StratoSpace-Rideshare Payload Requirements

StratoSpace project title	StratoSpace-Rideshare
StratoSpace project no	02
Document type	External
Document status	Draft
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Approved by	Márk Németh
Approval date	21/05/2025
Issue date	21/05/2025
Archive location, retention period	In digital format, until the end of the product life-cycle. Printed format not controlled, please check validity!
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1 Purpose of this Document

The purpose of this document is to give an overview for 3rd party payload designers on the Science in a Can mission structure, basic requirements for the payload and overview of the interface between the balloon platform and the payload.

This document is not a detailed description of the StratoSpace payload interface for the Rideshare program itself. This document is the initial starting point for further discussion, available for 3rd parties without applying Non-Disclosure Agreement between the parties.

2 Introduction

The Rideshare program provides opportunity for 3rd party development teams to put their small sized experiments to the stratosphere in an affordable way. The uniform payload containers are based on the CanSat standard but only contain the science experiment. While the payload attached to the balloon platform for the whole flight, the platform itself would perform all flight operation activities.

This document introduces the basic requirements imposed on the payload by the platform. Detailed requirements, interface definitions and timeline will be discussed between the payload developers and platform operators after the launch agreement.

3 Mission Description

This programme is based on ride-share missions to the stratosphere for 3rd party development teams. The StratoSpace Team provides available spaces in the form factor of a CanSat (see. Payload req.), launch service and payload recovery for the customers. Payloads are developed and manufactured by the customers in their own premises and delivered to the launch provider 7 days before the launch for acceptance test and mating with the platform.

The Launch Provider decides after the acceptance test if the payload will fly on the designated balloon or not.

In case the payload is accepted to fly, it will be mated with the balloon platform which activity is conducted by the Launch Provider. The Customer is entitled to nominate an observer to overlook the mating process.

Launch activities, including launch preparation, launch, flight operation and recovery are performed by the Launch Provider. The Customer is entitled to take part in the launch process as an observer. The Customer is also entitled to nominate a payload operator to support the scientific mission in the mission control or request remote connection for a Science Control Center.

The payload will be delivered back to the Customer after the post-flight procedures and inspection requested by the Customer.

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3.1 Payload Requirements

ID	Name	Description
STR.RDSHR-1	Payload Form Factor	The payload should fit in the CanSat form factor
STR.RDSHR-1.1	Payload Size	The payload shall fit inside a cylinder of 66mm diameter and 115mm height
STR.RDSHR-1.2	Payload Mass	The payload shall have a mass below 400g
STR.RDSHR-1.3	External Insulation	External insulation may be applied around the payload with no more than 10mm width
STR.RDSHR-2	Payload Mechanical Interface	The payload shall have a mechanical interface to be secured to the platform
STR.RDSHR-2.1	Payload Mechanical Interface Load Capacity	The mechanical interface shall withstand 50 N force without damage
STR.RDSHR-2.2	Payload Mechanical Interface Fixtures	The payload mechanical interface fixtures shall be placed according to the Rideshare Payload Interface Control Document [RD 1]
STR.RDSHR-3	Payload Electrical Interface	Payload may have Electrical Interface towards the platform
STR.RDSHR-3.1	Payload Electrical Interface Details	The payload electrical interface shall be defined by the Rideshare Payload Interface Control Document [RD 1]
STR.RDSHR-4	Payload Connection	The payload may use the peripherals located on the rideshare gondola (data storage, TCTM, power supply)
STR.RDSHR-5	Payload Power Supply	The payload may have its own on-board power supply or power may be provided by the rideshare gondola
STR.RDSHR-5.1	Payload On-Board Power Supply Maximum Voltage	The payload on-board power supply voltage shall not exceed 12V
STR.RDSHR-5.2	Payload On-board Voltage Level	All components of the payload shall operate under 24V
STR.RDSHR-5.3	Payload On-Board Battery Access	Payload On-Board battery shall be accessible after mating with the payload in case it has to be replaced/recharged
STR.RDSHR-6.1	Radio Frequencies	Payload radio frequencies shall be configurable if transmitting in the ISM frequency bands
STR.RDSHR-7.1	Payload Start up	The payload shall have a method to externally start up during the launch process
STR.RDSHR-7.2	Payload Dormant State	The payload shall remain in a dormant state until the launch crew performs the start up operation
STR.RDSHR-7.3	Payload Shelf Life	The payload shall withstand 7 days of dormant state between mating and the actual launch
STR.RDSHR-7.4	Payload Lifetime	The payload shall be stay operable for four continuous hours

ID	Name	Description
STR.RDSHR-8.1	Payload Materials	Explosives, detonators, pyrotechnics, and inflammable or dangerous materials are strictly forbidden. All materials used must be safe for the personnel, the equipment, and the environment. In case of doubt, Material Safety Data Sheets (MSDS) will be requested.
STR.RDSHR-8.2	Biological Samples	The payload can contain biological samples
STR.RDSHR-8.3	Living Creatures On-board	The payload shall not carry any vertebrates
STR.RDSHR-9.1	Temperature	The payload shall operate at -60 - +60°C temperature
STR.RDSHR-9.2	Pressure	The payload shall withstand as low as 100 Pa
STR.RDSHR-9.3	UV Radiation	The payload shall withstand high UV radiation for 4 hours

Table 3.1 - Payload Requirements

4 Interface Control Documentation

For detailed information see the StratoSpace-Rideshare Interface Control Document [RD 1].

4.1 Mechanical Interface

The payload will be connected to the payload train with its mechanical interface. The mechanical interface should withstand 50 N of pulling force without damage.

4.2 Electrical Interface

The payload may connect to the rideshare gondola through an electrical interface. The payload may use the peripherals located on the rideshare gondola (data storage, TCTM, power supply).

5 Design Documents

StratoSpace may request all or a selection of the following documents during the development phase of the payload.

5.1 System Requirements Report (SRR)

SRR documentation contains the agreed perspectives of the mission after the kick-off session between the parties. The SRR shall contain the following:

- Mission Objectives
- Requirements
- Product Tree
- Preliminary Schedule

5.2 Preliminary Design Report (PDR)

PDR documentation contains description of the design to judge the readiness of the project to move into next phase. The PDR shall contain the following:

- Mission Objectives
- Requirements
- Product Tree
- Technical description of the payload
- Preliminary ICD
- Schedule

5.3 Critical Design Report (CDR)

CDR documentation contains a detailed technical specification and description of the payload to check compatibility with the platform and to judge the readiness of the project move into next phase.

- Product Tree
- Detailed technical description of the payload
- ICD
- AIT process
- Schedule
- User Manual

5.4 Flight Readiness Report (FRR)

FRR documentation contains the proof that the payload is ready to fly, cause no harm to the platform and other payloads.

- Product Tree
- AIT log
- Test reports
- User Manual

6 List of Abbreviations

AIT	Assembly, Integration and Test
CDR	Critical Design Report/Review
EPS	Electric Power System
ESA	European Space Agency
FRR	Flight Readiness Report/Review
ICD	Interface Control Document
MSDS	Material Safety Data Sheets
NDA	Non-Disclosure Agreement
PDR	Preliminary Design Report/Review
SRR	System Requirements Report/Review
TBD	To Be Decided
TCTM	Telecommand/Telemetry

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8 References

8.1 Applicable and Normative Documents

AD	Title	Reference	Version
[AD 1]			
[AD 2]			
[AD 3]			
[AD 4]			
[AD 5]			
[AD 6]			

8.2 Reference Documents

RD	Title	Reference	Version
[RD 1]	StratoSpace-Rideshare Interface Control Document		i1.0
[RD 2]			
[RD 3]			
[RD 4]			
[RD 5]			
[RD 6]			

9 Document change history

Issue	Date	Sections	Description of change	Author
0.0	04/05/2020	All	Template created	Bence Goczan
0.1	25/02/2025	All	Initial version of document created	Bence Goczan
0.2	07/05/2025	3.1	Requirements updated to full list	Bence Goczan
0.2	07/05/2025	5	FRR added	Bence Goczan
1.0	21/05/2025	All	Issued for i1.0	Bence Góczán