



EUROPEAN UNION  
European Structural and Investing Funds  
Operational Programme Research,  
Development and Education



MINISTRY OF EDUCATION,  
YOUTH AND SPORTS

## PURCHASE CONTRACT

This purchase contract ("**Contract**") was concluded pursuant to section 2079 *et seq.* of the act no. 89/2012 Coll., Civil Code ("**Civil Code**"), on the day, month and year stated below by and between:

- (1) **Institute of Physics of the Academy of Sciences of the Czech Republic, a public research institution,**

with its registered office at: Na Slovance 2, Praha 8, PSČ: 182 21,

registration no.: 68378271,

represented by: RNDr. Michael Prouza, Ph.D. – director

("Buyer"); and

- (2) **Aperture Optical Sciences, Inc.**

with its registered office at: 170 Pondview Drive, Meriden, CT, 06450, USA,

registration no.:27-2329965

represented by: Flemming Tinker

("Seller").

(The Buyer and the Seller are hereinafter jointly referred to as "**Parties**" and individually as "**Party**".)

### WHEREAS

- (A) It is needed for the construction of the international laser research center ELI Beamlines to purchase the Object of Purchase as defined below.
- (B) The Seller wishes to provide the Object of Purchase to the Buyer for consideration.
- (C) The Seller's bid for the public procurement entitled "*Off-axis parabola mirror pair for ELIMAIA SP20\_005*", whose purpose was to procure the Object of Purchase ("**Public Procurement**"), was selected by the Buyer as the most suitable.



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## **IT WAS AGREED AS FOLLOWS:**

### **1. BASIC PROVISIONS**

- 1.1 Under this Contract the Seller shall hand over to the Buyer a product that is described in Annex 1 (*Technical Specification*) to this Contract in the quality and with the properties described therein (“**Object of Purchase**”) and shall transfer to the Buyer ownership right to the Object of Purchase, and the Buyer shall take over the Object of Purchase and shall pay the Seller the Purchase Price (as defined below), all under the terms and conditions stipulated in this Contract.
- 1.2 The Object of Purchase (all of its parts) shall be new (not remanufactured).

### **2. THE PLACE OF DELIVERY**

The place of delivery is ELI beamlines facility at the address Průmyslová 836, post code 252 41, Dolní Břežany, Czech Republic or any other address in Dolní Břežany, Czech Republic, which the Buyer communicated to the Seller prior to the delivery of the Object of Purchase.

### **3. THE TIME OF DELIVERY**

The Seller shall deliver the Object of Purchase within 5 months from the effectiveness of this Contract. The Object of Purchase are considered delivered once the acceptance protocol is signed. The Seller is entitled to deliver the Object of Purchase earlier, if the Buyer agrees to it. The Buyer is entitled to postpone the delivery time by up to another 3 months without stating any reason.

### **4. THE OWNERSHIP RIGHT**

The ownership right to the Object of Purchase shall be transferred to the Buyer upon the signature of the acceptance protocol by both Parties.

### **5. PRICE AND PAYMENT TERMS**

- 5.1 The purchase price for 1 piece of the Object of Purchase is 1.194.095 CZK, the purchase price for the pair of the Object Purchase is 2.388.190 CZK to this Contract (“**Purchase Price**”). VAT will be paid in accordance with the applicable legal regulations.



- 5.2 The Purchase Price cannot be exceeded and includes all costs and expenses of the Seller related to the performance of this Contract. The Purchase Price includes, among others, all expenses related to the handover and acceptance of the Object of Purchase, costs of copyright, insurance, customs, warranty service and any other costs and expenses connected with the performance of this Contract.
- 5.3 The Purchase Price for the Object of Purchase shall be paid on the basis of a tax document – invoice, to the account of the Seller designated in the invoice. The Purchase Price shall be paid in the following manner:
- a) 20% of the Purchase Price shall be paid after the signature of this Contract by both Parties;
  - b) 30% of the Purchase Price shall be paid after the Buyer approves Qualified Design (as defined in Annex 1) of the Object of Purchase; and
  - c) 50% of the Purchase Price shall be paid after the signature of the acceptance protocol. The copy of the acceptance protocol shall be attached to the invoice.
- 5.4 The Buyer shall realize payments on the basis of duly issued invoices within 30 days from their receipt. The invoice shall be considered to be paid for on the day when the invoiced amount is deducted from the Buyer's account on behalf of the Seller's account.
- 5.5 The invoice issued by the Seller as a tax document must contain all information required by the applicable laws of the Czech Republic. Invoices issued by the Seller in accordance with this Contract shall contain in particular following information:
- a) name and registered office of the Buyer,
  - b) tax identification number of the Buyer,
  - c) name and registered office of the Seller,
  - d) tax identification number of the Seller,
  - e) registration number of the tax document,
  - f) scope of the performance (including the reference to this Contract),
  - g) the date of the issue of the tax document,



- h) the date of the fulfilment of the Contract,
- i) Purchase Price,
- j) registration number of this Contract, which the Buyer shall communicate to the Seller based on Seller's request before the issuance of the invoice.

5.6 In case that the invoice shall not contain the above mentioned information, the Buyer is entitled to return it to the Seller during its maturity period and this shall not be considered as a default. The new maturity period shall begin from the receipt of the supplemented or corrected invoice to the Buyer.

## 6. SELLER'S DUTIES

6.1 The Seller shall ensure that the Object of Purchase is in compliance with this Contract including all its annexes and applicable legal (e.g. safety), technical and quality norms.

6.2 During the performance of this Contract the Seller proceeds independently. If the Seller receives instructions from the Buyer, the Seller shall follow such instructions unless these are against the law or in contradiction to this Contract. If the Seller finds out or should have found out if professional care was exercised that the instructions are for any reason inappropriate or illegal or in contradiction to this Contract, then the Seller must notify the Buyer.

6.3 If this Contract (including Annex 1) states that the Seller and the Buyer shall agree on certain matter or issue and such agreement is not reached, then the Seller must follow Buyer's decision on this matter or issue.

6.4 All things necessary for the performance of this Contract shall procure the Seller, unless this Contract stipulates otherwise.

## 7. HANDOVER AND TAKEOVER OF THE OBJECT OF PURCHASE

7.1 Prior to the handover and takeover of the Object of Purchase the Seller shall test the Object of Purchase in accordance with Annex 1 (*Technical Specification*) to this Contract. The Seller shall inform the Buyer in advance of the date of the testing and shall allow the Buyer to be present during the testing.



- 7.2 Handover and takeover of the Object of Purchase shall be realized on the basis of an acceptance protocol.
- 7.3 If the Object of Purchase does not meet requirements stipulated in this Contract, the Buyer is entitled to refuse the takeover of such Object(s) of Purchase. In such a case the Seller shall remedy the deficiencies within ten (10) working days, unless Parties agree otherwise. The Buyer is entitled (but not obliged) to takeover the Object(s) of Purchase despite the above mentioned deficiencies, in particular if such deficiencies do not prevent the Buyer in the proper operation of the Object(s) of Purchase. In such a case the Seller and the Buyer shall list the deficiencies in the acceptance protocol, including the manner and the date of their removal (remedy). If the Parties do not reach agreement in the acceptance protocol regarding the date of the removal, the Seller shall remove the deficiencies within ten (10) working days.
8. **WARRANTY**
- 8.1 The Seller shall provide a warranty of quality of the Object of Purchase for the period of 1 year. If any document of the Seller states the warranty of longer duration in relation to the Object of Purchase, then such warranty of longer duration shall be applied instead.
- 8.2 The warranty period shall begin on the day of the signature of the acceptance protocol by both Parties. If the acceptance protocol lists any deficiencies, the warranty period shall begin on the day, which follows the day, in which the last deficiency was removed.
- 8.3 If the Buyer ascertains a defect of the Object of Purchase during the warranty period, the Buyer shall notify such defect without undue delay to the Seller. Defects may be notified on the last day of warranty period, at the latest.
- 8.4 The Buyer notifies defects in writing via e-mail. The Seller shall accept notifications of defects on the following e-mail address: [abodden@apertureos.com](mailto:abodden@apertureos.com). The Seller shall confirm within 24 hours from the receipt of the notification.
- 8.5 In the notification the Buyer shall describe the defect. The Buyer has the right to:
- a) ask for the removal of the defect by the delivery of new Object(s) of Purchase or its individual parts, or
  - b) ask for the removal of the defect by repair, or



- c) ask for the reasonable reduction of the Purchase Price.

The choice among the above mentioned rights belongs to the Seller. The Buyer is also entitled to withdraw from this Contract, if by delivering the Object of Purchase with such defects this Contract is substantially breached.

- 8.6 The Seller shall remove defects that occur during the warranty period free of charge within 5 months from their notification, unless Parties due to the nature of the defect agree on the shorter or longer period of time.
- 8.7 Parties shall execute a protocol on the removal of the defect, which shall contain the description of the defect and the confirmation that the defect was removed. The warranty period shall be extended by a period of time that elapses between the notification of the defect until its removal.
- 8.8 In case that the Seller does not remove the defect within stipulated time or if the Seller refuses to remove the defect, then the Buyer is entitled to remove the defect at his own costs and the Seller shall reimburse these costs within 10 days after the Buyer's request to do so.
- 8.9 The warranty does not cover defects caused by unprofessional manipulation or by the failure to follow Seller's instructions for the operation and maintenance of the Object of Purchase.

## 9. **PENALTIES**

- 9.1 If the Seller is in delay with the removal of the defect, the Seller shall pay to the Buyer a contractual penalty in the amount of 0,05 % of the Purchase Price for every (even commenced) day of delay.
- 9.2 The Seller shall pay contractual penalties within fifteen (15) days from the day, on which the Buyer enumerated its claims. The payment of contractual penalties shall not affect the right of the Buyer to damages even to the extent to which such damages exceeds the contractual penalty.
- 9.3 Total amount of contractual penalties that the Buyer is entitled to claim shall not exceed 30 % of the Purchase Price.



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9.4 The Buyer is entitled to unilaterally set off claims arising from the contractual penalties against the claim of the Seller for the payment of the Purchase Price.

## 10. **RIGHT OF WITHDRAWAL**

10.1 The Buyer is entitled to withdraw from this Contract without any penalties, if any of the following circumstances occur:

- a) the Seller shall be in delay with the fulfilment of this Contract and such delay lasts more than 4 weeks;
- b) The Object of Purchase during testing does not fulfil the requirements stipulated in this Contract, in particular in Annex 1 (*Technical Specification*) and the deficiencies cannot be remedied;
- c) the insolvency proceeding is initiated against the Seller; or
- d) the Buyer ascertains that the Seller provided in its bid for the Public Procurement information or documents that do not correspond to the reality and that had or could have had impact on the result of the tendering procedure, which preceded the conclusion of this Contract.

## 11. **SPECIAL PROVISIONS**

By signing this Contract, the Seller becomes a person that must cooperate during the finance control within the meaning of Section 2 letter e) of the act no. 320/2001 Coll., on finance control in the public administration, and shall provide to the Directing Body of the Operational Programme Research, Development and Education or other control bodies access to all parts of the bid, Contract or other documents that are related to the legal relationship formed by this Contract. This duty also covers documents that are subject to the protection in accordance with other acts (business secrets, secret information, etc.) provided that control bodies fulfil requirements stipulated by these acts. The Seller shall secure that all its subcontractors are also obliged to cooperate with control bodies in the above stipulated extent. The possibility of effective control must be preserved until the year 2027.



## 12. PUBLICITY

Parties are aware that this Contract shall be published in the register of contracts in accordance with the Act no. 340/2015 Coll., on the Register of Contracts.

## 13. FINAL PROVISIONS

- 13.1 This Contract is governed by the laws of the Czech Republic, especially by the Civil Code.
- 13.2 All disputes arising out of this Contract or out of legal relations connected with this Contract shall be preferably settled by a mutual negotiation. In case that the dispute is not settled within sixty (60) days, such dispute shall be decided by courts of the Czech Republic in the procedure initiated by one of the Parties.
- 13.3 The Seller is not entitled to set off any of its claims or his debtor's claims against the Buyer's claims. The Seller is not entitled to transfer its claims against Buyer that arose on the basis or in connection with this Contract on third parties. The Seller is not entitled to transfer rights and duties from this Contract or its part on third parties.
- 13.4 All modifications and supplements of this Contract must be in writing.
- 13.5 If any of provisions of this Contract are invalid or ineffective, the Parties are bound to change this Contract in such a way that the invalid or ineffective provision is replaced by a new provision that is valid and effective and to the maximum possible extent correspond to the original invalid or ineffective provision.
- 13.6 This Contract is executed in four (4) counterparts and every Party shall receive two (2) counterparts.
- 13.7 An integral part of this Contract is Annex 1 (*Technical Specification*). If Annex 1 (*Technical Specification*) uses the term "Contracting Authority" or "contracting authority" it means Buyer. If Annex 1 (*Technical Specification*) uses the term "Supplier" or "supplier" it means Seller.
- 13.8 This Contract shall be valid on the date of the signature of both Parties and effective on the day, on which it was published in the register of contracts within the meaning of the Act no. 340/2015 Coll., on the Register of Contracts.





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**IN WITNESS WHEREOF** attach Parties their handwritten signatures:

**Buyer**

Signature: \_\_\_\_\_

Name: RNDr. Michael Prouza, Ph.D.

Position: director

Date:

**Seller**

Signature: \_\_\_\_\_

Name: Flemming Tinker

Position: president

Date:



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## **ANNEX 1**

### **TECHNICAL SPECIFICATION**

|                              |  |                         |                   |
|------------------------------|--|-------------------------|-------------------|
| <b>Confidentiality Level</b> | <i>PU - Publish</i>  | <b>TC ID / Revision</b> | <i>00272199/C</i> |
| <b>Document Status</b>       | <i>Document Released</i>                                   | <b>Document No.</b>     | <i>N/A</i>        |
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| <b>Project branch</b>        | <i>Engineering &amp; Scientific documents (E&amp;S)</i>    |                         |                   |
| <b>Document Type</b>         | <i>Specification (SP)</i>                                  |                         |                   |

**[RSD Product Category B]**

***Mid-quality off-axis parabola mirror pair for  
ELIMAIA  
SP20\_005***



**Keywords**

n/a

|                           | <b>Position</b> | <b>Name</b>       |
|---------------------------|-----------------|-------------------|
| <b>Responsible person</b> | RP3 Leader RP3  | Daniele Margarone |
| <b>Prepared by</b>        | Researcher      | Filip Grepl       |

| <b>RSS History</b>        |                               |  |                         |
|---------------------------|-------------------------------|--|-------------------------|
| <i>RSS TC ID/revision</i> | <i>RSS - Date of Creation</i> | <i>RSS - Date of Last Modification</i> | <i>Systems Engineer</i> |
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| <b>Reviewed By</b>     |  |                                 |                             |
|------------------------|--|---------------------------------|-----------------------------|
| <i>Name (reviewer)</i> | <i>Position (reviewer)</i>                     | <i>Date</i>                     | <i>Signature (approver)</i> |
| Daniele Margarone      | RP3 Leader RP3                                 | NOTICE (RSD product category B) |                             |
| Ladislav Půst          | Manager Installation of Technology             | NOTICE (RSD product category B) |                             |
| Martin Laub            | Chief Engineer                                 | NOTICE (RSD product category B) |                             |
| Roman Kuřátko          | Facility Manager                               | NOTICE (RSD product category B) |                             |
| Veronika Olšovcová     | Safety Team Manager                            | NOTICE (RSD product category B) |                             |
| Viktor Fedosov         | SE & Planning Group Leader;<br>Quality Manager | NOTICE (RSD product category B) |                             |

| <b>Approved by</b>     |                            |             |                             |
|------------------------|----------------------------|-------------|-----------------------------|
| <i>Name (approver)</i> | <i>Position (approver)</i> | <i>Date</i> | <i>Signature (approver)</i> |
| Daniele Margarone      | RP3 Leader RP3             |             |                             |

| <b>Revision History</b> |                           |                         |   |                    |
|-------------------------|---------------------------|-------------------------|---|--------------------|
| <i>Revision Number</i>  | <i>Revision Made by</i>   | <i>Date of Revision</i> | <i>Revision description</i>                     | <i>TC Revision</i> |
| 1                       | F. Grepl<br>D. Margarone  | 27.03.2020              | RSD draft creation, version for internal review | A                  |
| 2                       | F. Grepl, D.<br>Hanusková | 29.05.2020              | RSD version for review                          | B                  |
| 3                       | F. Grepl, D.<br>Hanusková | 02.06.2020              | RSD final version for approval                  | C                  |

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## 1. Introduction

### 1.1. Purpose

This Requirements Specification Document (RSD) lists the technical requirements and constraints on product applying in the ELI project. This can lead to the identification of product interfaces with the ELI science-based technology and ELI building facility. This RSD also acts as a parent document for 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 following spare parts: **Mid-quality off-axis parabola mirrors pair for ELIMAIA plasma mirror setup** (further "OAP mirrors pair"), **SP20\_005**.

The OAP mirror pair is an integral part of the Laser-driven ion acceleration (ELIMAIA) system and will be located in the E4 experimental hall. The OAP mirror pair is registered in the PBS software under the following PBS code: **E.E4.ELMA.4.2.2.2**.

This product is a **product Category B**. Category B does not require any design modifications of the product. Delta verification (test) program shall be decided and performed on a case-by-case basis.

### 1.3. Terms, Definitions and Abbreviations

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

| Abbreviation | Meaning   |
|--------------|---|
| Ag           | Silver  |
| Au           | Gold  |
| CA           | Contracting Authority (Fyzikální ústav AV ČR, v. v. i.) |
| E4           | Experimental hall 4                                     |
| ELI          | Extreme Light Infrastructure                            |
| FWHM         | Full-Width Half Maximum                                 |
| GDD          | Group Delay Dispersion                                  |
| I            | Inspection (as a verification method)                   |
| LIDT         | Laser Induced Damage Threshold                          |
| OAP          | Off-Axis Parabola                                       |
| R            | Review of documentation (as a verification method)      |
| RMS          | Root Mean Square  |
| RSD          | Requirements Specification Document                     |
| T            | Test (as a verification method)                         |
| VCD          | Verification Control Document                           |

### 1.4. Reference documents

| Number of doc. | Title of Document/File  |
|----------------|---|
| RD-01          | 00236690-A_5.2_ES_DW_Drawing-OAP_mirror_for_ELIMAIA_plasma_mirror.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

### 2.1. Requirements of OAP mirror pair

REQ-029888/A

Each mirror from OAP mirror pair (2 pieces) shall be manufactured by the Supplier in accordance with the reference drawing **RD-01** (see chapter 1.4).

Verification method: R - review, T - test, I - inspection

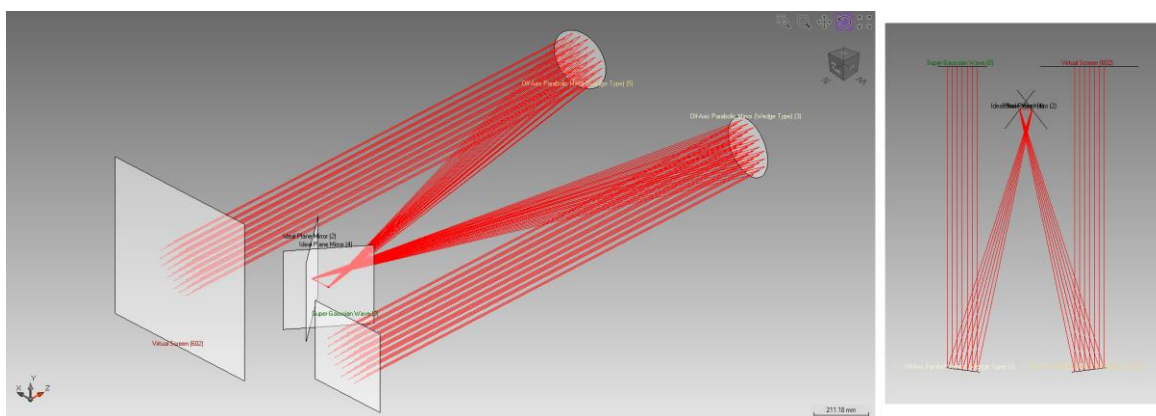
REQ-029890/A

The 2 manufactured and delivered OAP mirrors shall be identical with respect to the full off-axis angle, off-axis distance from vertex to the centre of the mirror and to the segment focal length (OAP centre to the focal point). I.e. numerical values of these specifications can be within given error interval, but the values concerning the mirror No.1 must be equal to the values concerning the mirror No.2. (best effort).  
Verification method: R - review, A - analysis, T - test, I - inspection

REQ-029891/A

Both elements from OAP mirror pair have the same parameters except for the clocking orientation. The OAPs clocking should be symmetric with respect to their common parent axis (see Figure 1.).

Verification method: R - review, I - inspection



**Figure 1:** OAP mirrors pair clocking orientation

REQ-029889/A

The manufactured and delivered OAP mirror pair shall meet the general requirements defined in Table 1 below.

Verification method: R - review, A – analysis, T - test, I – inspection

| #    | Parameter / Property of the OAP mirror                    | Specified value / Requirement  | Quality report (see chapter 6.1)            |
|------|---|--|---|
| 1.1  | Material  | Zerodur or equivalent  | V. Substrate material report or certificate |
| 1.2  | Front (i.e. reflective) surface                           | Protected Au coating   | -   |
| 1.3  | Clear aperture (perpendicular to the beam)                | Squared with dimensions at least 250x250 mm <sup>2</sup> and with rounded corners                                  | IV. Dimension report (or estimation report) |
| 1.4  | Center thickness  | (60±1) mm  | IV. Dimension report                        |
| 1.5  | Full off-axis angle                                       | (15.0±0.5)°  | IV. Dimension report                        |
| 1.6  | Off-axis distance from the vertex to center of the mirror | (569.402±21.200) mm  | IV. Dimension report                        |
| 1.7  | Segment focal length (OAP center to the focal point)      | (2200±10) mm   | IV. Dimension report                        |
| 1.8  | Surface quality, Scratch/Dig (S/D)                        | ≤ 60/40 S/D per MIL-PRF-13830B (with best effort: <b>40/20 S/D</b> )   | III. Surface cosmetics report               |
| 1.09 | Spectral bandwidth, Δλ in FWHM                            | 730 ≤ Δλ ≤ 930 nm  | II. Reflectivity measurement report         |
| 1.10 | Reflectivity  | ≥ 94 % over Δλ (with best efforts to provide the reflectance homogeneity over the clear aperture of the mirror)    | II. Reflectivity measurement report         |
| 1.11 | Group Delay Dispersion ( GDD )                            | ≤ 30 fs <sup>2</sup> for Δλ  | GDD  estimation report                      |
| 1.12 | Back face   | Fine ground (i.e. no wedge, parallel to tangent in OAP vertex)   | -   |
| 1.13 | Back face   | A mark indicating the plane with optical axis and focal point  | -   |
| 1.14 | Operational conditions                                    | Vacuum compatible under vacuum level up to 10 <sup>-6</sup> mbar without materials outgassing                      | -   |
| 1.15 | OAP mirror shape  | Rectangular in shape: (310+0-1) x (270+0-1) mm <sup>2</sup> , see drawing RD-01                                    | IV. Dimension report                        |
| 1.16 | Chamfers  | According to the drawing RD-01 (see chapter 1.4)   | IV. Dimension report                        |
| 1.17 | Lateral side  | Mounting interface in the form of a groove along 2 vertical sides according to the drawing RD-01 (see chapter 1.4) | IV. Dimension report                        |
| 1.18 | Coating damage threshold                                  | ≥ 100 mJ/cm <sup>2</sup> , 1000-on-1 @ 10 Hz @ 30 fs (central wavelength 820 nm)                                   | LIDT justification                          |
| 1.19 | RMS reflected wavefront error                             | ≤ λ/10 RMS (Power term removed) for spatial scale lengths > 10 mm  | I. Surface quality report                   |
| 1.20 | Surface slope error                                       | ≤ 60 μrad RMS under test wavelength of (633±2) nm  | I. Surface quality report                   |

**Table 1:** The required parameters of the OAP mirrors pair



### 3. Environmental requirements

REQ-029892/A

The Supplier and the CA shall agree on the cleaning method to clean the OAP mirror without decreasing the mirrors' properties and to avoid contamination of clean space (see REQ-029900/A).

*NOTE: The cleaning methods may use high temperatures (baking out), high gas flow (dry air) and specialised chemical cleaning liquids (alcohol, Isopropyl alcohol, demineralised water).*

Verification method: R - review

### 4. Delivery requirements

REQ-029893/A

The transportation to the final destination of the OAP mirror shall be conducted by the Supplier.

*NOTE: The Supplier is fully responsible for the delivery of undamaged mirrors.*

Verification method: I - inspection

REQ-029894/A

The OAP mirror shall be delivered in a protective package preventing damage, degradation and contamination and in a minimum of two plies separate clean packaging. The OAP mirror shall be cleaned and packaged in the clean environment of class 7 according to ČSN EN ISO 14644 (equivalent to ISO 14644) or cleaner.

Verification method: I – inspection, R - review

### 5. Safety Requirements

REQ-029895/A

The Supplier shall supply a Declaration of Conformity or any other equivalent document legally recognized and accepted in the Czech Republic for each product type if the appropriate legislation determines the Supplier's obligation to have a Declaration of Conformity (or the equivalent document) for the purposes of a Device sale in the Czech Republic to fulfil the requirements of 2001/95/EC directive or applicable Czech law.

Verification method: I – inspection

## 6. Quality control

### 6.1. Quality Reports (QRs)

REQ-029896/A

The Supplier shall perform a factory verification of the OAP mirror and provide corresponding **specific quality reports (I - V)** proving that the requirements have been met:

- I. **Surface quality report** which contains reflected wavefront error (RMS value), Surface slope error (in  $\mu\text{rad}$ ) and diffraction-limited focus size (diameter of diffraction-limited focal spot). All values measured all over the clear aperture of the mirror.
- II. **Reflectivity measurement report** of the central area over the specified bandwidth  $\Delta\lambda$  or of the witness sample.
- III. **Surface cosmetics report** specifying scratches and digs with locations of the main defects.
- IV. **Dimension report** specifying the physical dimension of the mirror.
- V. **Substrate material report**
- VI. **Focal spot size report** specifying the diameter of the circle where 81.5% of energy for square aperture or 83.8% of energy for circular aperture is enclosed. The actual wavefront (measured interferometrically) and the actual clear aperture (rectangular with dimensions of 250 mm x 250 mm or circular with diameter of 250 mm) must be used for calculations or simulations.

*NOTE: The results of the factory verification of the OAP mirror shall be provided to the CA in the corresponding specific QRs before the mirror delivery.*

Verification method: R - review of report, I – inspection

REQ-029897/A

For the OAP mirror pair, the Supplier shall perform a factory verification of |GDD| and Clear aperture.

*NOTE: The report may be carried out by the Supplier via measurements performed or calculations or simulations including the description of the estimation method.*

Verification method: R - review of report, I – inspection

REQ-029898/A

For the OAP mirror pair, the Supplier shall provide the laser damage threshold justification.

*NOTE: The report may be carried out by the Supplier via measurements performed or calculations or simulations including the description of the estimation method.*

Verification method: R - review of report, I – inspection

## REQ-029899/A

For the OAP mirror pair, the Supplier shall perform a factory verification of the focal spot size as the diameter of the circle where 81.5% of energy for square aperture or 83.8% of energy for circular aperture is enclosed. The actual wavefront (measured interferometrically) and the actual clear aperture (rectangular with dimensions of 250 mm x 250 mm or circular with diameter of 250 mm) must be used.

*NOTE: The report may be carried out by the Supplier via measurements performed or calculations or simulations including the description of the estimation method.*

Verification method: R - review of report, I – inspection

## 6.2. Documentation and data control

## REQ-029900/A

The Supplier shall supply the following relevant manufacturing documents:

- Technical documentation on the delivered OAP mirror (e.g. storage, installation, cleaning, safe operation and maintenance instructions);
- Specific quality reports (see REQ-029896/A, REQ-029897/A and REQ-029898/A) that demonstrate fulfilment of technical requirements described in chapter 2 above;
- All approved by the CA manufacturing drawings and design supporting documentation;
- All approved by the CA "requests for deviation/wavier from requirements described herein".

*NOTE: The manufacturing documents may be supplied in electronic form in relevant data formats described in the REQ-029901/A.*

Verification method: R - review, I - inspection

## REQ-029901/A

The Supplier shall use following data formats:

- \*.JPG, \*.PNG, \*.TIFF, \*.PDF/A, \*.HTML
- CAD 2D: \*.dwg
- CAD 3D: \*.stp; \*.ste; \*.step or other 3D CAD formats agreed with the CA
- text processors \*.doc, \*.docx, OpenDocument Format
- spreadsheet processors \*.xls, \*.xlsx, OpenDocument Format
- presentations \*.ppt, \*.pptx; OpenDocument Format

Verification method: Not to Be Tracked within VCD

### 6.3. Nonconformity Control System

REQ-029902/A

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

Verification method: Not to Be Tracked within VCD

### 6.4. Verification requirements for the Supplier

#### 6.4.1. Verification methods

REQ-029903/A

The verification shall be accomplished by the Supplier through one or more of the following verification methods:

1. **Review**; Verification via Review (**R**) shall consist of using approved records (examples of such approved records are design documents and reports, technical descriptions, and engineering drawings, manuals and accompanying operation documentation) or evidence that unambiguously shows that the requirement is met.
2. **Inspection**; Verification via Inspection (**I**) shall consist of visual determination of physical characteristics including photographs taken by the Supplier and sent to the CA proving that the specific requirements have been met.
3. **Test**; Verification via Test (**T**) shall consist of measuring product performance and functions under realistic operating conditions.
4. **Analysis**; Verification via Analysis (**A**) shall consist of performing theoretical or empirical evaluations (e.g. mathematical models, calculations and etc.).

Verification method: Not to Be Tracked within VCD

#### 6.4.2. Verification Control Document (VCD)

Verification Control Document (**VCD**) is a living document which shall be used throughout the entire Contract delivery and its phases. The **VCD** provides traceability during delivery phases and represents a formal tool of communication between the Supplier and the CA (formal record, reporting tool).

The **VCD** will be provided by the CA and it can be accommodated to the Supplier's needs.

## REQ-029904/A

The Supplier shall provide a Verification Control Document (VCD) for the reviews as agreed with the CA.

*NOTE 1: Guidelines for VCD preparation will be provided by the CA.*

*NOTE 2: The form of VCD will be agreed between the CA and the Supplier based on the best commercial praxis used by the Supplier.*

*NOTE 3: The form of VCD is agreed before starting verification activities.*

*NOTE 4: The VCD specifies **HOW** and **WHEN** each requirement is planned to be verified by the Supplier; when it was actually verified.*

Verification method: R - review

## REQ-029905/A

The final issue of the VCD shall be submitted by the Supplier after the approval of the last report and before starting the acceptance phase (see chapter 6.4.3).

Verification method: R - review

### 6.4.3. Acceptance

Acceptance will be carried out by the CA upon delivery of the final product not obviously damaged during transport. The basis for acceptance will be completed VCD summarizing the overall verification results together with relevant documentation supporting the verification (i.e. QRs, manufacturing documents, declaration of conformity and etc.).

In case of successful acceptance phase, the CA will provide to the Supplier signed acceptance protocol. In case of unsuccessful acceptance stage, the CA will provide to the Supplier Nonconformity Report and process in accordance with REQ-027574/A shall be applied.

## REQ-029906/A

The Acceptance phase shall demonstrate the following:

- The OAP mirror has been successfully verified by the Supplier and the results of this process have been documented in an appropriate way through QRs (see chapter 6.1) and VCD (see chapter 6.4.2);
- All detected non-conformities have been solved in accordance with REQ-029902/A;
- The final product is free of fabrication errors and is ready for the intended operational use.

Verification method: Not To Be Tracked within VCD