

Confidentiality Level	<i>RP - Restricted by policies</i>	TC ID / Revision	00328471/C
Document Status	<i>Document Released</i>	Document No.	N/A
WBS code	3.4 - L4 system		
PBS code	RA1.L4.LAS.PA1.SPAP		
Project branch	<i>Engineering & Scientific documents (E&S)</i>		
Document Type	<i>Specification (SP)</i>		

[RSD Product Category C]

Spare uncoated OAP 5050 mirror

SP22_001



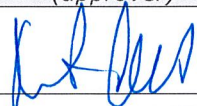
Keywords

n/a

	Position	Name
Responsible person	Group leader of Optical Materials Development	Daniel Kramer
Prepared by	Group leader of Optical Materials Development	Daniel Kramer

RSS History			
<i>RSS TC ID/revision</i>	<i>RSS - Date of Creation</i>	<i>RSS - Date of Last Modification</i>	<i>Systems Engineer</i>
023613/A.001	03.03.2022	03.03.2022	D. Hanusková
023613/A.002	08.03.2022	08.03.2022	D. Hanusková

Reviewed By			
<i>Name (reviewer)</i>	<i>Position (reviewer)</i>	<i>Date</i>	<i>Signature (approver)</i>
Bedřich Rus	Head of department of Laser Systems		NOTICE
Lucie Kaletusová	Cleanroom Group Leader		Via e-mail
Pavel Trojek	Group leader of L4 ATON		NOTICE
Radek Toman	Legal Group leader		Via e-mail
Veronika Olšovcová	Group Leader of Safety		NOTICE
Viktor Fedosov	Group Leader of Quality and Planning		NOTICE

Approved by			
<i>Name (approver)</i>	<i>Position (approver)</i>	<i>Date</i>	<i>Signature (approver)</i>
Bedřich Rus	Head of department of Laser Systems	8/3/2022	

Revision History				
<i>Revision Number</i>	<i>Revision Made by</i>	<i>Date of Revision</i>	<i>Revision description</i>	<i>TC Revision</i>
1	D. Kramer	02.03.2022	RSD draft creation	A
2	D. Hanusková	03.03.2022	RSD version for review	B
3	R. Toman, A. Kuzmenko, D. Hanusková	08.03.2022	RSD final version for procurement	C

Table of Content

1. Introduction	4
1.1. Purpose	4
1.2. Scope	4
1.3. Terms, Definitions and Abbreviations	4
1.4. Reference documents	4
1.5. References to standards	4
2. Functional, Performance and Design requirements.....	5
2.1. General requirements.....	5
3. Packaging requirements	5
3.1. General requirements.....	5
4. Quality control	6
4.1. Quality Reports (QRs)	6
4.2. Documentation and data control	7
4.3. Nonconformity Control System	7
4.4. Phasing of the delivery	8
4.4.1. Qualification of Design	8
4.4.2. Manufacturing.....	9
4.4.3. Acceptance.....	9

1. Introduction

1.1. Purpose

This Requirements Specification Document (RSD) lists the technical requirements and constraints on products applying in RA1 program of ELI project. This leads to the identification of interfaces with the ELI science-based technology. This RSD also acts as the parent document for the technical requirements that need to be addressed in lower level design description documents.

1.2. Scope

This RSD contains all of the technical requirements: functional, performance and design, delivery, safety and quality requirements for the product **Spare uncoated OAP 5050 mirror** (further "OAP 5050"), tender number **SP22_001**, which will be located in the L4b hall under the following PBS code: **RA1.L4.LAS.PA1.1.7**.

1.3. Terms, Definitions and Abbreviations

For the purpose of this document, the following abbreviated terms are applied:

Abbreviation	Meaning
CA	Contracting Authority (Fyzikální ústav AV ČR, v. v. i.)
CTE	Coefficient of Thermal Expansion
ELI	Extreme Light Infrastructure
NCR	Nonconformity Report
OAP	Off Axis Parabola
QR	Quality Report
RA1	Research activity 1
RD	Reference document
RSD	Requirements Specification Document

1.4. Reference documents

Number of doc.	Title of Document/File
RD-01	00328254 - Injection_mirror_OAP5050-6000mm-rev03.pdf

1.5. References to standards

If this document includes references to standards or standardized/ standardizing technical documents the CA allows/permits also another equal solution to be offered.

2. Functional, Performance and Design requirements

Functional, performance and design requirements for the **OAP 5050** are summarized within reference drawing **RD-01** (see chapter 1.4).

2.1. General requirements

REQ-033863/A

The Supplier shall provide basic manufacturing drawing for the **OAP 5050** in conformity with the reference drawing **RD-01** (see Chapter 1.4) and overall layout of the wavefront metrology concept. Documents shall demonstrate to the CA that the requirements from RD-01 were properly taken into account by the Manufacturer and the metrology concept is consistent.

REQ-033864/A

The parameters of the **OAP 5050** shall correspond to the requirements given in the reference drawing **RD-01** (see chapter 1.4).

As a proof shall Supplier provide the **Specific Quality Report: I, II, III, IV, V** (see REQ-033869/A).

REQ-033865/A

The substrate material used for the **OAP 5050** shall be mirror grade fused silica or low expansion glass ceramics with CTE <0.2ppm for 0-50°C.

As a proof shall Supplier provide the **Specific Quality Report VI** (see REQ-029875/A).

3. Packaging requirements

3.1. General requirements

REQ-033866/A

The **OAP 5050** shall be cleaned and packaged in the clean environment of **Class 6** according to **ČSN EN ISO 14644** (equivalent to EN ISO 14644) or cleaner.

NOTE: Regarding the referred to standard/s or technical documents the CA allows/permits also another equal solution to be offered.

REQ-033867/A

The **OAP 5050** shall be placed in a PET-G container preventing damage, degradation and contamination. Equivalent low outgassing solution can be agreed by CA. The PET-G container shall be packed in a minimum of two plies separate clean packaging and placed in a sufficiently padded box for transport with **TILT** and **SHOCK sensors** outside.

REQ-033868/A

The orientation of the substrate in the container shall be such that the concave S1 side faces upward.

4. Quality control

4.1. Quality Reports (QRs)

REQ-033869/A

For the **OAP 5050**, the Supplier shall perform the following tests of product quality and provide corresponding **specific quality reports (I - VI)**:

- I. An interferometric report of the full clear aperture. Sub-aperture measurement is acceptable for spatial periods below 6 mm. At least 2 measurement locations are required for the sub-aperture measurement;
- II. Focal length and off axis distance measurement report;
- III. Cosmetic quality report listing the main defects and their locations;
- IV. Microroughness report from center and 2 corners of Clear Aperture;
- V. Dimensional report listing the main dimensions;
- VI. Material report showing at least the material's class, batch number and producer.

4.2. Documentation and data control

REQ-033870/A

For the **OAP 5050**, the Supplier shall provide information of **outgoing check of the Product**. At least this information shall comprise a report about execution of outgoing check and fulfillment of the technical requirements defined by the product RSD, and completeness of the product.

REQ-033871/A

For the **OAP 5050**, the Supplier shall provide the interferometric data from the **Quality report I** (see REQ-033869/A) in a digital form readable by Zygo MX software. Data format shall be agreed with the CA.

REQ-033872/A

The Supplier shall use the following data formats:

- *.dat (Zygo binary file format for interferograms)
- *.JPG, *.PDF/A, *.HTML
- CAD 2D: *.dwg
- CAD 3D: *.stp; *.ste; *.step or other 3D CAD formats agreed with the CA
- *.doc, *.docx, *.xls, *.xlsx, *.ppt, *.pptx (for MS Office or OpenDocument Format)

REQ-033873/A

The Supplier shall provide the following type of documents:

- 2D final manufacturing drawings approved by the CA;
- Printable format for text documents.

4.3. Nonconformity Control System

REQ-033874/A

The Supplier shall establish and maintain a nonconformity control system compatible with ČSN EN ISO 9001 (equivalent to EN ISO 9001).

REQ-033875/A

Namely, in case the mid-spatial wavefront gradient exceeds the limit defined in RD-01, the Supplier shall provide the interferometric data to the CA. The wavefront shape will be then assessed and the CA will decide if further surface processing is needed.

4.4. Phasing of the delivery

This chapter is intended to briefly summarize basic milestones of the Contract delivery. These milestones represent gates (checkpoints) where the quality of the delivery is to be evaluated.

Delivery shall not proceed past these gates unless their satisfactory accomplishment is approved by the CA.

Delivery lifecycle shall contain at least the following phases (**quality gates**):

- **Qualification of Design**
- **Manufacturing**
- **Acceptance**

4.4.1. Qualification of Design

Summary of what has to be provided by Supplier in terms of documentation (QRs and manufacturing drawings) before starting the manufacturing. The goal is to verify the **manufacturing drawings**.

The output of this phase is **Qualified Design**.

REQ-033876/A

Before the ending of Qualified Design phase the Supplier shall provide the following information that shall be agreed by the CA:

- structure and content of quality reports (see REQ-033869/A);
- **HOW** and **WHEN** each of the technical requirements related to the final product will be verified (through QRs, see REQ-033869/A).

REQ-033877/A

Before the ending of Qualified Design phase the Supplier and the CA shall agree on:

- detailed procedures related to the testing during Manufacturing phase;
- common nonconformity control system (see REQ-033874/A and REQ-033875/A).
- the Supplier shall provide the final manufacturing drawings and metrology layout (see REQ-033863/A) for approval.

4.4.2. Manufacturing

The goal is to demonstrate that the manufactured product meets the specified technical requirements (RSD) of the CA.

This quality gate concerns primarily:

- **Testing at Supplier's site** (factory testing);
- **Packaging**

The output of this phase is the **Final Product meeting requirements**.

REQ-033878/A

The results of the Manufacturing phase of verification shall be recorded by the Supplier in corresponding QRs (see REQ-033869/A) and provided to the CA for approval.

4.4.3. Acceptance

The Acceptance phase shall demonstrate the following:

- Final product has been successfully verified and this process has been documented in an appropriate way through QRs (see REQ-033869/A);
- All detected nonconformities have been solved in accordance with REQ-033874/A;
- Final product is free of fabrication errors.

The output of this phase is a **Verified Product**.

In case of successful acceptance phase, the CA shall provide to the Supplier signed acceptance protocol. In case of unsuccessful acceptance stage, the CA shall provide to the Supplier Nonconformity Report (NCR) and process in accordance with REQ-033874/A shall be applied.

REQ-033879/A

Verification process shall be carried out by the Supplier and it is successfully completed when the final products comply with all specifications and the results of this process are documented in an appropriate way through QRs (see REQ-033869/A).

NOTE: Acceptance will be carried out by the CA (or if required, representatives/contractors appointed by the CA) on the final products at the CA's site.