the launch site:

- i) Spacecraft processing facility:

A facility where the SC's stand-alone operation (final assembly, propellant loading), SC/PLA mating(s) and fairing-encapsulation are conducted.

- ii) Vehicle Assembly Building:

A facility where the SC/PLA(s) and fairing are mated to the core vehicle (i.e. upper stage of LV).

2 Normative references

The following documents are applicable to the COP. In the event of a conflict in the description of this COP and the following documents, the descriptions of the COP supersede that of the referenced documents.

- | | | |
|-----|-------------|---|
| [1] | (TBD) | Spacecraft/Launch Vehicle Interface Control Document(ICD) |
| [2] | (TBD) | Safety Regulation for Launch Site Operation/Flight Control Operation. |
| [3] | (TBD) | Spacecraft Contamination Control Plan. |
| [4] | ISO 14620-2 | Safety requirements – Part 2: Launch site operations |
| [5] | ISO 26870 | Launch pad and integration site operational documents |

3 Terms, definitions and abbreviated terms

(1) Definitions

Operation Plan: Operational schedule showing operational chaining, responsible and safety requirement level (if not defined in another document)

Upper Composite: Spacecraft mated on its adaptor and encapsulated inside the fairing

(2) Abbreviated terms

COP	Combined Operation Plan
EGSE	Electric Ground Support Equipment
ICD	Interface Control Document
LV	Launch Vehicle
MGSE	Mechanical Ground Support Equipment
NFI	Non-Flight Item
NVR	Non Volatile Residue
PLA	Payload Adapter
RCS	Reaction Control (gas jet) System
RF	Radio Frequency
SC	Spacecraft
UC	Upper Composite
VAB	Vehicle Assembly Building

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4 General requirements

4.1 Requirements for entering the COP

The following requirements shall be satisfied before entering the COP:

- (1) The SC, LV and launch range shall be ready to enter the COP; this readiness shall be formally agreed between the three parts after presentation of their respective preparation status (before the first combined operation) and will include:
 - i) no show stoppers; and
 - ii) all anomalies still to recover are known and agreed.
- (2) Specific MGSE and EGSE including a harness necessary for the SC organization provided by the LV or launch range organization shall have been controlled, validated and formally agreed by the SC organization. The SC organization shall have been trained to their use if necessary.
- (3) Safety rules applicable on the launch site shall be known and accepted by the three parts (local application of [4]).
- (4) Safety responsibilities shall be known and accepted: range safety is overall responsible but for the Launch Complex where the LV organization is responsible.
- (5) Working rules (local application of [5]) shall be known and accepted.

- (6) SC team formation for the use of cranes, rolling systems and height of the work table.
- (7) UC air conditioning plan agreed between LV and SC.
- (8) A nominal COP planning with all foreseen combined operations on LV and SC operations during the COP shall be available and formally accepted at least by the SC and LV parts.
- (9) A directory shall be available and provided to SC, LV and range teams identifying (name and phone number):
 - i) LV, SC and range responsible people;
 - ii) safety responsible people; and
 - iii) other practical information (logistics, planning, etc...).

The coordination responsible for the SC and LV sides shall be identified and a coordination process (daily meetings) shall be agreed.

4.2 Requirements applicable to all operations

The following requirements are applicable to all the operations scoped in the COP.

“TBD” depends on the specific COP plan for the mission accepted and signed by the LV and SC operations’ responsible before its beginning.

4.2.1 Spacecraft

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- (1) Cleanliness and contamination control:
Cleanliness and contamination requirements per reference document [3].
 - (2) Periodical SC-health monitoring: [ISO 19971:2018](https://standards.iteh.ai/catalog/standards/sist/7be4104e-3315-40bf-a8fd-46879283709/iso-19971-2018)
Periodic health-check of SC is conducted once per (TBD) days.
 - (3) Battery charge:
Battery charge for SC is conducted at least during (TBD) hours periodically.
 - (4) Photographs:
Photographing is conducted as follows:
 - i) L-(TBD): Non-Flight Item(NFI) removal before SC/PLA mating;
 - ii) L-(TBD): NFI removal after SC/PLA mating and encapsulation;
 - iii) L-(TBD): MLI installation after SC/PLA mating; and
 - iv) L-(TBD) to L-0: Before access door closeout of fairing.

4.2.2 Launch Vehicle

The following operations conducted for launch vehicle integration are considered hazardous and SC-operations are prohibited during these operations:

- (1) pyrotechnics circuit connection: TBD hours@L-(TBD);
- (2) arming of interlock devices: TBD hours@L-(TBD);
- (3) pressurization of gas tanks: TBD;
- (4) propellant loading for auxiliary propulsion system: L-(TBD).