



## Purchase Contract

pursuant to Section 2079 et seq. of Act No. 89/2012 Coll., the Civil Code, as amended (hereinafter  
the “**Civil Code**”)

### I. THE PARTIES:

1. Buyer:

**Fyzikální ústav AV ČR, v. v. i.**

*(Institute of Physics of the Czech Academy of Sciences, public research institution)*

with its principal office at Praha 8, Na Slovance 2, PSČ 182 00, Czech republic

represented by: RNDr. Michael Prouza, Ph.D., the Director

Registered in the Registry of public research institutions kept by the Ministry of Education, Youth and Sports of  
the Czech Republic

Id. No.: 68378271

Tax Id. No.: CZ68378271

(hereinafter the “**Buyer**”)

and

2. Seller:

**OptiXs, s.r.o.**

with its principal office at Křivoklátská 37/3, Letňany, 199 00 Praha 9

represented by: Ing. Martin Klečka, statutory representative

registered in the commercial register kept by the Municipality court in Prague, item C 212818

Id. No. (if any): 02016770

Tax Id. No. (if any): CZ02016770

(Hereinafter the “**Seller**”; the Buyer and the Seller are hereinafter jointly referred to as the “**Parties**” and each  
of them individually as a “**Party**”).

enter, on the present day, month and year, into this Purchase Contract (hereinafter the “**Contract**”)

### II. Fundamental Provisions:

- 2.1 The Buyer is a beneficiary of more subsidies granted by the Ministry of Education, Youth and Sports of the  
Czech Republic within the Operational Programme “Research, Development and Education”.
- 2.2 The Seller has been awarded the public contract entitled “**L4 PW and L2 grating substrates TP21\_058**”  
(hereinafter the “**Public Contract**”).

### III. Subject of the Contract

- 3.1 Under this Contract, the Seller shall design and manufacture for the Buyer uncoated grating substrates denoted  
as L2 and L4PW grating substrates as specified herein and under the conditions stipulated herein including  
Annexes to this Contract, especially Annex No 1 Requirements Specification Document (hereinafter the “**RSD**”).  
Any uncoated grating substrate produced under this Contract is hereinafter referred to also each as the  
“**Substrate**” and together as the “**Substrates**”.



3.2 The Buyer shall take over the Substrates with all required documentation and pay the Purchase Price for them to the Seller as specified in Art. V. hereof.

Firm scope of this Contract

3.3 Under this Contract, the Seller shall design and manufacture **four L2 grating substrates** and **three L4PW grating substrates**.

Call option

3.4 Under this Contract, the Seller shall manufacture another **one L4PW grating substrate of the type L4P GR2** (as defined by Annex No 1) if the Buyer requests the Seller to do so (activation of the option).

Where it is needed in this Contract to distinguish between the Substrates to be delivered within the firm scope of this Contract and the one delivered under the call option, the former shall be referred to as the "**Firm Scope Substrates**" and the latter as the "**Optional Substrate**".

The Buyer is entitled (but not obliged) to request the delivery of the Optional Substrate by means of a written notice (an order) within two years from conclusion of this Contract.

#### **IV. Risk of Loss and Ownership Title**

The ownership title and the risk of loss or damage to the Substrates shall pass to the Buyer upon handing over the Substrates to the carrier designated by the Buyer in the Place of Delivery in accordance with Art. VII hereof (upon loading them to the means of transport used by the carrier).

#### **V. Purchase Price and Payment Terms**

5.1 The purchase prices for the Firm Scope Substrates and for the Optional Substrate are set forth in Annex No 2 hereto Prices (hereinafter also the "**Prices**").

5.2 All prices stipulated in this Contract are exclusive of VAT payable in the EU that will be paid by the Buyer in the Czech Republic.

5.3 The Seller, if applicable, is responsible for clearing (export formalities and documents) the Substrates for export from the country of origin to the country where the Buyer is going to transport them from the Seller for coating. The Buyer shall provide all needed assistance. The most probable countries of coating will be USA, Japan or an EU country (selection of the coating provider is subject to a later selection procedure).

5.4 The Prices for Substrates set out in Art. 5.1 hereof:

- include all costs related to the performance of the subject-matter of this Contract of which the Seller knew or should have known including all manufacturing costs, packaging and any other direct or indirect costs needed to perform this Contract duly and in time (but excluding VAT payable in the EU);
- are maximum permissible prices and are independent of the development of any costs and prices and currency exchange rates.

5.5 The Seller is entitled to invoice the Total price for the Firm Scope Substrates (Annex No 2, Item E) as follows:

- 60 % upon Qualified Design approval of all types of the Substrates;
- 40% upon the acceptance of the Firm Scope Substrates by the Buyer (Art. 8.2 hereof);

the Seller is entitled to invoice a proportionate portion of this instalment after a completed acceptance of any Firm Scope Substrate. The portions shall be agreed by the Parties based on prices of individual Substrates according to Annex No 2 hereto Prices.

5.6 The Seller is entitled to invoice the price for the Optional Substrate as follows:

- 60% upon receipt of the order;
- 40% upon the acceptance of the Optional Substrate by the Buyer (Art. 8.2 hereof);

5.7 If the Seller (and/or his subcontractors) perform this Contract in line herewith without substantial breaches hereof by the Seller and there are no reasons for doubts on continuing of due performance of the Contract by



the Seller because of overall approach of the Seller to the Contract performance (presented particularly by due preparation for performance of activities that are to come) and if it might ease and speed up further performance of the Contract by the Seller the Buyer reserves the right to provide the Seller with partial instalments of the Prices sooner than scheduled or in higher amount than stipulated by this Contract. If the conditions stipulated above are met the Buyer is entitled to modify the payment schedule included in this Contract anyhow in favour of the Seller and to provide it with any prepayment.

5.8 The instalments of Prices for the Substrates shall be paid based on tax documents – invoices, to the account of the Seller designated in the invoice. Invoices shall be payable within thirty (30) days from their delivery to the Buyer (hereinafter the "**Maturity Period**"). If the Seller indicates any shorter maturity period in an invoice, such other period is deemed irrelevant and the period set out herein applies. Payment of the invoiced amount is considered executed on the date of its remitting to the Seller's account. In conformity with the applicable tax regulations of the Czech Republic, the tax documents – invoices issued by the Seller hereunder shall include particularly the following details:

- a) the business name/designation and registered office of the Buyer
- b) the tax identification number of the Buyer
- c) the business name/designation and registered office of the Seller
- d) the tax identification number of the Seller
- e) the registration number of the tax document
- f) the scope and object of the taxable supply
- g) the date of issue of the tax document
- h) the date of the supply or the date of acceptance of the consideration, whichever is earlier, if it differs from the date of issue of the tax document
- i) the price of the supply
- j) a declaration that the invoiced performance is provided for purposes of a grant project which the Buyer shall identify in advance

and must also be in conformity with any double taxation treaties applicable to this Contract.

5.9 Invoices shall be submitted to the Buyer only in the electronic form to the email address: [efaktury@fzu.cz](mailto:efaktury@fzu.cz)

## **VI. Manufacturing Deadlines**

6.1. The Seller shall design and manufacture the **Firm Scope Substrates** so that they are ready (including all documentation needed for verification) for acceptance at the Seller's site **within 17 months (and within 13 months on best efforts basis regarding the L2 gratings)** from the signature of this Contract.

During the manufacturing process, the manufacture of the L2 grating substrates shall have time priority over the L4PW grating substrates.

6.2. The Seller shall manufacture the Optional Substrate so that it is ready (including all documentation needed for verification) for acceptance at the Seller's site **within 1 year from receipt of an order of the Substrate by the Seller**. If the Buyer documents (e.g. by subcontractors' quotes) that it is impossible to meet the deadline stipulated in the preceding sentence, the Buyer shall agree on a longer term.

## **VII. Place of Delivery**

A carrier designated by the Buyer shall take over the Substrates in any place chosen by the Seller and transport them to the final place of delivery. By handing over the Substrates to the carrier the Substrates are considered delivered to the Buyer. The Seller shall load transport boxes with PET-G containers with the Substrates to the means of transport used by the carrier and shall remain responsible for them until completion of the loading in the transport.

## **VIII. Production Phasing, Acceptance and Transport of the Substrates**

8.1 Qualification of Design



The Seller shall submit to the Buyer manufacturing drawings and other documentation and information in line with art. 6.1.1 of Annex No 1 hereto (RSD) for approval before manufacture of the Firm Scope Substrates.

The Buyer shall provide a statement (approval or any comments) on the manufacturing drawings and related documentation and information submitted by the Seller within 10 business days from receiving them. Potential necessity of implementation of any comments of the Buyer does not postpone the manufacturing deadlines stipulated hereby if the Buyer meets the 10-business-day deadline. Should the deadline for provision of the statement not be met by the Buyer, the manufacturing deadlines extend accordingly.

The Seller shall manufacture the Optional Substrate based on the already approved manufacturing drawing of the L4P GR2 substrate and other documentation and information.

#### 8.2 Manufacture and Acceptance

The Buyer shall accept the Substrates (or any Substrate separately) at the Seller's site when the Substrates comply with all requirements stipulated herein and the results of the verification process are documented through documentation requested under this Contract. In such a case, the Buyer shall provide the Seller with an acceptance protocol. The acceptance protocol might be also drafted by the Seller and submitted to the Buyer for approval.

#### 8.3 Transport of the Substrates

After the acceptance, the Substrates shall be packed and handed over by the Seller to the carrier designated by the Buyer in accordance with Art. VII. Because the carrier will transport the Substrates to a third person (a coating provider) the Seller shall thoroughly document the packaging of the Substrates (pictures, videos) so that in case of transport damage or damage during unpacking it is clear that the damaged was not caused by the Seller.

### **IX. Nonconformities of the Substrates and Warranty Claims**

9.1 A Substrate shall be deemed defective if it does not conform to the requirements stipulated herein. The Seller shall be liable for (i) any defects in the Substrates at the time of their acceptance in the Seller's site (non-conformity with requirements of this Contract) and (ii) for defects that occur in the Substrates during the entire warranty period (quality guarantee).

#### Defects Detected during Verification at the Seller's Site

9.2 If any defects of the Substrates are detected during verification process at the Seller's site, the Seller shall present a defect removal schedule under which the defects are to be removed with all reasonable expedition and promptly. The Buyer may (but is not obliged to) agree to such additional time for removing the defects. If the Seller removes the defects within the agreed additional time, the additional time for defects removal shall not be taken into account in terms of meeting the delivery deadline (Art. VI hereof). The rules of this Art. 9.2 shall similarly apply also in case of defects that occur prior to verification process where it is obvious that the original delivery deadline can't be met (e.g. sudden damage during manufacture).

9.3 The Buyer is also entitled based on its discretion to approve verification of the Substrates despite defects in them without removing the defects if the Parties agree on an adequate price discount.

#### Hidden defects

9.4 Acceptance of the Substrates in the Seller's site does not prevent the Buyer from making a later claim for removal of a hidden defect (that was present in a Substrate at the time of acceptance but could not have been detected during verification at the Seller's site due to the nature of the verification and inspection methods). In such a case, Art. 9.6 – 9.8. hereof apply.

#### Warranty (Quality Guarantee)

9.5 The Seller provides the warranty of quality for each Substrate for a period of 6 months from the date of acceptance of the Substrate. The Buyer shall raise a warranty claim against the Seller without undue delay after detecting a defect, but not later than on the last day of the warranty period, by means of a written notice sent to the Seller's authorised representative for technical matters set out herein.



- 9.6 The Seller shall remove the defect for which it is responsible free of charge.
- 9.7 The Seller undertakes to remove any defect within a deadline agreed with the Buyer. If the Parties do not reach an agreement, the Seller shall remove the defect (i) within six months and (ii) in case the removal requires remanufacture, the defect shall be removed within 40 weeks from raising the warranty claim.
- 9.8 The Parties shall execute a record on removal of the defect, in which they shall confirm that the defect has been removed.
- 9.9 The warranty shall not apply to defects caused by non-compliance with written rules of operation and maintenance of the Substrates provided by the Seller, manipulation errors or by normal wear and tear.

#### **X. Penalties, vis major circumstances and liability limitation**

##### Penalties

- 10.1 If the Seller is in delay with due finalization of manufacturing of any Firm Scope Substrate within the manufacturing deadline stipulated in Art. 6.1 hereof, the Seller shall pay to the Buyer a contractual penalty for delay in the amount of 0,01% of the Total price for the Firm Scope Substrates (Annex No 2, Item E) (without VAT) per each delayed Firm Scope Substrate for every (even commenced) day of delay.  
If the Seller is in delay with due finalization of manufacturing of the Optional Substrate within the manufacturing deadline stipulated in Art. 6.2 hereof, the Seller shall pay to the Buyer a contractual penalty for delay in the amount of 0,01% of the price of the Optional Substrate (Annex No 2, Item F) (without VAT) for every (even commenced) day of delay.
- 10.2 The total contractual penalty for delay with due finalization of manufacturing of one Firm Scope Substrate shall not exceed 5% of the price of the respective Firm Scope Substrate (Annex No 2, Items A - D) (without VAT). Where Annex 2 states price for 2 pieces, one half of the amount is considered to be the price of one piece.  
The total contractual penalty for delay with due finalization of manufacturing of the Optional Substrate shall not exceed 1% of the price of the Optional Substrate (Annex No 2, Item F) (without VAT).
- 10.3 If the Seller is in delay with removal of a defect in case of hidden defects (Art. 9.4) or a warranty claim (Art. 9.5), the Seller shall pay to the Buyer a contractual penalty for delay in the amount of 20€ for every (even commenced) day of delay.
- 10.4 The total contractual penalties for delay with removal of defects under this Contract shall not exceed 15 000€.
- 10.5 The Seller shall pay contractual penalties within fifteen (15) days from the day, on which the Buyer enumerated their claim. The payment by the Seller of contractual penalties for delay to which the Buyer is entitled under this Art. X hereof shall be the sole indemnification due by the Seller to the Buyer because of such delay. The Buyer has the right to terminate the present Contract for default of the Seller in application of the Art. 11.2 iii) hereof or to terminate an optional order for default of the Seller in application of the Art. 11.3.
- 10.6 The Buyer is entitled to unilaterally set off claims arising from the contractual penalties against the claim of the Seller for payment of any price due under this Contract after agreement by the Parties on the amount of penalties due by the Seller. The Buyer is not obliged to take into account objections of the Seller raised against the enumeration of the contractual penalties should the Seller fail to document, within 30 days from receipt of the notice of penalties, that the application of penalties is groundless or that it is not liable for the delays.

##### Vis major circumstances

- 10.7 Circumstances constituting vis major shall be deemed to have been constituted by such circumstances / obstacles which arose independently of the will of the obliged Party, and which prevent fulfilment of that Party's obligation, provided that it could not be reasonably expected that the obliged Party could overcome or avert this obstacle or its consequences, and furthermore that such Party could foresee such obstacle when it entered into



the respective covenants. Vis major shall not be constituted by obstacles that arose only after the obliged Party was in default with fulfilment of its obligations, or which arose in connection with its economic situation.

In addition and for the sake of clarity, the Parties agree that any particular effects or impacts on the Seller or his performance under this Contract of the Covid-19 epidemic that meet the conditions set out above in this Art. 10.7 will be considered as vis major cases despite the fact of the existence of the epidemic outbreak on the date of the signature of this Contract.

- 10.8 Should a situation occur, which a Party could reasonably consider to constitute vis major, and which could affect fulfilment of its obligations hereunder, such Party shall as soon as possible notify the other Party and attempt to continue in its performance hereunder in a reasonable degree. Simultaneously, such Party shall inform the other of any and all its proposals, including alternative modes of performance, however, without consent of the other Party, it shall not proceed to effect such alternative performance.
- 10.9 If a situation constituting vis major occurs, the deadlines imposed hereunder shall be extended by the period of the documented duration of the said vis major. The obliged Party shall properly document to the other Party the start and the finish of the vis major period.

Covid\_19 clause

- 10.10 Contractual penalties stipulated in Art. 10.1 and 10.3 above do not apply if the delay on the side of the Seller is caused by documented impacts of the covid\_19 outbreak on the Seller that could not have been reasonably foreseen and which can be overcome only with unreasonable additional effort or costs. Every such impact must be documented by the Seller, mainly the cause, when it occurred and how long it lasted.

Liability limitation

- 10.11 Except in case of any damage or injury to a property or to a human health or life, gross negligence, or wilful misconduct shall the Seller's liability be limited to the aggregate amount of this Contract. The Seller shall not be liable for indirect damages such as loss of business and loss of profit.

## **XI. Termination of the Contract**

- 11.1 This Contract may be terminated by withdrawal from the Contract on the grounds stipulated by law or in the Contract.
- 11.2 The Buyer is entitled to withdraw from the Contract without any penalty from Seller in any of the following cases:
  - i) material breach of the Contract is committed by the Seller and the Seller has not remedied such breach within 3 months (or another longer period agreed to by the Buyer if to remedy the breach in 3 months is impossible for reasons documented by the Seller) following the sending of a written notice by the Buyer;
  - ii) insolvency proceedings are initiated against the Seller's assets;
  - iii) the Seller is in delay with the delivery of any Firm Scope Substrate by more than 6 months.
- 11.3 The Buyer is entitled to withdraw from an order of the Optional Substrate without any penalty from the Seller (with the effect of the order cancelled but the Contract remaining valid) in case of delay with the delivery of the Optional Substrate by more than 6 months.
- 11.4 The Seller is entitled to withdraw from the Contract without any penalty from Buyer in the event of material breach of the Contract by the Buyer.

Termination of the Contract for vis major

- 11.5 Either Party is entitled to withdraw from the Contract without any penalty in case of a vis major event (Art. 10.7 hereof) related to the delivery of the Firm Scope Substrates that lasts more than 12 months.

Partial termination of the Contract for vis major

- 11.6 Either Party is entitled to partially withdraw from this Contract (i.e. to cancel the optional order) without any



penalty in relation to the manufacturing and delivery of the Optional Substrate in case of a vis major event (Art. 10.7 hereof) that lasts more than six months.

## **XII. Representatives, Notices**

12.1 The Seller has appointed the following authorised representative for communication with the Buyer in technical matters:

Ing. Martin Klečka

E-mail: [klecka@optixs.cz](mailto:klecka@optixs.cz), tel.: + 420 607 014 278

12.2 The Buyer has appointed the following authorised representative for communication with the Seller in technical matters:

Dr. Jonathan Tyler Green, e-mail: [tyler.green@eli-beams.eu](mailto:tyler.green@eli-beams.eu).

## **XIII. Choice of Law and disputes resolution**

13.1 This Contract and all the legal relationships arising out of it shall be governed by the laws of the Czech Republic.

13.2 The Parties acknowledge and note that the provisions of the Czech Civil Code shall apply in matters that are not explicitly regulated by this Contract.

13.3 Any and all disputes arising out of this Contract or the legal relationships connected with the Contract shall be resolved by the Parties by mutual negotiations. In the event that any dispute cannot be resolved by negotiations within sixty (60) days, the dispute shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one arbitrator appointed in accordance with the said Rules. The Emergency Arbitrator Provisions shall not apply.

**Arbitration proceedings place:** Berlin (Germany)

**Language:** English

**Constitution of the arbitral tribunal:** sole arbitrator

**Proceedings costs:** each Party shall bear its own proceedings and legal representation costs, no success based reimbursements.

## **XIV. Export Control**

In the event that the supply of the Substrates is under an applicable law subject to an end-user statement regarding use, an export license or any other similar administrative measure, the Buyer shall provide needed cooperation to meet the legal requirements and comply with the applicable rules. However, the Buyer must always remain entitled to use the Substrates for the operation of the ELI Beamlines research centre in the Czech Republic. Any resale of Substrates is subject to written approval of the Seller.

## **XV. SOCIAL, ECOLOGICAL AND INNOVATIVE ASPECTS**

The Buyer aims to conclude contracts with suppliers that take into account and implement the principles of social responsibility, ecological sustainability and innovation. Therefore, the Seller shall ensure that:

- a) this Contract shall be fulfilled only by persons that are employed in accordance with the applicable legal regulations (no illegal or child workers);
- b) while performing this Contract, all applicable health and safety regulations and rules at work place are observed;
- c) all persons performing this Contract are employed under fair and non-discriminatory working conditions;
- d) if presented with different manners of fulfilling this Contract, the Seller shall select the solution/process that is in accordance with the principles governing nature conservation and nature protection, ecological sustainability and ecological waste management; and



e) if presented with different manners of fulfilling this Contract, the Seller shall select the solution/process that is the most innovative.

## **XVI. Final provisions**

16.1. The Buyer makes the Seller aware that the Buyer is going to transfer the ELI Beamlines research facility (as of today owned and operated by the Buyer) for construction and operation of which is the supply under this Contract being purchased to the Extreme Light Infrastructure ERIC (ELI ERIC). The Extreme Light Infrastructure ERIC (ELI ERIC) is a legal person set up under the Regulation (EC) No 723/2009 and it is the future long term owner and operator of the ELI Beamlines facility. The Seller by entering this Contract agrees that the Buyer is entitled to assign all rights and obligations from this Contract to Extreme Light Infrastructure ERIC (ELI ERIC) without further consent of the Seller. The Buyer shall inform the Seller on the completed assignment without undue delay.

16.2. The Buyer hereby declares that it is not with respect to the subject hereof an entrepreneur and that the subject of the Contract doesn't fall within the scope of any of its entrepreneurial activities.

16.3. The Contract represents the entire and comprehensive agreement between the Buyer and the Seller.

16.4. In the event that any of the provisions of this contract shall later be shown or determined to be invalid, ineffective or unenforceable, then such invalidity, ineffectiveness or unenforceability shall not cause invalidity, ineffectiveness or unenforceability of the Contract as a whole. In such event the Parties undertake without undue delay to replace after mutual agreement such invalid, ineffective or unenforceable provision of the Contract by a new provision, that in the extent permitted by the laws and regulations of the Czech Republic, relates as closely as possible to the intentions of the Parties to the Contract at the time of creation hereof.

16.5. 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.

16.6. This Contract may be changed or supplemented solely by means of numbered supplements in writing, furnished with the details of time and place and signed by duly authorised representatives of the Parties.

16.7. The following Annexes form integral part of the Contract:

Annex No. 1: Requirements Specification Document

Annex No. 2: Prices

16.8. The Parties, manifesting their consent with its entire contents, affirm the Contract with their signature.

For: Fyzikální ústav AV ČR, v. v. i.

For: OptiXs, s.r.o.

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Name: RNDr. Michael Prouza, Ph.D.  
Title: Director

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Name: Ing. Martin Klečka  
Title: CEO



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



## Annex No. 1 Requirements Specification Document

<b>Confidentiality Level</b>	<i>PU - Publish</i>	<b>TC ID / Revision</b>	<i>00317334/C</i>
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<b>Document Type</b>	<i>Specification (SP)</i>		

**[RSD Product Category C]**

***L4 PW and L2 grating substrates***

***TP21\_058***



***Keywords***

Gratings, optics, polishing

	<b>Position</b>	<b>Name</b>
<b>Responsible person</b>	Group leader of L2 DUHA Laser	Tyler Green
<b>Prepared by</b>	Group leader of Optical Materials Development	Daniel Kramer

### RSS History

RSS TC ID/revision	RSS - Date of Creation	RSS - Date of Last Modification	Systems Engineer
023367/A.001	22.10.2021	22.10.2021	A. Kuzmenko
023367/A.002	03.11.2021	03.11.2021	A. Kuzmenko

### Reviewed By

Name (reviewer)	Position (reviewer)	Date	Signature (approver)
Bedřich Rus	Head of department of Laser Systems		<u>NOTICE</u>
Lucie Kaletusová	Cleanroom Group Leader		<u>NOTICE</u>
Martin Laub	Head of department of Construction and Design Support		<u>Via TC</u>
Mojmír Havlík	Optical designer	3.11.2021	[REDACTED]
Pavel Trojek	Group leader of L4 ATON Laser	3.11.2021	[REDACTED]
Radek Toman	Legal Group leader	3.11.2021	[REDACTED]
Tyler Green	Group leader of L2 DUHA Laser		<u>Via TC</u>
Veronika Olšovcová	Group Leader of Safety	3.11.2021	[REDACTED]
Viktor Fedosov	Group Leader of Quality and Planning		<u>Via TC</u>

### Approved by

Name (approver)	Position (approver)	Date	Signature (approver)
Bedřich Rus	Head of department of Laser Systems	8/11/2021	[REDACTED]

### Revision History

Revision Number	Revision Made by	Date of Revision	Revision description	TC Revision
1	D. Kramer	21.10.2021	Draft preparation	A
2	D. Kramer, A. Kuzmenko	22.10.2021	RSD update; version for review	B
3	J.T. Green, A. Kuzmenko	03.11.2021	Final version	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.....	5
2. Functional, Performance and Design requirements .....	5
2.1. General requirements .....	5
2.2. Marking .....	6
3. Environmental Requirements .....	7
4. Packaging and transport requirements .....	7
4.1. Packaging Requirements .....	7
4.2. Transportation Requirements.....	8
5. Quality requirements .....	8
5.1. Quality Reports (QRs).....	8
5.2. Documentation and Data Control .....	8
5.3. Non-Conformity Control System.....	9
6. Verification Requirements for the Supplier .....	9
6.1. Phasing of the Delivery .....	9
6.1.1. Qualification of Design .....	9
6.1.2. Manufacturing .....	10
6.1.3. Acceptance .....	10

## 1. Introduction

### 1.1. Purpose

This Requirements Specification Document (RSD) lists the technical requirements and constraints on product applying in the RA1 Program of 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 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, operational, design, packaging, transportation, safety and quality requirements for the following products (*TP21\_058*): **L4 PW and L2 grating substrates** further referenced as **Grating Substrates**.

The products are integral parts of the standalone **L4 PW Laser System and L2 DUHA laser system**. These products are registered in the PBS software under the following PBS codes: **RA1.L4.CMP2.3 and RA1.L2.L2\_1.CMP.G**. In addition to the requirements specified in this RSD, the Grating Substrates shall comply completely with the requirements given in the Reference documents [see chapter 1.4].

### 1.3. Terms, Definitions and Abbreviations

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

Abbreviation	Meaning
CA	Contracting Authority (Institute of Physics CAS)
ELI	Extreme Light Infrastructure
NCR	Nonconformity Report
QR	Quality Report
RA1	Research Activity 1
RD	Reference Document
RMS	Root Mean Square
RSD	Requirements Specification Document

### 1.4. Reference documents

Number of doc.	Title of Document/File
RD-01	00317336-C_Drawings for Grating substrates L2 and L4PW_TP21_058.rar

Detailed list of drawings included within **RD-01 archive**:

Type #	Drawing Name	Drawing Number	Sheets	File format
1	L2 G1 substrate	L2 G1	1	PDF
2	L2 G2 substrate	L2 G2	1	PDF
3	L4P GR1 substrate	L4P GR1	1	PDF
4	L4P GR2 substrate	L4P GR2	1	PDF

## 1.5. References to standards

If this document or RD-01 include references to standards or standardized/standardizing technical documents the CA allows/permits also another equivalent solution to be offered.

## 2. Functional, Performance and Design requirements

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

### 2.1. General requirements

REQ-033471/A

The Supplier shall deliver within the firm scope of delivery the number of **Grating Substrates** given in Table 1.

Table 1 – number of elements to be delivered

Drawing Name	Pieces required
L2 G1	2
L2 G2	2
L4P GR1	2
L4P GR2	1

REQ-033472/A

The Supplier shall deliver within the optional scope of delivery (as described in the contract) the **Grating Substrates** given in Table 2.

Table 2 – number of elements which can be supplied upon request of the CA

Drawing Number	Pieces required
L4P GR2	1

REQ-033473/A

The Supplier shall provide the manufacturing drawings for the **Grating Substrates** in conformity with reference document **RD-01** (see chapter 1.4) for the review as agreed with the CA.

*NOTE: It is not necessary to disclose any proprietary information but to make sure all the requirements related to production from this RSD were correctly taken into account.*

REQ-033474/A

The parameters of the uncoated **L2 G1 grating substrates** shall correspond to the requirements given in the reference document **RD-01** (Type #1; see chapter 1.4).

REQ-033475/A

The parameters of the uncoated **L2 G2 grating substrates** shall correspond to the requirements given in the reference document **RD-01** (Type #2; see chapter 1.4).

REQ-033476/A

The parameters of the uncoated **L4P GR1 grating substrates** shall correspond to the requirements given in the reference document **RD-01** (Type #3; see chapter 1.4).

REQ-033477/A

The parameters of the uncoated **L4P GR2 grating substrates** shall correspond to the requirements given in the reference document **RD-01** (Type #4; see chapter 1.4).

REQ-033478/A

Each **Grating substrate** shall be delivered with 2 pc of 50.8 mm (+0/-0.5 mm) diameter witness samples polished with the same technology and made from the same material as the main parts. The thickness shall be (9.5 ± 0.5) mm and wedge 10 to 30 arc min.

REQ-033577/A

If the Supplier intends to use a material other than Corning ULE or Ohara ClearCeram-Z HS (CCZ-HS) for the L2 G1 and L2 G2 substrates, the Supplier must prove the equivalence of the suggested material to Corning ULE or Ohara ClearCeram-Z HS.

*NOTE: Any choice of material is subject to approval by the CA.*

## 2.2. Marking

REQ-033479/A

Each **Grating Substrate** delivered within the firm scope shall be marked according to the reference document **RD-01**.

*NOTE1: Alternative marking method can be agreed with the CA.*

*NOTE2: The serial numbers and grating names are listed in Table 3.*

Table 3: names and serial numbers for marking

Element type	Element #	Part Name	Unique part identifier number
L2 grating substrate G1	1	L2 GR1 (1)	21100231
L2 grating substrate G1	2	L2 GR1 (2)	21100232
L2 grating substrate G2	3	L2 GR2 (1)	21100233
L2 grating substrate G2	4	L2 GR2 (2)	21100234
L4PW grating substrate G1	5	L4P GR1 (1)	21100158
L4PW grating substrate G1	6	L4P GR1 (2)	21100159
L4PW grating substrate G2	7	L4P GR2 (1)	21100160

REQ-033480/A

The optional **Grating Substrate** shall be marked according to instructions provided by the CA upon written order of the substrate.

### 3. Environmental Requirements

REQ-033481/A

The Supplier and the CA shall agree on the cleaning method to clean **Grating Substrates** without decreasing their properties and to avoid contamination of clean space.

*NOTE: The cleaning methods may use high gas flow (dry air) and specialized chemical cleaning liquids (i.e. methanol, isopropyl alcohol, deionized water).*

### 4. Packaging and transport requirements

#### 4.1. Packaging Requirements

REQ-033482/A

All the **Grating Substrates** shall be cleaned and packed in a 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 equivalent solution to be offered.*

REQ-033483/A

Each **Grating Substrate** shall be placed in a separate PET-G container preventing damage, degradation and contamination. The PET-G containers shall be packed in a minimum of two plies separate clean packaging and placed in a sufficiently padded box for transport. Transport boxes shall contain tilt and shock sensors.

*NOTE: Alternative solution consisting i.e. of metallic containers with compliant inserts has to be approved by the CA in advance.*

## 4.2. Transportation Requirements

REQ-033484/A

The transportation to the final destination of the **Grating Substrates** shall be conducted by the CA after acceptance of the substrates.

## 5. Quality requirements

### 5.1. Quality Reports (QRs)

REQ-033485/A

For each uncoated **Grating Substrate**, the Supplier shall perform the following tests of product quality and provide corresponding **specific quality reports (I - V)**:

- I. S-D report listing the main defects;
- II. Microroughness report from the center and 1 corner;
- III. Dimensional report listing main dimensions;
- IV. Substrate material report;
- V. Interferometric report of surface flatness over the clear aperture including wavefront slope error at angle of incidence specified in RD-01 (the use of other angles is possible upon approval of CA). Sub-aperture measurement is possible for spatial periods smaller than 6 mm.

### 5.2. Documentation and Data Control

REQ-033486/A

For each **Grating Substrate**, the Supplier shall provide a report about the fulfilment of the technical requirements defined by the product RSD, and completeness of the product (see REQ-033493/A).

REQ-033487/A

The Supplier shall use the following data formats:

- \*.dat (Zygo MX compatible 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
- text processors \*.doc, \*.docx, OpenDocument Format
- spreadsheet processors \*.xls, \*.xlsx, OpenDocument Format
- presentations \*.ppt, \*.pptx; OpenDocument Format

REQ-033488/A

The Supplier shall provide the following type of documents:

- 3D model (if available) and 2D manufacturing drawings;
- Printable format for text documents;
- Binary format for interferometric data readable by Zygo MX Software.

## 5.3. Non-Conformity Control System

REQ-033489/A

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

## 6. Verification Requirements for the Supplier

The verification process will be performed by the Supplier to demonstrate that the **Grating Substrates** meet the specified requirements of the CA.

### 6.1. 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 for Manufacturing**
- **Manufacturing**
- **Acceptance**

#### 6.1.1. 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**.

Output of this phase is **Qualified Design**.

REQ-033490/A

The Supplier shall present to the CA the following documents for approval:

- detailed procedures related to the testing during the Manufacturing phase;
- final manufacturing drawings and metrology layout (see REQ-033473/A and REQ-033488/A). No proprietary information shall be revealed to the CA on the drawings.

REQ-033491/A

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

- structure and content of quality reports (see REQ-033485/A);
- **HOW** and **WHEN** each of the technical requirements related to the appropriate Grating Substrates will be verified (through QRs, see REQ-033485/A);
- common non-conformance control system (see REQ-033489/A).

### 6.1.2. Manufacturing

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

This quality gate concerns primarily:

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

Output of this phase is **readiness of the verified Grating Substrates to shipment**.

REQ-033492/A

The results of verification within the Manufacturing phase shall be recorded by the Supplier in corresponding QRs (see REQ-033485/A and REQ-033486/A) and provided to the CA for approval.

### 6.1.3. Acceptance

The Acceptance phase (as defined in the Contract) shall demonstrate the following:

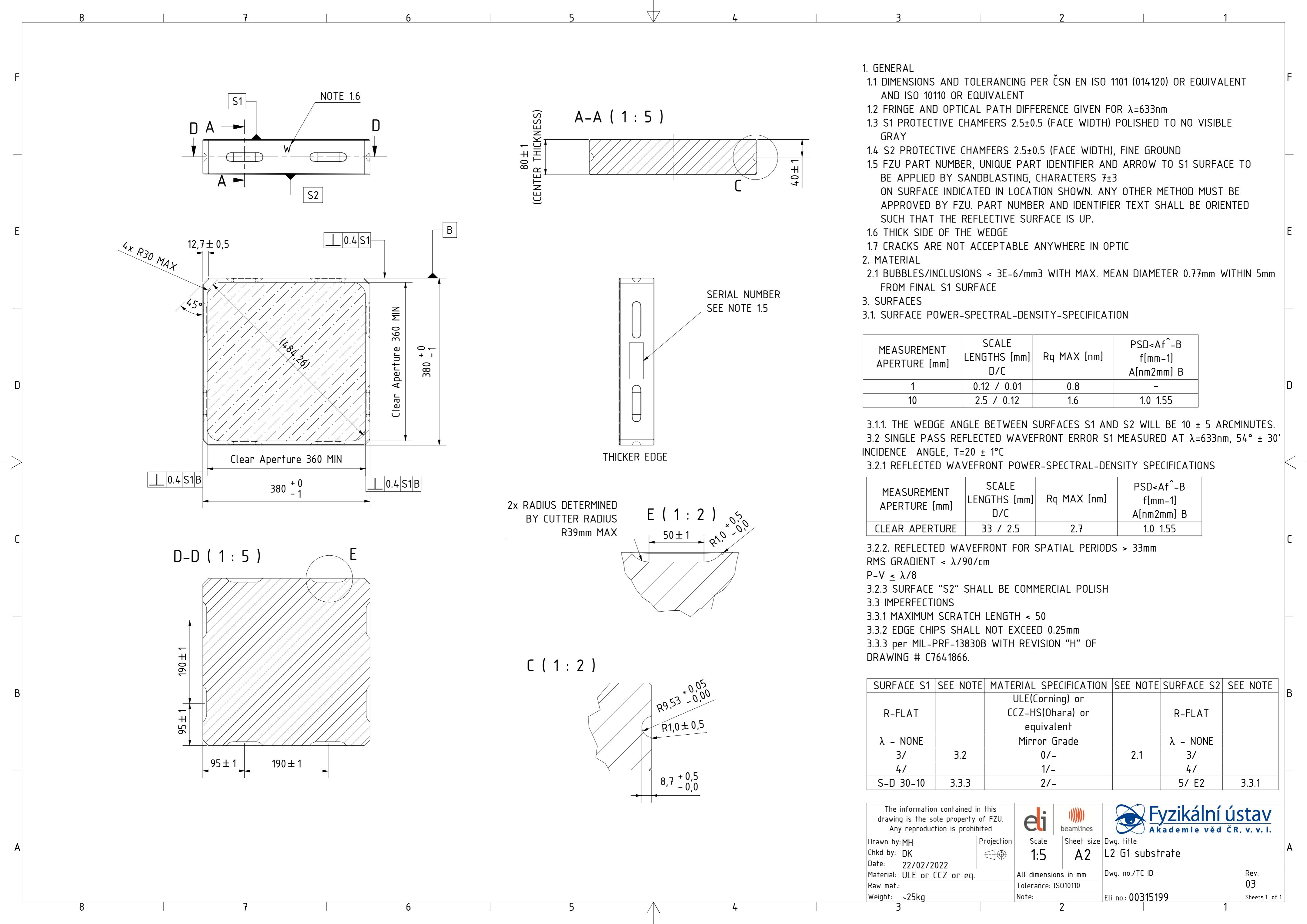
- Each Grating Substrate has been successfully verified and this process has been documented in an appropriate way through QRs (see REQ-033485/A, REQ-033486/A);
- All detected non-conformities have been solved in accordance with REQ-033489/A;
- Grating Substrates are free of fabrication errors.

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 the Non-Conformity Report (NCR) and ELI non-conformity control process shall be applied (see REQ-033489/A).

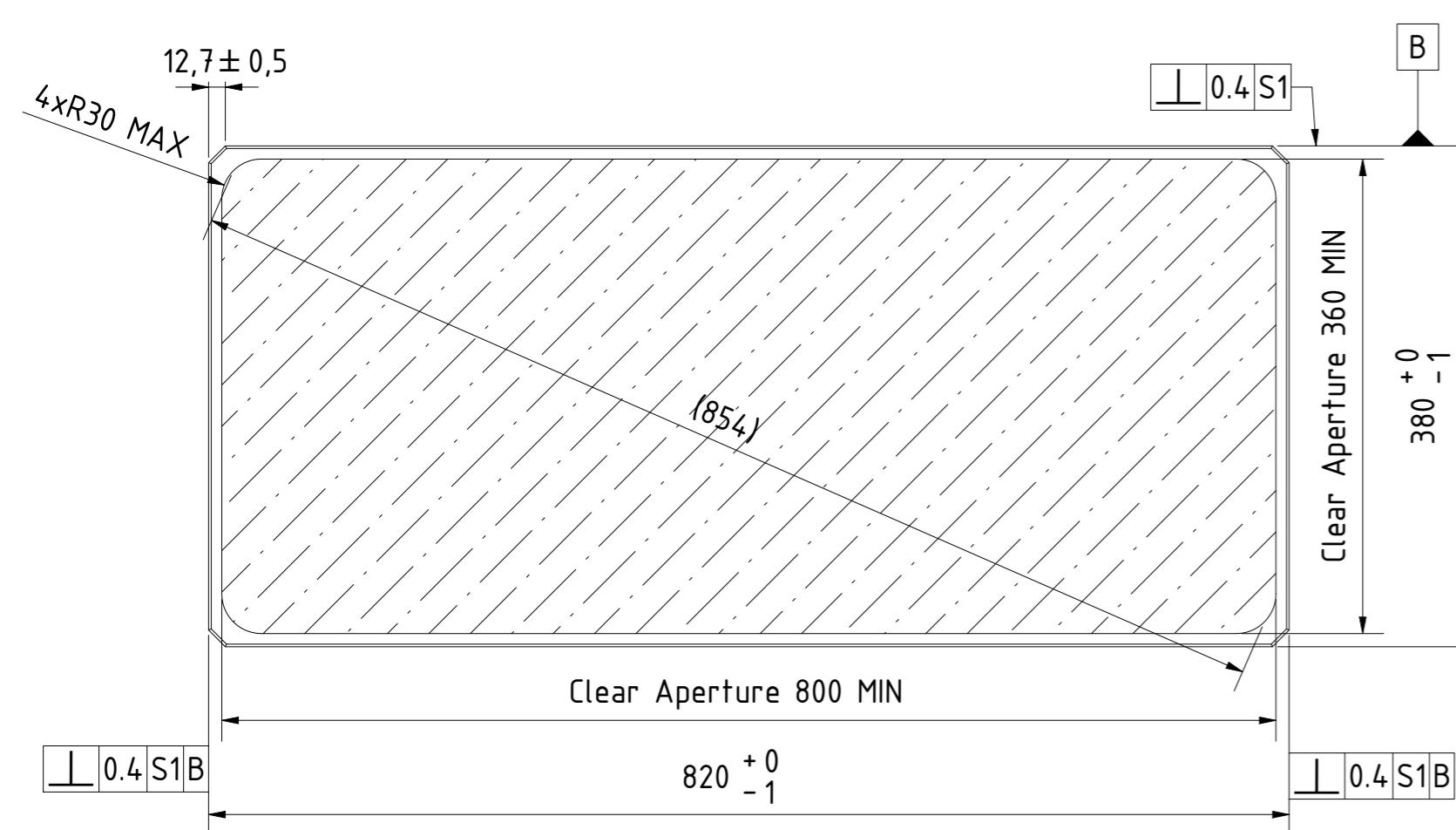
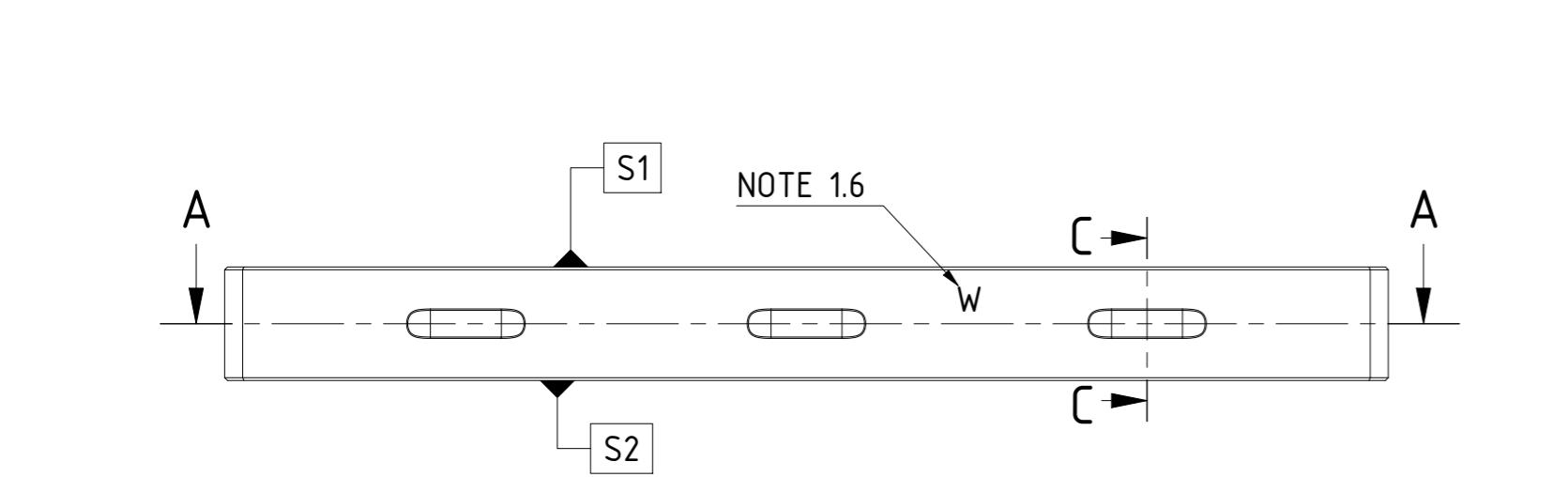
REQ-033493/A

The verification process shall be carried out by the Supplier and it is successfully completed when the Grating Substrates comply with all specifications and the results of this process are documented in an appropriate way through QRs (see REQ-033485/A, REQ-033486/A).

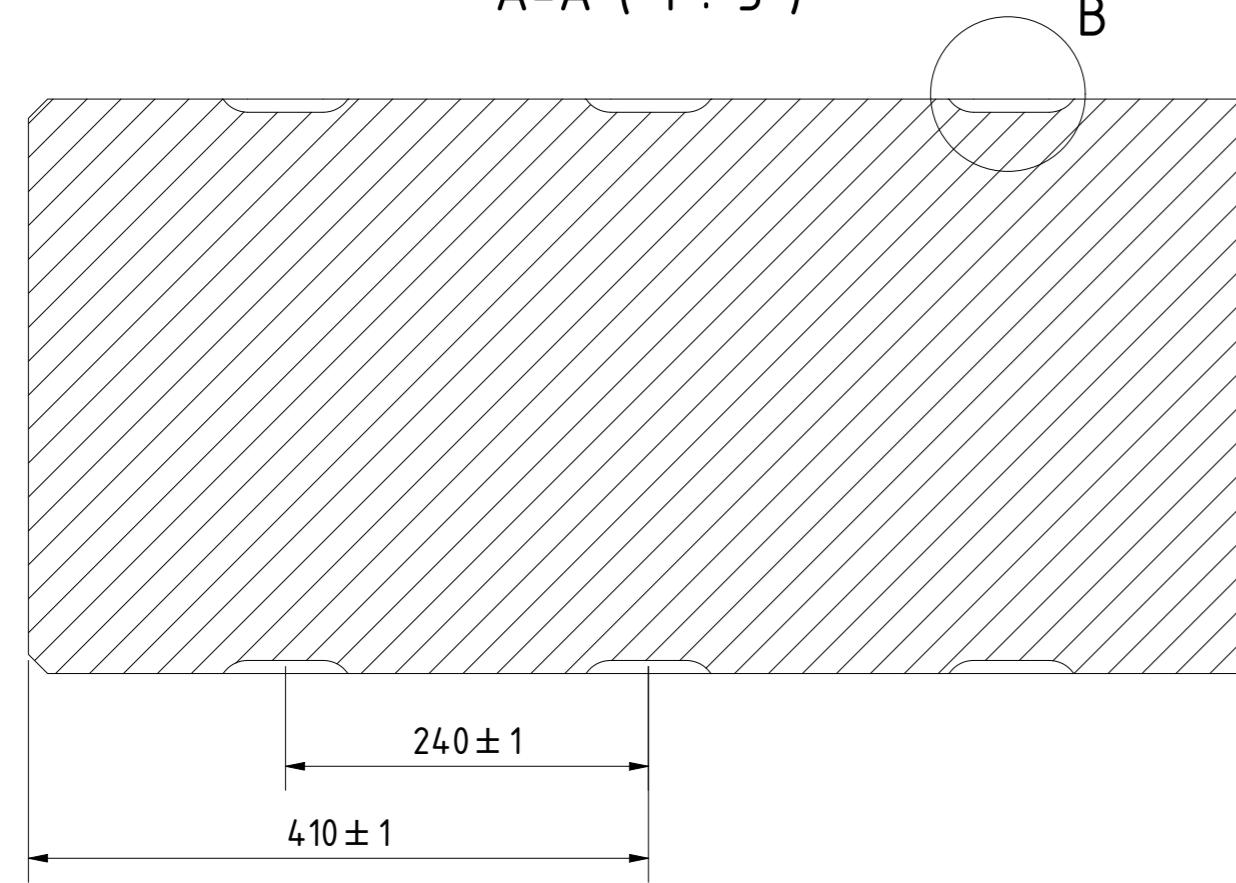
*NOTE: Acceptance will be carried out by the CA (or if required, representatives/contractors appointed by the CA) on the final products at the Supplier's site.*



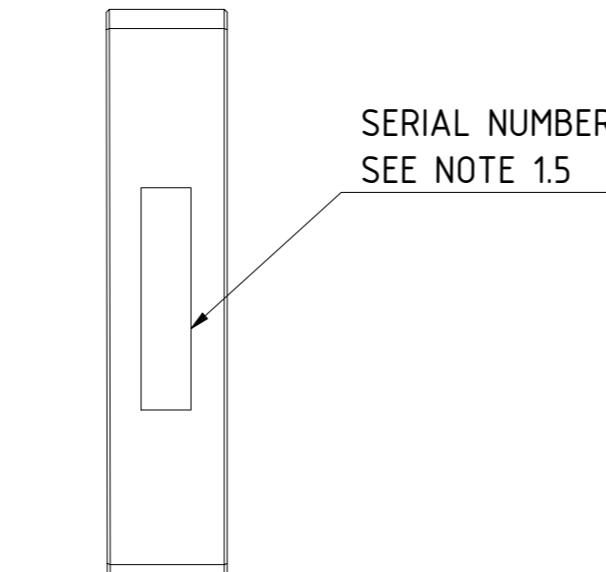
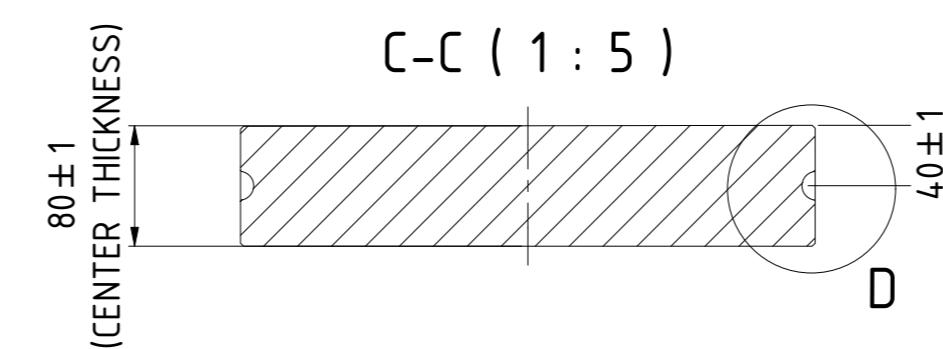
8 7 6 5 4 3 2 1



A-A (1 : 5)

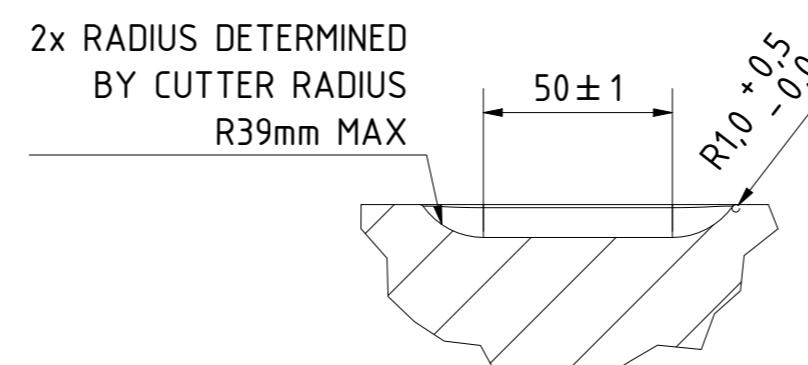


C-C (1 : 5)

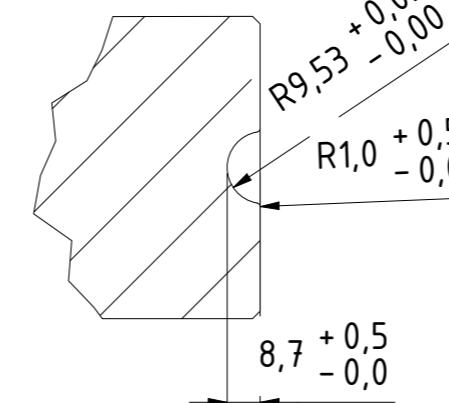


THICKER EDGE

B (1 : 2)



D (1 : 2)



## 1. GENERAL

1.1 DIMENSIONS AND TOLERANCING PER ČSN EN ISO 1101 (014120) OR EQUIVALENT AND ISO 10110 OR EQUIVALENT

1.2 FRINGE AND OPTICAL PATH DIFFERENCE GIVEN FOR  $\lambda=633\text{nm}$

1.3 S1 PROTECTIVE CHAMFERS  $2.5 \pm 0.5$  (FACE WIDTH) POLISHED TO NO VISIBLE GRAY

1.4 S2 PROTECTIVE CHAMFERS  $2.5 \pm 0.5$  (FACE WIDTH), FINE GROUND

1.5 FZU PART NUMBER, UNIQUE PART IDENTIFIER AND ARROW TO S1 SURFACE TO BE APPLIED BY SANDBLASTING, CHARACTERS  $7 \pm 3$  ON SURFACE INDICATED IN LOCATION SHOWN. ANY OTHER METHOD MUST BE APPROVED BY FZU. PART NUMBER AND IDENTIFIER TEXT SHALL BE ORIENTED SUCH THAT THE REFLECTIVE SURFACE IS UP.

1.6 THICK SIDE OF THE WEDGE

1.7 CRACKS ARE NOT ACCEPTABLE ANYWHERE IN OPTIC

## 2. MATERIAL

2.1 BUBBLES/INCLUSIONS  $< 3E-6/\text{mm}^3$  WITH MAX. MEAN DIAMETER  $0.77\text{mm}$  WITHIN  $5\text{mm}$  FROM FINAL S1 SURFACE

## 3. SURFACES

### 3.1. SURFACE POWER-SPECTRAL-DENSITY-SPECIFICATION

MEASUREMENT APERTURE [mm]	SCALE LENGTHS [mm] D/C	Rq MAX [nm]	PSD<Af^B f[mm^-1] A[nm^2mm] B
1	0.12 / 0.01	0.4	-
10	2.5 / 0.12	0.55	1.0 1.55

3.1.1. THE WEDGE ANGLE BETWEEN SURFACES S1 AND S2 WILL BE  $10 \pm 5$  ARCMINUTES.

3.2 SINGLE PASS REFLECTED WAVEFRONT ERROR S1 MEASURED AT  $\lambda=633\text{nm}$ ,  $54^\circ \pm 30'$  INCIDENCE ANGLE,  $T=20 \pm 1^\circ\text{C}$

### 3.2.1 REFLECTED WAVEFRONT POWER-SPECTRAL-DENSITY SPECIFICATIONS

MEASUREMENT APERTURE [mm]	SCALE LENGTHS [mm] D/C	Rq MAX [nm]	PSD<Af^B f[mm^-1] A[nm^2mm] B
CLEAR APERTURE	33 / 2.5	1.8	1.0 1.55

3.2.2. REFLECTED WAVEFRONT FOR SPATIAL PERIODS  $> 33\text{mm}$  RMS GRADIENT  $\leq \lambda/90/\text{cm}$

P-V  $\leq \lambda/8$

3.2.3 SURFACE "S2" SHALL BE COMMERCIAL POLISH

### 3.3 IMPERFECTIONS

3.3.1 MAXIMUM SCRATCH LENGTH  $< 50$

3.3.2 EDGE CHIPS SHALL NOT EXCEED  $0.25\text{mm}$

3.3.3 per MIL-PRF-13830B WITH REVISION "H" OF DRAWING # C7641866.

LEFT SURFACE	SEE NOTE	MATERIAL SPECIFICATION	SEE NOTE	RIGHT SURFACE	SEE NOTE
R-FLAT		ULE(Corning) or CCZ-HS(Ohara) or equivalent		R FLAT	
$\lambda$ - NONE		Mirror Grade		$\lambda$ - NONE	
3/	3.2	0/-	2.1	3/	
4/		1/-		4/	
S-D 30-10	3.3.3	2/-		5/E2	3.3.1

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Drawn by: MH

Chkd by: DK

Date: 22/02/2022

Material: ULE or CCZ or eq.

Raw mat.:

Weight: ~55kg



Fyzikální ústav  
Akademie věd ČR, v. v. i.



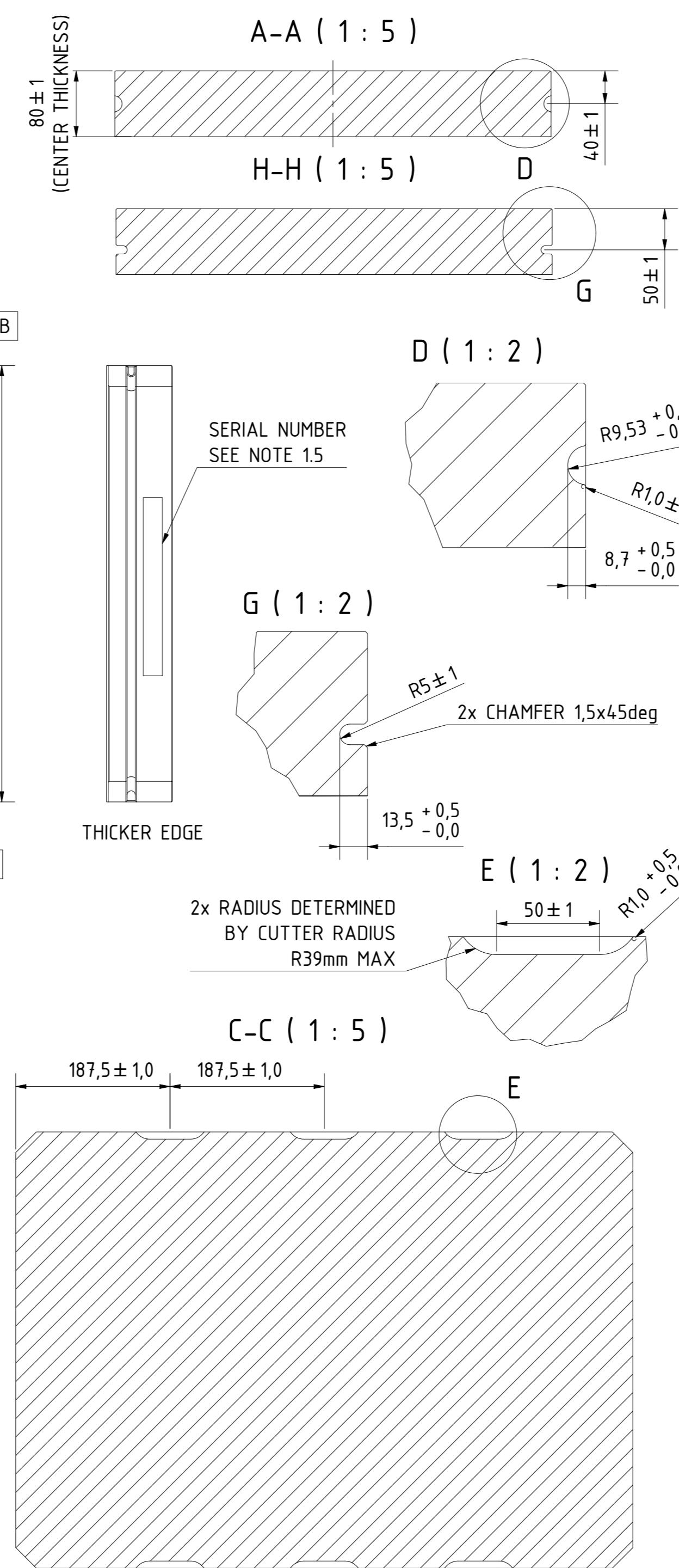
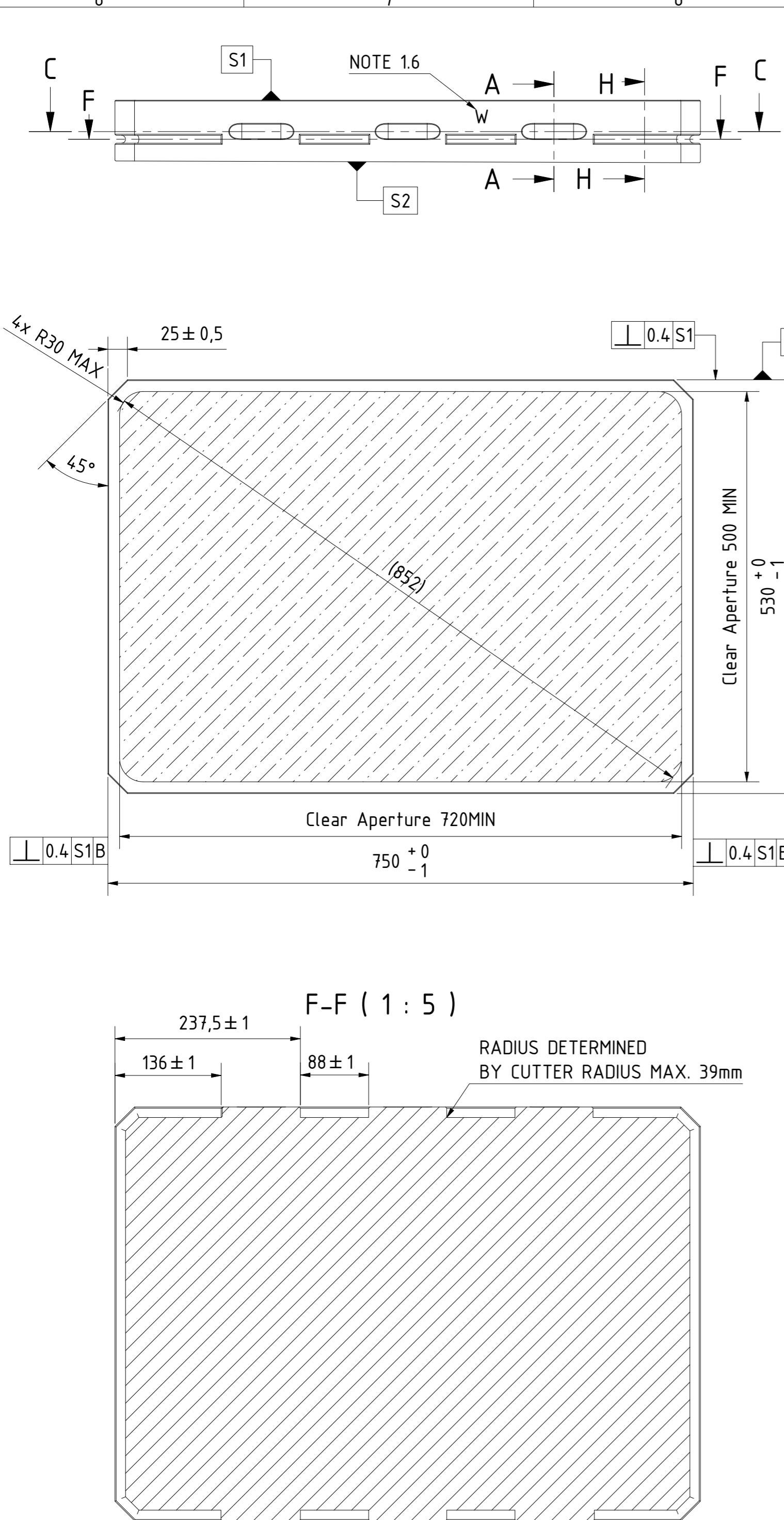
Dwg. title  
L2 G2 substrate

Dwg. no./TC ID

Rev. 03

Eli no.: 00315200

Sheets 1 of 1



1. GENERAL

- 1.1 DIMENSIONS AND TOLERANCING PER ČSN EN ISO 1101 (014120) OR EQUIVALENT AND ISO 10110 OR EQUIVALENT
- 1.2 FRINGE AND OPTICAL PATH DIFFERENCE GIVEN FOR  $\lambda=633\text{nm}$
- 1.3 S1 PROTECTIVE CHAMFERS 2.5±0.5 (FACE WIDTH) POLISHED TO NO VISIBLE GRAY
- 1.4 S2 PROTECTIVE CHAMFERS 2.5±0.5 (FACE WIDTH), FINE GROUND
- 1.5 FZU PART NUMBER, UNIQUE PART IDENTIFIER AND ARROW TO S1 SURFACE TO BE APPLIED BY SANDBLASTING, CHARACTERS  $7\pm 3$  ON SURFACE INDICATED IN LOCATION SHOWN. ANY OTHER METHOD MUST BE APPROVED BY FZU. PART NUMBER AND IDENTIFIER TEXT SHALL BE ORIENTED SUCH THAT THE REFLECTIVE SURFACE IS UP.
- 1.6 THICK SIDE OF THE WEDGE
- 1.7 CRACKS ARE NOT ACCEPTABLE ANYWHERE IN OPTIC

## 2. MATERIAL

2.1 BUBBLES/INCLUSIONS  $< 3E-6/\text{mm}^3$  WITH MAX. MEAN DIAMETER 0.77mm WITHIN 5mm FROM FINAL S1 SURFACE

## 3. SURFACES

### 3.1. SURFACE POWER-SPECTRAL-DENSITY-SPECIFICATION

MEASUREMENT APERTURE [mm]	SCALE LENGTHS [mm] D/C	Rq MAX [nm]	PSD $<Af^B$ f[mm $^{-1}$ ] A[nm $^2\text{mm}$ ] B
1	0.12 / 0.01	0.8	-
10	2.5 / 0.12	1.6	1.0 1.55

3.1.1. THE WEDGE ANGLE BETWEEN SURFACES S1 AND S2 WILL BE  $10^\circ \pm 5$  arcminutes.  
3.2. SINGLE PASS REFLECTED WAVEFRONT ERROR S1 MEASURED AT  $\lambda=633\text{nm}$ ,  $73^\circ \pm 30'$  INCIDENCE ANGLE,  $T=20 \pm 1^\circ\text{C}$

### 3.2.1 REFLECTED WAVEFRONT POWER-SPECTRAL-DENSITY SPECIFICATIONS

MEASUREMENT APERTURE [mm]	SCALE LENGTHS [mm] D/C	Rq MAX [nm]	PSD $<Af^B$ f[mm $^{-1}$ ] A[nm $^2\text{mm}$ ] B
CLEAR APERTURE	33 / 2.5	2.7	1.0 1.55

3.2.2. REFLECTED WAVEFRONT FOR SPATIAL PERIODS  $> 33\text{mm}$   
RMS GRADIENT  $\leq \lambda/90/\text{cm}$   
 $P-V \leq \lambda/8$

3.2.3 SURFACE "S2" SHALL BE COMMERCIAL POLISH

### 3.3 IMPERFECTIONS

3.3.1 MAXIMUM SCRATCH LENGTH  $< 50$  nm

3.3.2 EDGE CHIPS SHALL NOT EXCEED 0.25mm

3.3.3 per MIL-PRF-13830B with revision "H" of drawing # C7641866.

SURFACE S1	SEE NOTE	MATERIAL SPECIFICATION	SEE NOTE	SURFACE S2	SEE NOTE
R-FLAT		Fused Silica or Glass-ceramic with CTE $< 0.2\text{ppm/K}$ @ 20deg C		R-FLAT	
$\lambda$ - NONE		Mirror Grade		$\lambda$ - NONE	
3/	3.2	0/-		2.1	3/
4/		1/-		4/	
S-D 30-10	3.3.3	2/-		5/ E2	3.3.1

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Drawn by: MH  
Chkd by: DK  
Date: 22/02/2022  
Material: All dimensions in mm  
Raw mat.: Tolerance: ISO10110  
Weight: ~69kg

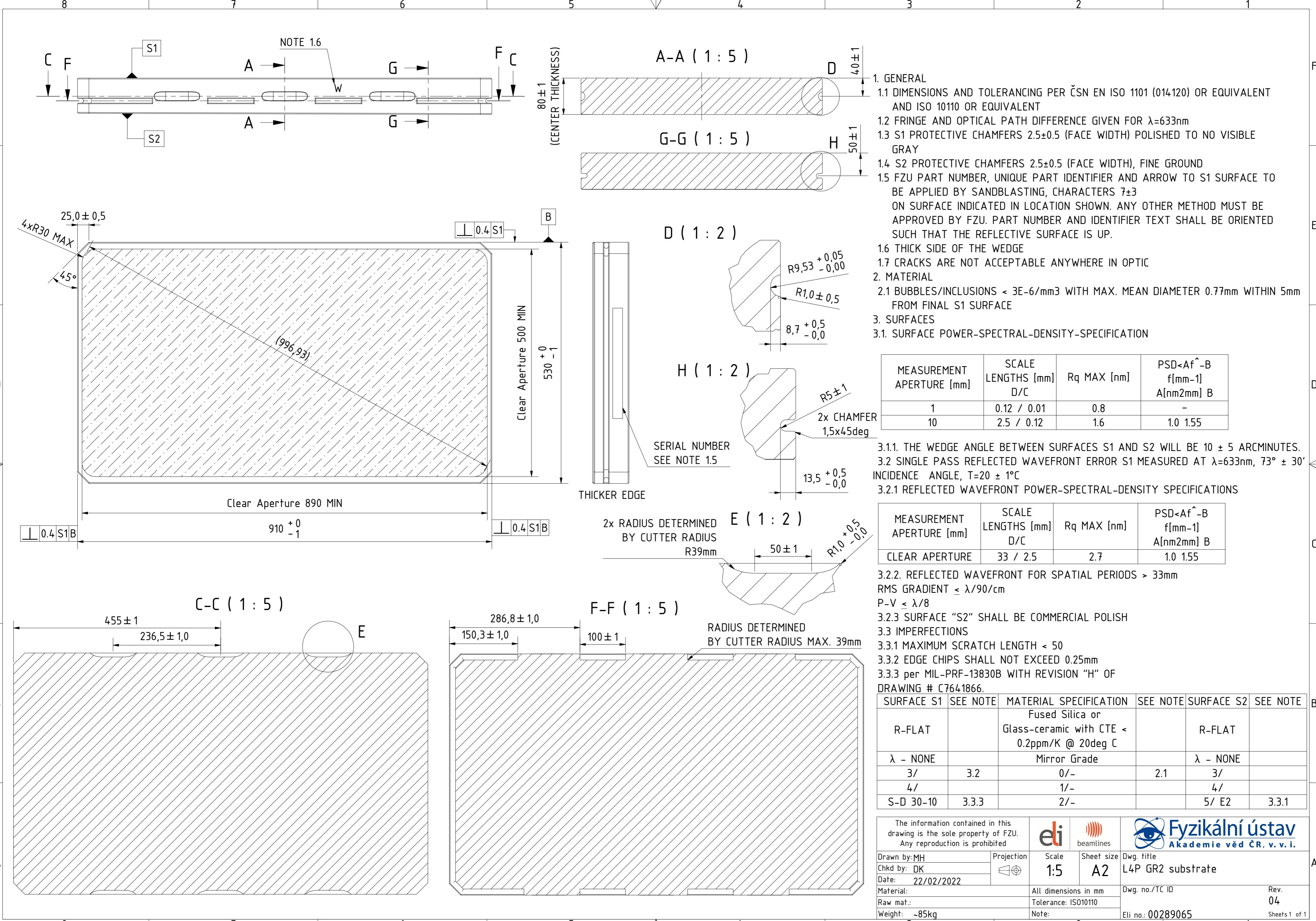
Projection  
Scale  
Sheet size

1:5  
A2

Dwg. title  
Fyzikální ústav  
Akademie věd ČR, v. v. i.

L4P GR1 substrate  
Dwg. no./TC ID  
Rev. 04

Eli no.: 00315201  
Sheets 1 of 1





## Annex No. 2 Prices

Item	Description of the Item	Price in USD excl. VAT
<b>Firm scope:</b>		
A	Manufacture of <b>2 pieces of L2 G1 Substrates</b>	██████████
B	Manufacture of <b>2 pieces of L2 G2 Substrates</b>	██████████
C	Manufacture of <b>2 pieces of L4PW GR1 Substrates</b>	██████████
D	Manufacture of <b>1 piece of L4PW GR2 Substrate</b>	██████████
E	<b>Total price for Firm Scope Substrates (= item A + item B + item C + item D)</b>	██████████
<b>Call option:</b>		
F	Price for <b>1 extra L4PW GR2 Substrate</b>	██████████
<b>Total Bid Price:</b>		
G	<b>Total Bid Price</b>	<b>1 151 730,00</b>