



CROCUS

SUMMARIZED LAUNCH AND INSURANCES REQUIREMENTS

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SOMMAIRE

1	GENERAL.....	4
1.1	INTRODUCTION.....	4
1.2	SCOPE.....	4
1.3	APPLICABLE DOCUMENTS.....	4
2	DEFINITIONS AND ACRONYMS.....	5
2.1	ACRONYMS.....	5
2.2	SPECIFICATIONS LABELLING.....	5
2.2.1	Priority.....	5
3	DESCRIPTION OF THE CROCUS MISSION.....	6
3.1	CROCUS MISSION	6
3.2	DESCRIPTION OF THE SATELLITE	6
4	RESPONSIBILITIES, DELIVERABLES AND SCHEDULE.....	7
4.1	INPUT FROM ONERA.....	7
4.2	SERVICES, DELIVERABLES AND RESPONSIBILITIES	7
4.2.1	Mandatory services and supplies.....	7
4.2.2	Other	8
4.2.3	PAS with mandatory costing.....	8
4.2.4	PAS with optional costing	8
4.3	SCHEDULE	9

1 GENERAL

1.1 INTRODUCTION

ONERA is looking for a launch service provider for the CROCUS mission that will launch into orbit in 2027. This document details the requirements for the launch service provider. The provider is identified as “the supplier” in the rest of the document.

CROCUS is an ONERA CubeSat mission composed of one satellite flying on a Sun-Synchronous Orbit (SSO) at around 520 to 595 km.

The payloads are developed internally at ONERA and at LATMOS (Laboratoire Atmosphères, Observations Spatiales) and are implemented within the same platform integrated by ONERA based on validated and flight-proven building blocks.

The supplier is in charge of all the steps from the delivery by ONERA of the flight model (FM) platform, integrated and tested by ONERA, to the launch as well as the insurances before, during and after launch.

1.2 SCOPE

This document is written, together with its applicable documents, to establish a summarized list of requirements for the booking of the launch, the deployer and the satellite integration, the shipping and insurances. It is mainly divided into two sections:

- First, a description of the CROCUS mission
- Second, a detail of the responsibilities and a list of all deliverables

This document is applicable to all hardware, software, services, documentation and support provided by the supplier.

1.3 APPLICABLE DOCUMENTS

[AD 1] Space Operations Act (loi n° 2008-518 du 3 juin 2008 relative aux opérations spatiales)(France)

2 DEFINITIONS AND ACRONYMS

2.1 ACRONYMS

CDS	Cubesat Design Specification
CLIR	CROCUS Launch and Insurance Requirements
COTS	Components off-the-shelf
FM	Flight Model
GSE	Ground Support Equipment
LEO	Low Earth Orbit
LEOP	Launch and Early Orbit Phase
LOS	Loi relative aux Opérations Spatiales (French Space Law)
LTAN	Local Time of Ascending Node
LTDN	Local Time of Descending Node
PAS	Potential Additional Service
SSO	Sun-Synchronous Orbit
TPL	Third Party Liability
TVAC	Thermal Vacuum Chamber

2.2 SPECIFICATIONS LABELLING

2.2.1 Priority

Each requirement shall be considered in regard of its priority as defined below:

- Mandatory [**M**]: Requirement whose existence and level are non-negotiable.
- Secondary [**S**]: Important but not essential to satisfy ONERA's needs.
- Mandatory and Secondary [**MS**]: Function whose existence is essential and for which ONERA imposes minimum non-negotiable characteristics. However, the applicant may propose characteristics higher than the minimum required by ONERA.
- Option with mandatory costing [**OM**]: Optional requirement with mandatory response.
- Option with optional costing [**OO**]: Optional requirement, with no mandatory response.

3 DESCRIPTION OF THE CROCUS MISSION

3.1 CROCUS MISSION

The use of nanosatellites, especially of the CubeSat standard, in order to speed up the access to space for ONERA technologies, is an objective by itself in ONERA scientific and technologic roadmaps in the domain of safe access to space and sustainable and safe space.

Primary objectives include the measurements of three characteristics of the Earth and its low-orbit environment including electron fluxes above 10 keV during auroral arcs, atomic oxygen fluxes and the terrestrial radiative flux. It also aims to characterize electrostatic discharge phenomena and test technologies to reduce their occurrence.

The CROCUS mission deals with these topics and also further develops ONERA's expertise on a set of scientific themes such as ionosphere studies and space weather surveillance through detection of charging events on the satellite.

The CROCUS mission uses one CubeSat. The platform is designed, integrated and tested by ONERA based on flight-proven components off-the-shelf (COTS). The payloads are designed, manufactured, integrated and tested by ONERA and LATMOS. The goal of completion of FM is by January 2027. The FM of the 3U platform will be delivered ready to launch (integrated and tested).

The targeted orbit for the satellite is a Sun-Synchronous Orbit (SSO) of altitude 520 km to 595 km and Local Time of Ascending Node (LTAN) between 9 am and 3 pm +/- 30 min or between 9 pm and 3 am +/- 30 min.

The CROCUS satellite has an estimated cost of 0.6 M€, excluding the launch cost. This value shall be considered for the calculation of the insurance.

3.2 DESCRIPTION OF THE SATELLITE

Information regarding the satellite is derived from the critical design review. Critical design documentation will be provided to the supplier. Slight changes may occur during satellite assembly and integration.

The CROCUS satellite (3U, ~4 kg) will be equipped with the CubeSIM, RESISTACK and ERS payloads. CubeSIM detects fluxes of electrons of energy above 10 keV, detects charging events and discharge occurrence. RESISTACK detects atomic oxygen. ERS measures the Earth radiative flux. The platform will have detumbling capabilities.

4 RESPONSIBILITIES, DELIVERABLES AND SCHEDULE

4.1 INPUT FROM ONERA

The following items will be provided by ONERA in order for the supplier to perform its activities:

- Critical design documentation regarding the satellite: dimensions, materials, mechanical properties
- FM of CROCUS expected to be provided in January 2027.
- Procedures for visual inspection of the FM of CROCUS expected to be provided 2 months before FM delivery

4.2 SERVICES, DELIVERABLES AND RESPONSIBILITIES

The following items give the list of deliverables and required actions from the supplier. Potential additional services (PAS) are also given.

4.2.1 Mandatory services and supplies

4.2.1.1 *Deployer and satellite integration*

- Provide a 3U deployer matching the technical requirements for the launch [M]
- Verify the integrity of the satellite upon receipt at supplier facility by visual inspection [M]
- Integrate the satellite into the 3U deployer [M]
- Set the deployment sequence timer and speed [M]

4.2.1.2 *Launch and post-launch*

- Provide a launcher matching ONERA's requirements [M]
- Provide all documentations and information required by the launch provider, with the support of ONERA [M]
- Provide ONERA with launcher documentation and requirements for environmental tests (vibration, TVAC testing, etc) [M]
- Take all necessary measures to prepare the satellite for pre-launch operations (battery charging, etc.) [M]
- Take all necessary measures to avoid collisions during injection in orbit [M]
- Provide ONERA with detailed information regarding anticipated pre-launch injection orbit ephemerides before the launch [M]
- Provide ONERA with detailed information regarding corrected post-launch ephemerides after the launch, no later than 1 day after the orbital injection [M]

4.2.1.3 *Shipping*

- Perform all shipments from the time the satellite is received by the supplier and until the satellite integrated to the deployer is delivered at the launch pad [M]
 - Including Ground Support Equipment (GSE), shock warning, shipping case [M]
 - Including custom clearance and duty if required [M]
 - Including export control clearance if required [M]

4.2.1.4 *Insurances*

- Provide a damage insurance for integration in the deployer, for transportation from the supplier facilities to the launch pad, for pre-launch operations and for launch [M]
- Provide the Certificate of Financial Guarantee covering third-party liability related to launch operations [M]

4.2.2 Other

- Provide videos and pictures of integration and launch with distribution rights [S]

4.2.3 PAS with mandatory costing

- PAS 1 - Provide ONERA access to the platform during integration at supplier site for the visual check of payloads after removing their protection before flight [OM].
- PAS 2 - Provide a re-booking option in case first launch is missed due to platform delivery delay [OM], if possible within 6 months [OM]
- PAS 3 - Provide a 3U test deployer matching the technical requirements for the achievement of vibration tests to be executed by ONERA with the FM of CROCUS [OM]
- PAS 4 - Provide a complementary third-party liability (TPL) insurance for Launch in case the above-mentioned Certificate of Financial Guarantee covering third-party liability related to launch operations does not cover requirements from *Loi relative aux Opérations Spatiales* (LOS, French Space Law, [AD 1]) [OM]
- PAS 5 - Provide a TPL insurance for in-orbit operations during one year [OM]
- PAS 6 - Provide a TPL insurance for in-orbit operations during two years [OM]
- PAS 7 - Provide a TPL insurance for in-orbit operations during three years [OM]
- PAS 8 - Provide a TPL insurance for in-orbit operations during four years [OM]

4.2.4 PAS with optional costing

- PAS 9 - Provide a damage insurance for launch [OO]

4.3 SCHEDULE

The platform will be “ready to fly” by January 2027 (according to the estimated current schedule, in March 2026). It will be delivered by ONERA and ready to be integrated into the deployer.

The following table gives the major schedule steps, where L stands for Launch:

CROCUS SUMMARIZED LAUNCH AND INSURANCES REQUIREMENTS

Milestone	Date	Items under ONERA's responsibility	Items under supplier's responsibility
Contract Notification	T0	Delivery of the mechanical definition of the satellite	
M0	T0 + 1 month		Delivery of the test deployer by the supplier to the ONERA center of Chatillon [PAS 3]
M1	T0 + 2 month		Delivery of the following items: - Certificate of Financial Guarantee covering third-party liability related to launch operations - TPL insurance for launch [PAS 4] - Damage insurance for transportation and launch
M2	T0 + TBD months		Delivery of requirements and levels for the selected launcher
M3	T0 + TBD months	Delivery of the as-built definition of the satellite	
M4	L - TBD months		Confirmation of launch date: nominal or backup date
M5	L - TBD months	Delivery of the procedures for visual inspection of the FM of satellite	
M6	L - TBD months	Delivery of FM satellite	
M7	L - TBD months		Check and verification of the satellite upon reception Integration into the deployer Provide access to the satellite to ONERA [PAS 1]
M8	L - 5 months		Delivery of updated certificate of Financial Guarantee covering third-party liability related to launch operations
M9	L - TBD months		Delivery of TPL insurance for the insured operation [PAS 5, PAS 6, PAS 7, PAS 8]
M10	L - TBD months		Setting of the deployment sequence

CROCUS SUMMARIZED LAUNCH AND INSURANCES REQUIREMENTS

M11	L - TBD months		Delivery of the deployer with the satellite integrated inside the deployer to the launch site
M12	L - TBD months		Achievement of pre-launch operations on the launch site
M13	L - 1 day		Delivery of pre-launch ephemerides
	L	Launch	
M14	L + 1 day		Delivery of detailed post-launch ephemerides

END OF DOCUMENT