

Procurement Guide

for the European open tender for a Bifacial LED based Solar Simulator

Contracting Authority:

TNO, Netherlands Organisation for applied scientific research

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Definitions

In this Procurement Guide, words written with an initial capital, both singular and plural, shall have the following meanings. Terms not mentioned in this list but defined in the Dutch Public Procurement Act [*Aanbestedingswet*] have the meaning assigned to them in the Procurement Act.

Contracting Authority	: TNO, Netherlands Organisation for applied scientific research.
Procurement Guide	: the present document describing the Procurement Procedure.
Procurement Procedure	: the present European public Procurement Procedure by which the conclusion of the Contract is tendered.
Dutch Public Procurement Act	: Dutch Public Procurement Act 2012 (hereinafter: "Procurement Act" or "Aw") concerning the implementation of procurement directives 2014/23/EU, 2014/24/EU and 2014/25/EU.
Procurement Documents	: all documents prepared by or on behalf of TNO for the purpose of the Procurement Procedure.
Announcement	: the Notice of Procurement Procedure at www.TenderNed.nl .
Annex(es)	: The Annexes to the Procurement Guide, namely: <ul style="list-style-type: none">• A01 to A.[...] - i.e. the formats to be used by the Tenderer in preparing and submitting its Tender,• B01 to B.[...] - i.e. the formats to be used by the intended beneficiary for the purpose of submitting supporting documents relating to the ESPD at the request of TNO,• C01 to C.[...] - i.e. documents and (additional) information, which form part of the Procurement Guide and are not intended for submission by the Tenderer or the intended beneficiary.
Combination	: an alliance of enterprises tendering jointly as a single Tenderer, each of the Combination members being jointly and severally liable for the performance of the Contract.
Third Party	: natural persons on whom, or legal entities on which, a Tenderer may rely in order to meet the Suitability Requirements of financial and economic standing and/or technical and professional competence, irrespective of the legal nature of its links with said Third Party.
Suitability Requirements	: the requirements imposed by TNO on Tenderers not excluded on the basis of the Grounds for Exclusion, which Tenderers must meet as a minimum in order to be eligible for the award of the Contract, on penalty of invalidation, as described in Section 5.
Award criterion	: the criterion used by TNO in the assessment and ranking of Tenders for the purpose of awarding the Contract, as referred to in Section 6.
Award decision	: the written communication of TNO's choice of the Tenderer with which it intends to conclude the Contract or its choice not to conclude a Contract.
Tenderer	: an entrepreneur submitting a Tender.
Tender	: an offer/quotation made by a Tenderer.
Minimum Requirements	: the requirements set by TNO regarding the manner in which the Contractor must perform the Contract.
Information Notice	: the document containing further information about the Procurement Procedure and/or the Procurement Documents and in which TNO presents and answers the Tenderers' questions in anonymised form.
Contractor	: the Tenderer with which the Contract is concluded.
Contract	: the Contract concluded with the Contractor pursuant to the outcome of the Procurement Procedure e.g. the Purchase Order provided to the Contractor, referring to this Tender procedure and the Tender concerned. The Contract is concluded after it has been signed by TNO and the Contractor.

Grounds for Exclusion : grounds for exclusion from participation in the Procurement Procedure, which – depending on the provisions of the Procurement Documents – relate to circumstances concerning the (person of the) Tenderer, the (person of the) Third Party and/or the (person of the) Subcontractor.

European Single Procurement Document : the declaration as referred to in Article 2.84(1) of the Procurement Act, which TNO has attached to the Procurement Guide as Annex **A01** (hereinafter: ESPD).

1 Contracting Authority and Contract

1.1 TNO

TNO, Netherlands Organisation for applied scientific research, hereinafter referred to as "TNO", is a modern unit-driven Research & Knowledge organisation, established by law in 1932 to make scientific research applicable to enterprises, government bodies and civil-society organisations and thereby strengthen innovative capacity.

TNO is a public-law legal entity and operates under the ministerial responsibility of the Dutch Minister of Economic Affairs but, as an organisation, performs its tasks independently.

Every day, TNO's employees are working on the development and application of innovative research. TNO provides contract research and specialist consultancy and licenses patents and specialist software. TNO starts up new enterprises to bring innovations to market.

TNO's strength lies in its ability to combine diverse fields of science to create ground-breaking, sustainable solutions. Increasingly, TNO does so by collaborating with government bodies, industry, other knowledge institutions and civil-society organisations, both nationally and internationally. Through its work, TNO stimulates economic growth and social innovation.

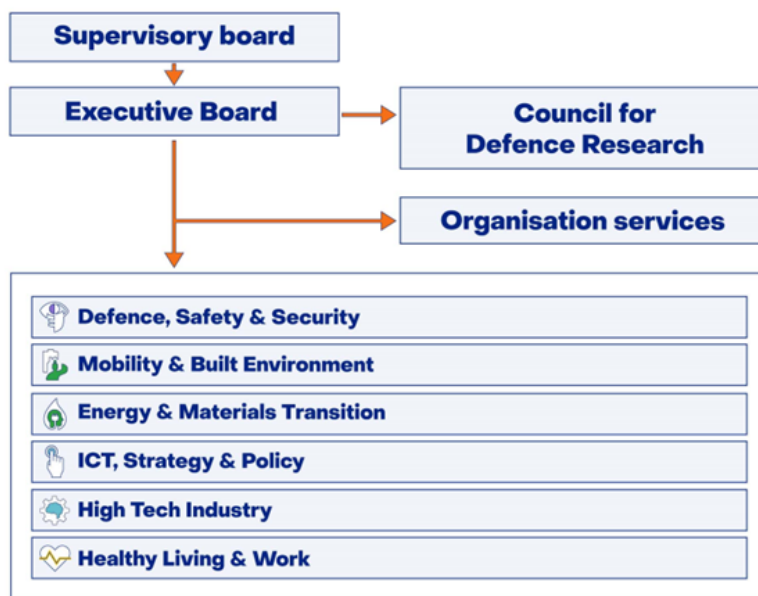
TNO's mission is creating impactful innovations for the sustainable wellbeing and prosperity of society. How TNO fulfils this mission is described in its strategic plan for 2022-2025 and focuses on four societal challenges: a safe and secure society, a sustainable society, a healthy society and the digitalisation of society and industry.

TNO's goal is to connect, change and accelerate: Innovation for Life

For more information on TNO, see: www.TNO.nl.

1.2 The TNO organisation

With TNO's highly ambitious approach comes an organisational form that effectively facilitates this ambition and a culture that challenges employees to innovate and collaborate. The TNO organisation has a unit structure as shown below:



The six organisational units (Units) are market-oriented and recognisable to TNO's customers and partners.

The Units are based across the Netherlands with a total of 21 locations/research facilities.

The head office is located in The Hague and accommodates the central staff bodies (Shared Services Organisation) and from where the entire TNO organisation is supported and managed.

Procurement department

The Procurement department is effecting the procurement on behalf of TNO in close cooperation with the department Solar Technologies & Applications. Procurement, as part of the Finance & Procurement department, is responsible for organising and executing procurement processes and ensuring that these processes are in line with the TNO objectives.

Solar Technologies and Applications

The Solar Research groups of TNO work together with industrial and scientific partners and clients, on research and development in the field of solar technologies and its integration into surfaces in our living environment. To this end, the groups have excellent technical facilities and in-depth expertise on all aspects of the PV value chain; from small solar cells to scale-up processes on semi-industrial pilot lines. Furthermore, these solar cells and modules must have a circular design and be intrinsically reliable and safe. This entails new solar cell design, new process and equipment development, reliability and lifetime testing, prototyping, field testing, development of advanced characterization and performance models. The ambition is to support the energy transition by delivering sustainable, reliable and highly efficient solar technologies which can be

integrated everywhere. For more information on the Solar Technologies and Applications department, see: <https://www.tno.nl/en/about-tno/organisation/units/energy-transition/solar-technologies-applications/>

1.3 Purpose of the Tender

The purpose of the Tender is TNO's intention to enter into a Contract with one (1) Contractor for the supply/delivery of a Bifacial LED based Solar Simulator. This supply/service shall be performed in accordance with the requirements and preferences as set out in the Procurement Documents.

1.4 Term of the Contract

TNO aims to have the Contract commence on the date mentioned in the schedule of paragraph 2.1. The Contract will consist of a Purchase Order to be sent based on the offer of the winning Tenderer.

1.5 Current situation, vision of future situation

In the current situation, TNO uses a solar simulator with a light engine based on a Xenon lamp. There are two reasons for TNO to replace this solar simulator. Firstly, the operational cost and dependency of a single (lamp) source for replacement parts. Second is the need to accurately measure multijunction and bifacial solar cells and (mini) modules.

Switching to a LED based light engine reduces the operational cost in multiple ways, not only (lamp) replacement parts but also energy consumption. On top TNO expects the additional functionality of spectral tuning. Therefore, TNO is looking for a 30x30 cm² bifacial LED based solar simulator with ample functionality and additional spectral tunability.

1.6 Objective, scope and content of the proposed Contract

The Contract to be entered into, provides for the supply of a Bifacial LED based Solar Simulator suitable to measure bifacial tandem cells and modules including external quantum efficiency, as specified in detail in the Programme of Requirements and Preferences (Sections 8 and relevant Annexes). Following the present European open tender procedure, hereafter: (public) Procurement Procedure, TNO intends to award a contract in accordance with the Procurement Guide. In general terms, the contract involves:

- Delivery
- Installation
- Service and Maintenance for 2 years.

2 Procurement Procedure

The Procurement Procedure is conducted pursuant to the applicable rules under the Aw. TNO has opted for the public procedure. This tender has been published on and will proceed through TenderNed, www.TenderNed.nl.

2.1 Schedule for the Procurement Procedure

The proposed schedule for the Procurement Procedure is as follows:

No.	Action points	Date
1.	Publication of Announcement of Contract (at www.TenderNed.nl)	3 December 2025
2.	Closing date for submission of questions by Tenderers	14 January 2026, 14:00 CET
3.	Issue of (final) Information Notice	28 January 2026
4.	Closing date and time for submission of Tenders	11 February 2026, 14:00 CET
5.	Notification of Award Decision	25 February 2026
6.	Closing date for submission of supporting documents by intended beneficiary	4 March 2026
7.	Closing date for submission of challenges	18 March 2026
8.	Final award	19 March (or short after)

The dates are indicative. TNO reserves the right to change the dates, subject of course to the minimum periods as laid down in the Dutch Public Procurement Act [*Aanbestedingswet*]. Affected enterprises will be notified of any change in the schedule via TenderNed.

2.2 Tender conditions

As part of the Procurement Procedure, TNO applies the following conditions.

2.2.1 Agreement

Submission of the Tender implies that the Tenderer agrees to the terms and conditions of the Tender Procedure and agrees to the contents of the Tender Documents, including any unwelcome answers in the Information Notice.

2.2.2 Formats

The Tenderer should use the formats as included in the Annexes to this Procurement Guide. It is expressly not permitted to make changes to these formats, unless TNO has expressly stated otherwise.

2.2.3 European Single Procurement Document (ESPD)

The Tenderer must submit an ESPD as specified in the instructions given below. The Tenderer must use the ESPD as appended in Annex **A01**.

To access and complete the ESPD electronically, the Tenderer must only use the Adobe Reader software program, preferably the latest version. Opening the ESPD in a program other than Adobe Reader may result in the ESPD appearing different from the version pre-filled by TNO and/or showing errors. Submission of an ESPD that differs from the version as provided by TNO with the Procurement Documents will render the Tender invalid, unless TNO considers this disproportionate in a specific case. The responsibility for opening the ESPD in the prescribed manner and submitting the correct version thereof rests with the Tenderer.

For legally valid signature of the ESPD, see Section 2.2.20 of this Procurement Guide.

2.2.4 Precedence of Procurement Documents

In the event of discrepancies between the contents of the various Procurement Documents, the following order of precedence applies during the Procurement Procedure, in descending order of prevalence:

- Information Notice(s): from most recent to least recent;
- Procurement Guide's Programme of Requirements;
- The Price Sheet (Annex A03);
- Announcement.

2.2.5 Contact person and communication

All communication relating to the Procurement Procedure, with the exception of Section 2.3 "Further Information (questions)", will take place via TenderNed only and in the manner specified in this Procurement Guide.

If direct contact with TNO is specified/necessary, communication will take place exclusively with the TNO contact person stated below, in writing at all times, via the TenderNed messaging module.

Name : R.M. Peddemors

Position : Procurement Advisor
Department : Procurement
Postal address : PO Box 96800, NL-2509 JE The Hague

Tenderers cannot derive any rights from oral statements, undertakings and suggestions made by TNO employees and/or consultants in relation to the Procurement Procedure and/or the Procurement Documents. Tenderers may only rely on information provided in writing by or on behalf of TNO.

On penalty of exclusion, enterprises may not contact persons other than the contact person with regard to the Tender, unless TNO considers this disproportionate in a specific case. Nor is it permitted, on penalty of exclusion, to communicate with the contact person in any way other than via TenderNed, unless TNO considers this disproportionate in a specific case.

An instruction regarding digital procurement via TenderNed can be found by selected bidders in TenderNed's support environment (<https://www.TenderNed.nl/cms/help>). If you have any questions or are unclear about the operation of TenderNed (for example, if you are unable to log in or submit documents) or if TenderNed malfunctions, the TenderNed service desk can be contacted from 8.30 a.m. to 4.30 p.m. on working days on 0800 - 836 33 76 or via servicedesk@TenderNed.nl.

2.2.6 Language

Tenders must be written in the English language. Tenders in languages other than English will be excluded from participation. Official documents that cannot be submitted in the English language may be written in the language of the document's country of origin. Upon request, the Tenderer shall arrange a translation by a sworn interpreter-translator. The costs incurred shall be borne by the Tenderer.

2.2.7 Single Tender

An enterprise may only be involved in one (1) Tender: either as an independent Tenderer, a member of a Combination, or a subcontractor or Third Party. With regard to enterprises belonging to the same group as referred to in Sections 2:24b and 2:24c of the Dutch Civil Code, more than one company from the group may submit a Tender, provided that the enterprises demonstrate, at TNO's request, that the Tenders have been drawn up independently and autonomously.

Where this cannot be demonstrated by all the Tenderers concerned, all the Tenders emanating from enterprises belonging to the same group will be excluded.

2.2.8 Combination

A Combination of enterprises may submit a Tender jointly as a single Tenderer. To do so, the following conditions must be met.

- All members of the Combination shall submit their own completed and validly signed ESPD. This states that registration takes place in Combination and, if selected, registered.
- The ESPD specifies which member of the Combination will fulfil the role of coordinator. The coordinator is the only member with which TNO corresponds regarding the Procurement Procedure and, where applicable, the Contract. The coordinator must have the power to legally bind all members of the Combination in respect of the Procurement Procedure and, where applicable, (the award of) the Contract.
- All members of the Combination must individually declare in their own ESPD whether they are subject to Grounds for Exclusion (see Section 5.1). The members of the Combination will each be assessed individually against the Grounds for Exclusion. If one or more Exclusion Grounds apply to one or more members, the entire Combination will be excluded.
- The Combination as a whole will be assessed against the Suitability Requirements, subject to any exceptions referred to in Section 5.2. In the ESPD, the Combination members declare how the Combination meets the Suitability Requirements. If the Combination as a whole does not meet all Suitability Requirements, the submission of the Combination will be laid aside.

By submitting the Tender, the Combination members declare that all the participants in the Combination are jointly and severally liable for the fulfilment of the obligations arising from the Procurement Procedure, as well as from any performance of the Contract. By submitting the Tender, the Combination members declare that the coordinator is authorised to validly represent the Combination and the individual Combination members in all matters relating to the Tender and, in the event of the award of the Contract, the Contract.

2.2.9 Subcontracting

A Tenderer may use one or more subcontractors to carry out the work. A cooperative venture in the form of a main contractor and subcontractors may tender as single Tenderer. The main contractor shall remain at all times responsible and liable for all work, including any work performed by a subcontractor.

TNO recognises the following subcontractors:

Reliance on subcontractor to meet Suitability Requirements

Where the Tenderer relies on the financial and economic standing and/or technical and professional competence of a subcontractor to meet the Suitability Requirements, said subcontractor shall also be deemed a Third Party. In this case, the Tenderer must follow the instructions as described in Section 2.2.10 concerning reliance on the resources of a Third Party or Parties. All Third Parties must be listed in Section IIC of the ESPD (Annex **A01**).

Deployment of subcontractor to perform the contract

Where a Tenderer meets the specified Suitability Requirements independently but wishes to use one or more subcontractors to carry out the work, the Tenderer need not disclose the identity of the subcontractor(s) in the Tender. While the Tenderer must tick the box in its ESPD, Part IID, to indicate that it intends to use subcontractors, their names need not be disclosed at this time. However, the Tenderer must do so not later than seven (7) calendar days after the provisional award, as TNO has to pre-approve the subcontractors to be used. If the Contractor wishes to replace a subcontractor during performance of the Contract, this will only be possible subject to TNO's prior consent in writing.

If a Tenderer wishes to use a subcontractor, a completed ESPD (Annex **A01**; parts IIA, IIB and III) must be submitted not later than seven (7) calendar days after the provisional approval of said subcontractor, as well as the supporting documents relating to the Grounds for Exclusion (Section 5). Where a subcontractor is subject to one or more Grounds for Exclusion and said subcontractor has not given convincing reasons in the ESPD why it should nevertheless not be excluded (see Section 5), the subcontractor will not be approved. Otherwise, approval of a subcontractor will not be unreasonably withheld.

If a Tenderer intends to use multiple subcontractors, a completed and duly signed ESPD (Annex A01) must be submitted from each subcontractor. The subcontractor has only to complete parts IIA, IIB and III of the ESPD. These ESPDs will be appended to the Tender.

The subcontractor's ESPD (Annex **A01**) must be duly signed. For signing authority, please refer to Section 2.2.20.

If the Tenderer does not intend to use subcontractors

The Tenderer should indicate its intention not to use subcontractor(s) by ticking only the "no" box in Part II D of the ESPD (Annex **A01**).

2.2.10 Reliance on Third Party resources?

The Tenderer may rely on the financial and economic standing and/or technical and professional competence of a Third Party or Parties.

If the Tenderer relies on the financial and economic capacity of a Third Party or Parties, both the Tenderer and the Third Party or Parties on whose financial and economic capacity the Tenderer relies will be jointly and severally liable for the obligations arising from the Procurement Procedure and for the obligations arising from the performance of the Contract, if awarded to the relevant Tenderer.

If the Tenderer relies on the technical and professional competence of a Third Party or Parties, said Third Party or Parties should also be involved in the performance of the Contract, if awarded to the relevant Tenderer.

No reliance on Third Party resources

If the Tenderer does not rely on the financial and economic standing and/or technical and professional competence of a Third Party or Parties, it should complete Part II C of the ESPD (Annex **A01**) to indicate that it does not rely on the financial and economic standing and/or technical and professional competence of a Third Party or Parties, by ticking the "no" box.

Reliance on Third Party resources

A) Requirements for submitting a Tender

If the Tenderer does rely on the financial and economic standing and/or technical and professional competence of a Third Party or Parties, the Tenderer should complete Part II C of the ESPD (Annex **A01**) to indicate:

1. that it is relying on the financial and economic standing and/or technical and professional competence of a Third Party or Parties, by ticking the "yes" box
2. the Suitability Requirements for which it relies on the Third Party or Parties and,
3. for each stated Suitability Requirement for which it relies on a Third Party or Parties, and the Third Party or Parties it relies on for that purpose.

In addition, if the Tenderer relies on the financial and economic standing and/or technical and professional competence of a Third Party or Parties, it shall submit the following:

4. a separately completed and duly signed ESPD (Annex **A01**) from each Third Party on whose financial and economic standing and/or technical and professional competence it relies, in which the Third Party completes Parts II A, II B and III in respect of the Third Party itself. The ESPDs of the Third Party or Parties must be duly signed as referred to in Section 2.2.20.

Additional requirement for submitting a Tender in the event of reliance on technical and professional competence of a Third Party or Parties

5. If and insofar as the Tenderer relies on the technical and professional competence of a Third Party or Parties, the Tenderer must submit a list of reference projects completed by the Third Party or Parties on whose technical and professional competence the Tenderer relies, in addition to any list of its own reference projects to be submitted by itself with its Tender. If and insofar as the Tenderer submits reference projects of a Third Party or Parties, it must also use the format for reference projects (Annex **A03**) for this purpose.

B) Requirements for intended beneficiary relying on a Third Party or Parties

The Tenderer to which TNO intends to award the Contract on the basis of the Award Decision and which relies on the financial and economic standing and/or technical and professional competence of a Third Party or Parties must submit at TNO's request within the period specified in Section 7.1 of the Procurement Guide:

1. a declaration by said Third Party or Parties stating that the Tenderer can actually access the resources of the Third Party or Parties relied upon. If the Tenderer relies on the financial and economic standing of a Third Party, it shall submit a declaration in the format provided in Annex **B01**. If the Tenderer relies on the technical and professional competence of a Third Party, it shall submit a declaration in the format provided in Annex **B02**;
2. any evidence as referred to in Section 5.1, which allows the Third Party or Parties whose suitability the Tenderer relies on to demonstrate that the Grounds for Exclusion do not apply to the Third Party.

Additional requirement for intended beneficiary in the event of reliance on financial and economic standing of a Third Party or Parties

3. The Tenderer to which TNO intends to award the Contract on the basis of the Award Decision and which relies on the financial and economic standing of a Third Party or Parties must, at TNO's request, submit within the period specified in Section 7.1 of the Procurement Guide, in addition to the documents referred to above under B) (regarding "*Requirements for the Intended Beneficiary*"): the documents that will be substituted for those that the Tenderer must submit to prove that it meets the Suitability Requirements regarding financial and economic standing.

2.2.11 Variants

Offering variants and/or alternative Tenders is not permitted and they will therefore be disregarded.

2.2.12 "Or equivalent"

The technical specifications are formulated as much as possible on the basis of EU and other standards, performance requirements and functional requirements. Where the Procurement Documents, including the Annexes, nevertheless refer to brand names, patents, types, manufacturing processes, etc., the Tenderer should read "or equivalent" after the relevant phrase.

Tenderers are free to provide an equivalent product, service or type of work. If they do so, the Tenderers must justify in or with their Tender why they are offering an equivalent product, service or type of work. It is up to TNO to assess whether the latter are actually equivalent. TNO reserves the right to have their equivalence assessed by a third party if necessary.

2.2.13 Rights reserved by TNO

1. TNO reserves the right to stop the entire Procurement Procedure temporarily or permanently. If TNO decides to discontinue the Procurement Procedure, legal protection is guaranteed in accordance with paragraph 2.4 of the Procurement Guide.
2. TNO reserves the right at all times to subject the data and statements provided by Tenderers to further investigation and verify their accuracy (or have them verified), as well as to approach any references provided, without prior notification thereof to Tenderer. The results thereof will be considered in the assessment of the Tender.

The Tenderer is aware that if at a later stage it is found that incorrect and/or incomplete information has been provided and/or that requirements set out in the Procurement Documents are not or no longer being met, the Tenderer will be excluded from further participation in the Procurement Procedure or agreements already made may be cancelled and contracts dissolved. In such cases, TNO cannot be held liable for the consequences thereof for the relevant Tenderer and TNO will not be obliged to reimburse any costs and/or any loss or damage of any kind.

2.2.14 Confidentiality

The Tenderer will observe strict confidentiality in respect of all information that is or becomes known to it through TNO. It will not make the information available to Third Parties and will only disclose it to its staff, including consultants, subcontractors and Third Parties, insofar as this is necessary for the submission of the Tender or – if and insofar as applicable – the performance of the Contract.

TNO acknowledges the confidentiality of the Tenderer's Tender and will not disclose to Third Parties any information known to it from this source. It will be necessary to disclose information from the Tender, where appropriate, in the context of justifying the Award Decision. The Tenderer recognises this and agrees accordingly.

2.2.15 Distortion of competition

Distortion of competition will result in exclusion. If TNO suspects that distortion of competition has occurred, it will give the relevant Tenderer(s) the opportunity to demonstrate that it has not been guilty of distorting competition. If TNO deems that the Tenderer has failed to do so, the Tenderer will be excluded from further participation in the Procurement Procedure.

2.2.16 Withdrawal by Tenderer

Any Tenderer who has submitted a Tender may withdraw it until the closing date for tenders. After that moment, the period of validity starts. The Tender is irrevocable during the period of validity.

2.2.17 Period of validity

The Tenderer upholds ninety (90) calendar days from the closing date for submission of the Tender (Section 2.1). The period of validity is automatically extended until the final conclusion of the Contract with the first-ranked Tenderer.

If summary proceedings are instituted against the Award Decision, the period of validity will be automatically extended by a period of thirty (30) calendar days from the date of the decision of the preliminary relief judge.

TNO may request Tenderers to extend the period of validity. Tenderers cannot derive from this any right to be awarded the Contract.

2.2.18 Contract terms

The Contract will be awarded in accordance with:

- Procurement documents;
- General Purchasing Conditions of TNO, February 2022, as included in Annex **C03**, except insofar as they are explicitly deviated from in the Procurement Documents.

In accordance with Section 2.3 of this Procurement Guide, Tenderers may submit text and amendment proposals for this Contract and the General Purchasing Conditions of TNO. The final Information Notice will respond to these proposals or add the final Contract and General Purchasing Conditions of TNO.

The general terms and conditions (including terms of supply) or terms and conditions of Third Parties (including subcontractors and auxiliary persons) used by the Tenderers, both during this Procurement Procedure and also, in the event of award, during the performance of the final Contract and any contracts to be concluded under its terms, are expressly rejected by TNO. If they declare their own terms and conditions applicable, this will render their Tender invalid.

In the final Information Notice, TNO will indicate where final changes have been made.

Acceptance of these amendments to the Framework Agreement/Acceptance of the Final Contract and General Purchasing Conditions of TNO is a minimum requirement. Failure to comply with these conditions will result in the Tenderer's exclusion from further participation in the procedure.

2.2.19 Conditional Tender

TNO will exclude conditional Tenders from further participation in the Procurement Procedure.

2.2.20 Legally valid signature

The Tender must be validly signed. "*Validly signed*" means that the ESPD has been signed by the duly authorised representative(s) of the Tenderer as stated in TenderNed. A validly signed ESPD means that the Tender as a whole has been validly signed, unless a separate valid signature is required for one or more documents. TNO would point out that the trade register may state that two or more persons are joint authorised representatives, or that a representative is authorised only up to a certain monetary value. This has implications for the authority to sign and Tenderers should anticipate this.

The authority to sign should be evidenced by an extract from the trade register. It is also possible for the Tender to be signed by a proxy. In this case, a power of attorney must be issued by a legally authorised representative of the Tenderer, as evidenced by the trade register, or the power of attorney must be recorded in the trade register.

The extract or the power of attorney need only be issued to TNO if a request to that effect has been made by TNO, as specified in the requirements set out in Section 7.1 of the Procurement Guide.

A Tender not validly signed shall be deemed not to have been made and shall be invalid.

This provision also applies to the ESPD submitted by members of a Combination and/or for the Third Party or Parties on whose standing/experience/resources the Tenderer relies. In their case too, only the ESPD need be validly signed and this signature will also serve as a valid signature for other documents completed and submitted by them.

Electronic signature

Signature in the form of an electronic signature is also permitted. The following requirements apply in this regard: an E-recognition tool ("*eHerkenning*" in Dutch) with at least security level 4 (EH4) must be used.

2.2.21 Reimbursement of expenses incurred in submitting the Tender

Any expenses incurred by Tenderers in preparing and submitting the Tender will not be reimbursed.

2.2.22 Statement of prices and expenses

Prices and costs must be stated in euros excluding VAT and will be fixed for the term of the Contract unless otherwise specified. TNO hereby explicitly states that no price negotiations will be entered into as part of this Procurement Procedure.

2.2.23 Publicity

No publicity will be given to the Procurement Procedure by the Tenderer or by partners and/or subcontractors to be engaged by the Tenderer except with TNO's consent in writing. All information on the Tender will be treated confidentially by Tenderer and the parties to be engaged by them.

2.2.24 Intellectual property

Subject to exceptions as specified in the Dutch Copyright Act [*Auteurswet*], no part of the Procurement Documents may be reproduced (other than for the purpose of submitting a Tender) in any manner whatsoever without TNO's consent in writing. Tenders and all Annexes submitted by Tenderers as part of the Procurement Procedure will become TNO's property upon receipt.

2.2.25 TNO logo

The TNO logo may not be copied, altered or otherwise used on documents submitted by the Tenderer as part of the Procurement Procedure.

2.2.26 TNO Supplier Code of Conduct

TNO expects its suppliers, and therefore also its Tenderers, to endorse the TNO Supplier Code of Conduct, 2024 (Annex C02).

2.3 Further information (questions)

The Procurement Documents shall be prepared with the utmost care. Tenderers may request further information on the Procurement Procedure and/or the Procurement Guide up to the closing date and time "closing date for submission of questions" as stated in the schedule in Section 2.1. Said further information may, for example, address any lack of clarity, ambiguities, discrepancies. Further information should be requested within the time limit and in the manner described in this section. Questions and comments not submitted on time and/or correctly will in principle not be dealt with in the Information Notice, except in cases where this is deemed necessary and/or desirable at TNO's sole discretion.

Moreover, at the time of the above deadline, Tenderers will have the opportunity to ask reasoned questions on, or propose text or amendments to the General Purchasing Conditions of TNO, Annex **C03**. Text proposals will serve only to improve the Contract and must not affect its essence. TNO would point out that it reserves the right at all times to accept or not to accept these text or amendment proposals.

If the Tenderer fails to raise questions about and/or challenge to (lack of clarity, ambiguities or discrepancies in) the Procurement Procedure and/or the Procurement Guide and/or in the manner described in this section, or does not do so in a timely manner, it will forfeit its right to challenge any deficiencies identified at a later stage, e.g. in interlocutory proceedings.

Questions and/or comments should be communicated **exclusively** to the TNO contact person (see Section 2.2.5) using the "Standard Template for Tenderer Questions" in Annex **C01** ("editable" MS Excel file) prepared by TNO. Using the "pull-down" menu in this Excel file, the Tenderer should indicate which section of the Procurement Guide the question relates to. Once completed, Annex **C01** should be submitted via [the TenderNed messaging module](#).

TNO is therefore **not using the question module in TenderNed**. Questions submitted in this question module will **not** be considered.

The TNO contact person will include the questions and/or comments and their answers in anonymised form in one or more Summaries of Additional Information. The final date for asking questions is included in the schedule in Section 2.1. The Summary(ies) of Additional Information will be published at www.TenderNed.nl as per the schedule in the table in Section 2.1.

All the questions and their answers should be considered an integral part of this Procurement Guide. The basic premise is that the Procurement Guide will be deemed final after publication of the last Information Notice.

TNO may decide to hold one or more additional briefing rounds. Parties will be informed of this in the Information Notice. Questions and comments submitted as part of an additional briefing round may relate solely to the contents of the immediately preceding Information Notice. Questions and comments that do not relate to the immediately preceding Information Notice may be disregarded by TNO – without notice.

The responsibility for submitting questions and/or comments in a timely and correct manner rests with the Tenderer. Questions raised after the expiry of the deadline will in principle not be answered in the Information Notice unless answering is necessary, in TNO's opinion, for the submission of a proper Tender.

TNO would advise Tenderers to wait until the last Information Notice is published before submitting their Tender as the Information Notice may contain further clarifications and amendments to the Procurement Guide that are relevant to the preparation of the Tender.

TNO would expressly remind Tenderers that it can answer their questions in confidence (Section 2.53(3) Aw). If a Tenderer does not wish to have a question answered in the Information Notice, the Tenderer must give reasons as to why a public answer would damage its legitimate economic interests. TNO will take a decision on whether or not to answer a question in confidence based on these reasons. If TNO decides not to do so, it will notify the questioner accordingly, giving reasons. The questioner will then have the option of withdrawing or submitting its question for the Information Notice.

2.4 Applicable law and disputes

This Procurement Procedure is governed by the laws of the Netherlands. The Preliminary Relief Judge at the District Court of The Hague shall have exclusive jurisdiction to settle disputes relating to the present Procurement Procedure.

Tenderers should bring their challenges to all or part of the Procurement Procedure, to all or part of the information provided or to other aspects relating to the Procurement Procedure to the attention of the TNO contact person (see Section 2.2.5) at the shortest possible notice.

The period within which legal action must be taken against the Award Decision and/or the Procurement Procedure is twenty (20) calendar days from the date of the Award Decision. Any summons should be served within this period, which is a (contractual) expiry date, at TNO's address. If this objection period, also expiry date, is exceeded without legal proceedings having been commenced by service of a summons, any right to do so shall (inadmissible) lapse. The standstill period is automatically extended to the next working day if the standstill period ends at the weekend, on a public holiday or a so-called "notice-free day" [when bailiffs cannot issue writs].

A Tenderer wishing to initiate summary proceedings is requested to request foreclosures from TNO.

If a summons has been served within the standstill period, the relevant Tenderer is requested to send a copy of the served summons via TenderNed to the contact person for the Procurement Procedure no later than two (2) working days after service. This is because the processing of documents within TNO can lead to delays in processing the summons.

If a Tenderer institutes summary proceedings in a timely and valid manner in respect of the Award Decision and/or the Procurement Procedure, the Tenderer to which the contract has been provisionally awarded shall intervene in the summary proceedings. If the Tenderer to which the Contract has been provisionally awarded does not intervene, said Tenderer shall exercise the right to institute court proceedings or third-party proceedings in the event that the judgment in the first-instance summary proceedings orders the amendment or revocation of the Award Decision. This is because it is important for all the parties to obtain clarity as soon as possible and put all the arguments on the table in the first instance. If the standstill period is exceeded, this situation cannot be remedied.

Any Tenderer that has instituted summary proceedings is obliged to provide a copy of the summons when requested to do so by other Tenderers so that said Tenderer(s) can determine whether intervention is appropriate. Of course, it is up to the Tenderer that initiated the summary proceedings to determine whether or not confidential business information will be disclosed at that stage and, if so, which. If the Tenderer that initiated the summary proceedings does not (expeditiously) provide a copy of the summons to the Tenderer requesting it, TNO reserves the right to provide a copy of the summons itself. In doing so, TNO will determine at its own discretion whether confidential business information will be deleted and, if so, which.

If summary proceedings have been instituted in a timely and legally valid manner and the judgment does not oppose the conclusion of the Contract, TNO will be free to enter into the Contract. TNO is not obliged to await any appeal or proceedings on the merits. In other cases, TNO will consider the next steps to be taken based on the judgment in first instance.

2.5 Submission of the Tender

2.5.1 Digital tendering

The Tender consists of the completed and, where necessary, validly signed Annexes **A01 to A04**, the formats of which are appended as Annexes to the Procurement Guide. When the ESPD is validly signed, the Tender as such is also validly signed. The absence of a legally valid signature on the ESPD will render the Tender invalid.

For legally valid signatures, see Section 2.2.20.

For this Tender, TNO is using a digital procurement system via TenderNed. The Tender must be uploaded to the TenderNed digital vault not later than the date and time specified in the schedule in Section 2.1 under "Closing date for submission of Tenders". After uploading, the Tenderer will receive a transaction code via SMS. This code must be entered in TenderNed. The Tender is not actually submitted until the correct transaction code has been entered. The SMS code must therefore be entered within the tendering period for the Tender to be deemed complete and correct.

Tenders received late and/or Tenders not deposited in the digital vault and/or Tenders submitted by means other than via TenderNed will not be considered and will therefore be excluded from participation. Tenderers will remain at all times solely responsible for submitting their Tender on time and in the correct manner.

Tenderers are strongly advised to take careful note of the guide provided by TenderNed for the digital submission of Tenders, particularly as regards placing documents in the digital vault. In doing so, uploading should be completed with the tendering wizard (authorisation by SMS code).

Tenderers are advised to start uploading documents in good time. If a Tenderer experiences problems with the system due to a malfunction of TenderNed, the TNO contact person (Section 2.2.5) and TenderNed should be contacted without delay. In the event that a TenderNed malfunction actually occurs, as a result of which the submission of Tenders is not possible, shortly before the closing date and TNO has not taken note of Tenders that have been uploaded to the TenderNed digital vault on time despite the malfunction, TNO will extend the closing date for submission of Tenders pursuant to Section 2.109 Aw.

TNO further advises Tenderers to take note of the content of Section 2.109a Aw and, in accordance with the provisions of that section, to be prepared to submit the encrypted version of their Tender in a timely manner if occasioned by TenderNed malfunctioning.

2.5.2 Sending and grading Tender

The Tender consists of the following documents. Documents in **Part A** relate to the Tenderer. Documents in **Part B** relate to either Third Party(ies) whose experience/resources the Tenderer appeals to under the Eligibility Requirements and/or the Declaration of Willingness of Tenderer for the required insurance. The documents under **Part B** need to be submitted only if Third Party(ies) are invoked or if Tenderer is not (yet) in possession of either the insurance company's policy or satisfactory statement within the stipulated timeframe.

Part A Submission of the Tender

The Tender consists of the following components on pain of invalidity.

- Annex A01** European Single Procurement Document (Tenderer, if applicable: all individual Combination members; the individual Third Party or for the benefit of one or more subcontractors to be used for the work).
- Annex A02** Format for reference projects
- Annex A03** Price sheet
- Annex A04** Format for answering questions/fulfilling preferences, sub-award criterion: quality

The above sheets must be completed in full. Only the ESPD need be validly signed.

Gather the pdf files, Annexes **A01** to **A04**, as separate "loose" files into a compressed file (zip file) named: "....."_part A. The Tenderer should replace the dotted line with all or part of its company name. Upload this compressed file to TenderNed's digital vault.

Part B Submission of supporting documents

- Annex B01** Format for Declaration as to Reliance on Financial and Economic Standing of Third Party or Parties
- Annex B02** Format for Declaration as to Reliance on Technical and Professional Competence of Third Party or Parties
- Annex B03** Format for Statement of Policy/Declaration as to Insurance

The above sheets must be completed in full. Only the ESPD need be validly signed.

Gather the pdf files, Annexes **B01** to **B03** as separate "loose" files into a compressed file (zip file) named: "....."_part B. The Tenderer should replace the dotted line with all or part of its company name. Upload this compressed file to TenderNed's digital vault.

3 Assessment of Tenderers and Tenders

3.1 Assessment team

A team of subject-matter and process experts has been constituted to conduct a qualitative assessment of the Tenders (assessment of the Tenders on the qualitative Award Criteria). The assessment team assesses the quality of the Tenders without having any knowledge of the financial part of the Tenders.

The members of the assessment team assess, on a strictly personal basis and independently, the elaboration of the qualitative (sub-sub-)award criteria for the Tenders. For these criteria, see section 6.1.2 and its elaboration in Chapter 8. In a meeting of the individual assessors, the average of the individual scores is then determined.

The average of the individual scores then determines the overall score for a sub-sub-award criterion. Average scores are rounded to one decimal place.

In the announcement of the Intention to Award, TNO will state the numbers of completed points per (sub-)sub-award criterion. The total score for sub-award criterion: Quality (QY) has been arrived at by totalling unrounded scores on the sub-sub-award criterion, after which this total score is rounded to a whole number for the purpose of said announcement.

3.2 Assessment procedure

The assessment procedure is as described in the following sections.

Section 4 : concerns the assessment of the timeliness, formal requirements and completeness of the Tender submitted.

Section 5 : concerns requirements formulated in respect of Grounds for Exclusion and Suitability Requirements. If one or more Grounds for Exclusion apply and/or if a Tenderer fails to meet the Suitability Requirements, the Tenderer will be excluded/the Tender will be invalid.

Section 6 : concerns the description of the assessment by TNO of the Tenders against the Award Criterion. The Award Criterion is assessed by allocating points to the Tender

Section 7 : concerns the assessment of supporting documents and other documents requested by TNO from the intended beneficiary.

Section 8 : this describes the assessment carried out by TNO in respect of the Minimum Requirements. This involves assessing TNO's requirements and preferences for the performance of the Contract, i.e. the Programme of Requirements and Preferences ("PoR"):

TNO assesses and ranks the Tenders on the basis of the Award Criterion: Best Value for Money (BVM), see Section 6 in this regard.

TNO may ask the Tenderer for clarification with regard to the submitted Tenders up to the end of the Procurement Procedure. The Tenderer is deemed to be willing and able to answer questions within 48 hours of sending the questions. If questions are not answered (in a timely manner), TNO may interpret the Tender in any manner it sees fit, based on the documents known to it.

4 Assessment of timeliness, formal requirements and completeness

4.1 Assessing timeliness of submission

The Tender must be submitted in a timely manner, i.e. within the tendering period (see Section 2.1). Tenders not submitted in a timely manner are invalid and TNO will discard them.

4.2 Assessing for other formal requirements and completeness

Tenders submitted by means other than through TenderNed will not be assessed and will be discarded. The foregoing is subject to any malfunctions of TenderNed, recognised as such by TenderNed.

The Tenders will be assessed as regards completeness and the formal requirements applicable in the Procurement Procedure, including at all events the legally valid signature. Tenders that are incomplete and/or fail to meet all the formal requirements will be declared invalid by TNO and discarded. Missing answers, documents, or data will result in exclusion if there is no rectifiable omission. Tenderers are reminded that TNO is not obliged to have deficiencies rectified. TNO has the discretionary power to offer a rectification option.

If – for whatever reason – a question cannot be answered or the requested data cannot be submitted in full or at all, this must be explicitly stated at the time of the Tender, together with reasons. Depending on the nature of the deficiency, TNO will assess whether the Tender is invalid, in which case it will be discarded, or whether the deficiency is amenable to rectification.

Deficiencies for which TNO offers a rectification option must be rectified within the timeframe as stated in the relevant request from TNO. If a deficiency is not rectified within the notified period or at all, the Tender will be invalid after all.

5 Assessment of Grounds for Exclusion and Suitability Requirements

5.1 Assessing Grounds of Exclusion

The Tenderer will be assessed in terms of the Grounds for Exclusion listed in the ESPD (Section III). The Tenderer declares in the ESPD whether the Grounds for Exclusion used are applicable or not at the time of tendering. Where one or more Grounds for Exclusion apply, the Tenderer will generally be excluded. The Tenderer will have the opportunity to give reasons in the ESPD why it should not be excluded after all because of self-cleansing measures or at least why exclusion would be disproportionate. TNO will take these reasons into account in its decision on the final exclusion of the Tenderer. The reasons must be included in or appended to the ESPD. Tenderers may not continue to submit and/or alter the reasons once the tendering period has elapsed.

If the Tenderer is a Combination and a Ground for Exclusion applies to any of the participants in that Combination, the Combination as a whole will be excluded. Each Combination member must submit its own legally signed ESPD.

If the Tenderer relies on the suitability of a Third Party or Parties as described in Section 2.2.10 of the Procurement Guide and a Ground for Exclusion applies to one or more Third Parties, TNO will reject its reliance on the suitability of the Third Party or Parties in question. If the Tenderer, whose reliance on a Third Party or Parties has been rejected, fails – after having been given the opportunity to do so by TNO – to rely (in a timely manner) on the resources of a substitute Third Party or Parties, or if the Tenderer does rely on a substitute Third Party or Parties but fails to comply fully or at all with the requirements set for that purpose, the Tenderer will be excluded from participating in the Procurement Procedure. The substitute Third Party or Parties must be proposed within seven (7) calendar days of a request to that effect from TNO, submitting all the documents requested in the Procurement Documents for that purpose. Proposing a substitute Third Party is not considered an amendment to the Tender. If a Tenderer is permitted to propose a substitute Third Party, the Tenderer may only substitute the Third Party while submitting the relevant documents in this connection. Other parts of the Tender, including, but not limited to, the elaboration of the award criteria remain unchanged.

The completed and validly signed ESPD will suffice in the first instance as evidence that the Grounds for Exclusion do not apply to the Tenderer. At TNO's request, the Tenderer to which TNO intends to award the Contract will provide – by the date specified in Section 7.1 of the Procurement Guide – the supporting documents referred to in section 7.1. If the Tender is submitted in Combination, all the Combination members must submit the supporting documents listed below. If the Tenderer relies on the standing/resources/experience of one or more Third Parties, then the supporting documents listed below from each Third Party should be submitted.

Tenderers are reminded that it may take several weeks to obtain some supporting documents. Tenderers are therefore advised to request the supporting documents at the earliest possible stage so that they can be supplied in a timely manner – in response to any request from TNO. TNO would point out that any Tenderer relying on a Third Party is itself responsible for the timely submission of supporting documents in respect of the Third Party's ESPD. TNO therefore advises Tenderers to inform, in a timely and appropriate manner, Third Parties on whose suitability they rely which documents may be requested by TNO in the event of award to the Tenderer and the time required to obtain these documents.

Failure to obtain supporting documents in a timely manner or at all remains at the Tenderer's risk. If the supporting documents are not supplied in a timely manner and/or complete, the Tenderer will still be excluded. If a supporting document has not been obtained in a timely manner, but has been requested in good time and the failure to obtain it is not due to a circumstance within the Tenderer's sphere of risk, the Tenderer will not be excluded. To this end, the Tenderer must demonstrate that the relevant supporting document has been requested not later than two (2) working days after publication of the announcement of the Procurement Procedure.

5.2 Assessing Suitability Requirements

The Tenderer must, at the time of Tendering, possess a certain minimum level of expertise and ability to perform the contract: the Suitability Requirements.

The Tenderer will be assessed on the Suitability Requirements. If the Tenderer relies on the suitability of a Third Party or Parties as referred to in Section 2.2.10 of the Procurement Guide, TNO will assess whether the Third Party or Parties meets the specified Suitability Requirements, for which the Tenderer relies on said Third Party or Parties.

The Suitability Requirements refer to the required financial and economic standing, technical and professional ability and professional competence that the Tenderer must meet in order to be eligible to submit a Tender.

The Tenderer must meet all the Suitability Requirements at the time when the Tender is submitted. If the Tenderer fails to meet all the Suitability Requirements, with or without relying on one or more Third Parties, the Tender will be invalid.

If tendering in Combination, the Combination as a whole must meet the Suitability Requirements and in principle not all the individual Combination members. However, this may be different for a specific Suitability Requirement.

5.2.1 Financial and economic standing

5.2.1.1 Insurance

The Tenderer must be insured against business liability and/or professional liability, with as per the annexed General Purchasing Conditions, cover of at least €1,250,000 per loss-causing event or series of related events, or be willing and able to arrange said insurance cover in the event of an Intention to Award. The Tenderer is responsible for ensuring that, if

awarded Contract, it remains insured at least in accordance with this requirement during the term of the Contract. The Contractor will inform TNO without delay of any changes to the insurance policies. If the Contractor's insurance does not or no longer meets this Suitability Requirement during the term, TNO will be entitled to dissolve the Contract without notice of default or judicial intervention and without being liable to pay compensation to the Contractor.

Ticking the "yes" box in Part IV of the Tenderer's ESPD (Annex **A01**) will suffice in the first instance as evidence that the Tenderer meets this requirement.

At TNO's request, the Tenderer whose Tender was ranked first will provide the evidence of insurance within the set timeframe as referred to in Section 7.1. This supporting document comprises a policy showing the required insurance cover, the insurance contract, the policy schedule or a satisfactory declaration from the insurance company showing that the Tenderer is insured as required in the Procurement Documents. If a group policy is submitted, the Tenderer must supply a copy thereof to demonstrate that it is jointly insured.

If the Tenderer does not (or not yet) have the insurance company's policy or satisfactory declaration in its possession within the set timeframe, it should sign a Declaration of Readiness instead (Annex **B03**). By signing this declaration, the Tenderer declares that it will provide a copy of the policy or of a satisfactory statement by the insurance company within seven (7) calendar days after the notification by TNO that it intends to enter into the Contract with the Tenderer under the suspensive condition of the required insurance, based on the assessment of the supporting and other documents already submitted (see Sections 7.1 and 7.2). Said notification will be issued by TNO only after the standstill period has expired without summary proceedings being instituted or – where summary proceedings have been instituted – the relevant judgment states that the Award Decision can be upheld. The Contract will not be entered into until such time as evidence of the Tenderer being adequately insured has been received. If the Tenderer is unable to provide the required insurance policy or a satisfactory declaration from the insurance company within the set timeframe, the Contract will not be concluded and TNO will retain the right to award the Contract to the Tenderer which would be ranked in first place after the number one was eliminated in accordance with the assessment system, and which has stood by its Tender.

5.2.2 Technical and professional competence

Competence requirements state the degree to which Tenderers may be considered capable of performing the actual activities under the present Contract as required.

5.2.2.1 Reference projects

The Tenderer should demonstrate experience in the required core competences by providing details of reference projects. The Tenderer should cite one reference project for each core competence. The Tenderer may cite the same reference project to fulfil the different core competences.

As evidence that the Tenderer has experience in the core competences listed below, the Tenderer shall cite the required reference projects immediately upon submission of the Tender. To this end, the Tenderer should submit a fully completed Annex **A02** for each core competency. If the Tenderer uses one reference for multiple core competences, then a completed Annex **A02** must be submitted for each core competence. The completed Annex **A02** must show that the reference project cited fulfils all aspects of the core competence. Additions or amendments to the details in Annex **A02** are not permitted after the expiry of the tender date.

If the Tenderer relies on the technical and professional competence of a Third Party or Parties, the Tenderer shall submit for each core competence for which it relies on the relevant Third Party or Parties an Annex **A02** fully completed by said Third Party or Parties.

If a project is cited that has not yet been (fully) completed, only the actual results achieved under the current Contract may be stated and a forecast of results is not sufficient.

TNO has identified the following core competences that correspond to the desired experience in key areas of the present Contract.

Core Competence 1: The Tenderer has experience in LED based light engines, with the same technology (e.g. LED drivers) on comparable areas, being any area between 400 and 2500 cm².

Reference project: The Tenderer must have delivered a project that fulfils Core Competence 1 in the past 3 years from the date of Announcement of this Procurement Procedure and whose contract value was a minimum of € 150.000 excluding VAT. The project should have been delivered in accordance with the conditions agreed at the time, including the completion date and budget.

Core Competence 2: The Tenderer has experience in solar device characterisation, with similar software and measurement electronic as specified in the tender.

Reference project: The Tenderer must have delivered a project that fulfils Core Competence 2 in the past 3 years from the date of Announcement of this Procurement Procedure and whose contract value was a minimum of € 150.000 excluding VAT. The project should have been delivered in accordance with the conditions agreed at the time, including the completion date and budget.

TNO reserves the right to check references with the referee without involving the Tenderer. TNO assumes that the Tenderer has informed the referees accordingly. The information obtained by TNO from the referent will be taken into account in the assessment of the Tender.

If the Tenderer has not demonstrated in its Tender that it has the required experience in all the core competences, this will result in the Tender being rendered invalid.

5.2.3 Professional competence

By completing the ESPD (Annex **A01**) and ticking the "yes" box in Part IV, the Tenderer declares that it is registered in the professional or trade register in accordance with the regulations of the Member State in which it is based.

At TNO's request, the Tenderer to which TNO intends to award the Contract within the period specified in Section 7.1 of the Procurement Guide will provide relevant evidence:

- for enterprises based in the Netherlands, an extract from the trade register of the Chamber of Commerce must be submitted, which is not more than six months old at the time of submission of the Tender. For enterprises based outside the Netherlands, a similar document should be appended in accordance with the applicable regulations of the relevant country in which the enterprise is based;
- where the Tenderer is a partnership or general partnership, the Tenderer shall submit the extracts of those that form the partnership/general partnership (if recorded in the trade register) as well as a declaration signed by all the partners showing the power of representation for the purposes of this Tender;
- where the Tenderer is a Combination, the Tenderer shall submit extracts from all participants in that Combination, and;
- where the Tenderer submits a Tender relying on the standing/capacity/experience of one or more Third Parties, the Tenderer shall submit extracts from all Third Parties or subcontractors, as the case may be.

5.2.4 Legal suitability to perform an assignment

On 8 April 2022, the EU adopted a fifth sanctions package regarding the Russian war in Ukraine (Council Regulation 2022/576). In that package, contracting authorities are prohibited from granting assignments to (1) natural persons with Russian nationality or legal entities established in Russia, (2) legal entities that are owned for 50% or more by one of the natural persons or legal entities referred to under (1), and/or (3) natural persons or legal entities acting in the interests or on the instructions of a natural person or legal entity referred to under (1).

TNO applies the above requirements as a suitability condition for this Procurement Procedure. A Tenderer will be legally unsuitable to perform the assignment (Section 2.90(4) of the Dutch Public Procurement Act (*Aanbestedingswet*)), and its Tender will be invalid, if:

- 1) the natural persons have Russian nationality or the legal entities are domiciled in Russia; and/or
- 2) they are legal entities that are owned for 50% or more by natural persons or legal entities referred to under (1); and/or
- 3) they are natural persons or legal entities acting in the interests or on the instructions of a natural person or legal entity referred to under (1).

The Tenderer must therefore demonstrate in its Tender that:

- 1) the Tenderer does not have Russian nationality and/or is not domiciled in Russia; and
- 2) the Tenderer is not owned for 50% or more by a natural or legal person referred to under (1); and
- 3) the Tenderer is not acting in the interests or on the instructions of a natural or legal person referred to under (1), including the payment of monies to a natural or legal person referred to under (1), whether or not it is legally obliged to do so and whether or not it is actually possible at present.

If one or more of the above three (3) requirements cannot be demonstrated, the Tender will be invalid.

Where the Tenderer tenders in Combination, this requirement shall apply to all the individual Combination members. Where the Tenderer relies on the standing/resources/experience of one or more Third Parties, this requirement shall also apply to the Third Parties on whose standing/resources/experience the Tenderer relies. If the Tenderer wishes to use one or more subcontractors during the performance of the Contract, the Contractor will have to demonstrate – for that subcontractor – that it meets this requirement at the time a subcontractor is presented to TNO for approval.

Ticking the "yes" box in Part IV of the Tenderer's ESPD (Annex **A01**) will suffice in the first instance as evidence that the Tenderer meets this requirement.

To this end, the Tenderer to which TNO intends to award the Contract within the set timeframe as referred to in Section 7.1, shall provide the means of proof relating to this Suitability Requirement. This concerns the following documents:

- a) a recent (not older than six (6) months from date of Tender) extract from the trade register reflecting the most recent state of affairs; and
- b) an up-to-date report on the holding structure (where the Tenderer is part of a holding structure) showing the direct and indirect ownership relationships of the Tenderer; and

- c) a copy of the Tenderer's current articles of association.

In addition, the Tenderer shall declare categorically not to supply products - including semi-finished and finished products - listed in Annex XVII of the European Commission Regulation (EC) No 833/2014 on Russia Sanctions. When supplying products covered by this Annex XVII, the Tenderer shall provide as proof a Mill Test Certificate (MTC), or similar certificate such that it meets the requirements and obligations to establish the country of origin.

The Tenderer must continue to meet the Suitability Requirement. TNO will be entitled to verify this during the term of the Contract. If it becomes apparent during the term of the Contract that the Contractor does not meet – or no longer meets – the Suitability Requirement, TNO will be entitled to terminate the Contract with immediate effect, without being liable to pay damages to the Contractor and without the necessity of a notice of default or judicial intervention.

6 Assessment of Award Criterion

TNO assesses and ranks the Tenders based on the Award Criterion: Best Value for Money (BVM). The Tenderer with the highest overall score is deemed to have submitted the 'Most Economically Advantageous Tender' and is therefore provisionally awarded the contract.

6.1 Award Criterion: Best Value for Money (BVM)

This criterion is divided into the following sub-award criteria, with the corresponding weighting factors, where the assessment of the sub-award criteria: Price TP, Total Price) and Quality (QY) is scored by setting a number of point scores to be achieved.

Award Criteria	Max. points score
Price TP (Total Price)	300
Quality (QY)	700
Total Score	1000

The Tender with the highest total points score will be designated as Best Value for Money "BVM", on the basis of which TNO intends to award the Contract. See also Section 6.2 Award.

Point scores for each sub-award criterion will be rounded to one (1) decimal place. Total points are scored for each sub-award criterion by adding up unrounded point scores. In the announcement of the Intention to Award, TNO will state the rounded points scores allocated to each (sub-)sub-award criterion.

If the Tenderers with the highest Total Score have an equal Total Score, the Contract will be provisionally awarded to the Tenderer with the highest score for the sub-sub-award criterion Quality (QY). If these scores are also equal, a draw will be held among the Tenderers with equal scores which are eligible for award. The protocol for the draw, if any, will be shared with the Tenderers among which lots will be drawn.

If, after the provisional award, the Tenderer with the highest score nevertheless proves to be invalid/is excluded from the procedure, the Tenders will be reassessed on the basis of the Award Criterion: Price, after which a new total score will be determined. TNO will award the Contract again based on this reassessment. This is to avoid what is referred to as the "ranking paradox".

6.1.1 Sub-award criterion: Price TP

To determine the sub-award criterion: Price TP (Total Price), TNO asks the Tenderer to use the Price Sheet prepared by TNO (in MS Excel) according to Annex **A03** for its price proposal. This Price Sheet should be completed and appended to the Tender. The Tenderer should strictly follow the outline of the Price Sheet and complete it in full. If the Price Sheet has not been submitted in full and/or correctly or at all, TNO will declare the Tender invalid and exclude it from further participation in the Procurement Procedure. Changing the format and layout of the Price Sheet (Annex **A03**) will also invalidate the Tender.

The distribution of the maximum number of point scores to be achieved for TP is given in the table below:

Criterion	Max. points score
Price TP	300

When completing the Price Sheet, the following Minimum Requirements apply:

- 1) Prices and expenses should be stated in euros excluding VAT, and to two (2) decimal places;
- 2) Only the unit prices and fees included in the Price Sheet will be assessed and apply during the performance of the final Agreement. Prices stated elsewhere in the Tender do not create any rights or obligations between TNO and the Tenderer during the performance of the final Agreement;
- 3) The prices/rates listed in the Price Sheet are all-inclusive. This means that all the costs/services/obligations/etc. required for the performance of the Contract in accordance with the contract terms have been factored into the prices and rates. During the performance of the Contract, the Contractor shall not be entitled to any other and/or additional remuneration other than that in accordance with the Price Sheet;
- 4) The Price Sheet should include a price proposal on all the required items. The Tenderer shall use the Price Sheet prepared by TNO unchanged;
- 5) The Tenderer is solely responsible for stating prices and adding them correctly;
- 6) The prices quoted by the Tenderer should be based on the Procurement Documents without reservations of any kind;
- 7) Specific Minimum Requirements or additional instructions relating to the Price Sheet are included in the "additional instructions" tab (if applicable) and are accepted by the Tenderer;
- 8) The prices and rates quoted in the Tender shall apply in the event of final award on commencement of the Contract and shall be fixed for the duration of the Contract.

- 9) The prices and rates quoted in the Tender will apply in the event of final award on commencement of the Agreement and will be fixed for the duration the Agreement.

The value of the lowest Price TP (Total Price) is determined on the basis of the cumulative costs in the Price Sheet defined by TNO. The Tenderer with the lowest Price TP, being the lowest total price calculation, will be awarded the full number of points, set by TNO at 300 points. For the remaining Tenderers, the number of points to be obtained will be determined on a pro rata basis, with points deducted from the maximum number of points to be obtained.

Total points for TP (Total Price) are calculated according to the following formula:

$$\text{Total points} = 300 - \left\{ \frac{(I - LI)}{LI} \times 300 \right\}$$

Where:

Number of points = number of points obtained for sub-award criterion Price TP

I = Tender with "Price TP"

LI = Tender with the lowest "Price TP"

If $I \geq 2 \times LI$, then zero (0) points are awarded for sub-award criterion TP. The total score is rounded to whole points.

6.1.2 Sub-award criterion: Quality (QY)

Section 8, the Programme of Requirements and Preferences (hereinafter "PoR"), of the Procurement Guide describes the requirements to be met by the performance of the Contract.

The PoR also contains a number of preferences with regard to the quality of the requested service/supply. These preferences are set out in the form of a questionnaire. By filling in the preferences section and answering questions, Tenderers can differentiate themselves in terms of quality.

The Tenderer is asked to provide notes for each wish/question, answering the subject-matters listed in the questionnaire.

The Tenderer shall answer the open questions clearly, unambiguously and point by point.

When elaborating an answer for each open question, the Tenderer should respect the set maximum number of A4 pages (font size at least 10 points and line spacing at least 1.5). Tenderers should bear in mind, when elaborating the preferences, that said answers become part of the Contract and must therefore be capable of fulfilment by the Tenderer.

TNO bases the assessment of the answers on the set maximum per answer. This means that Annexes or references to them should not form part of the answer in order to "get round" the set maximum number of A4 pages in this way. However, illustrations, diagrams, organisational charts and sample reports can form part of the answer. Annexes should not form part of the answer and will not be included in the assessment. If the set maximum is exceeded, the excess number of A4 pages will not be included in the assessment. Any part of the elaborated answer that exceeds the maximum will not become part of the Contract. The elaboration of the preferences will be assessed in absolute terms. It is therefore possible that more than one Tenderer has the same score for the relevant answer to the question asked.

The answers to the questions and therefore the compliance with preferences should be structured in the manner and order as specified in Section 8 and can be submitted using the Tenderer's own A4 format, subject to the aforementioned requirements.

The distribution of the maximum number of points to be achieved for sub-sub-award criterion: Quality (QY) is shown in the table below.

Section 8 Sub-sub-award criterion: Quality	Max. points
8.3.1 Mitigation against bad contacts:	
8.3.1 a Separate fused connection	40
8.3.1 b Automated contact check	60
8.3.1 c Hard current and voltage limit	50
8.4.1 Spectral bands	30
8.4.2 Suns-Voc and suns-Isc:	
8.4.2 a Suns-Voc single junction	20
8.4.2 b Suns-Voc multijunction	40
8.4.2 c Suns-Voc Isc	20

8.4.3 Suns–Voc minimum intensity	20
8.4.4 External Quantum Efficiency	150
8.4.5 Monitoring reference cells in parallel	20
8.6.1 Installation:	
8.6.1 a Downtime	70
8.6.1 b Infrastructure	20
8.6.1 c Cooling of light engines	10
8.7.1 Support	150
Total	700

The assessment of the answers to the questions as posed under the preferences in the PoR is carried out in the manner described in Section 3.1. As stated in Section 3.1, the average of the individual scores determines the corresponding total score. The average is determined by first determining the score per assessor (percentage * maximum score) and then averaging that score across all assessors (individual scores summed/number of assessors).

Each percentage referred to in the table equals a percentage of the maximum score per wish.

Valuation	Score	Notes to valuation
No/poor answer	0%	No answer given or answer is not good, i.e. it is not in accordance with TNO's (minimum) wish(es)
Unsatisfactory answer	20%	Answer is not complete (the wish is not fully elaborated), not sufficient, not satisfactory, i.e. it is not fully in line with TNO's preferences
Satisfactory answer	50%	Answer is sufficient, satisfactory, adequately reflects TNO's wish(es)
Good answer	85%	Answer is good, i.e. the answer accurately reflects TNO's wish(es)
Very good answer	100%	Answer is outstanding, i.e. the answer exceeds TNO's wish(es)

The following questions will be considered when assessing compliance with the preferences:

- Is the answer specific, realistic, achievable, effective, complete and consistent?
- To what extent does the answer reflect TNO's situation and the Programme of Requirements and Preferences? Does the Tenderer address the requested elements, subject-matters and aspects as stated in the relevant wish/question and the Programme of Requirements and Preferences?

The assessment will be based on the overall impression given by the answer given. The wish does not involve separate assessment aspects or criteria.

6.2 Award of Contract

Notification of the Award Decision

All Tenderers will receive from TNO, expectedly on the date referred to in the schedule under Section 2.1, the notification of the final result of the assessment of the Tenders and the intended Award Decision.

In this notification of the Award Decision, TNO will indicate the Tenderer to which it intends to award the Contract, as well as, for unsuccessful Tenderers, reasons for their rejection.

Challenge

If a Tenderer disagrees with the Intention to Award as notified by TNO, it will be given the opportunity to challenge the Intention to Award within twenty (20) calendar days after the date of publication of the Intention to Award in the manner described in Section 2.4 of the Procurement Guide.

Final award

Once the standstill period has expired without summary proceedings having been instituted or, if summary proceedings have been instituted in a timely manner, the judgment in first instance does not oppose final award, TNO will contact the successful Tenderer as soon as possible to proceed with the award, except where a situation exists in which summary proceedings have been instituted in a timely manner. No final award will be made until the Contract has been validly signed by both Parties. If this is not the case, there is no question of TNO being bound in any way.

Digital Signature of Contract

To this end, TNO signs its Contracts using a so-called advanced digital signature tool, known as ValidSign. On receipt of the provisional award, the Tenderer is requested to provide the e-mail address and personal mobile phone number of the organisation's authorised signatory. The telephone number is needed to make the Contract legally binding (using SMS authentication).

On receipt of the final award, the Tenderer receives an e-mail containing a link to the documents to be digitally signed and clicks on "sign the documents" and is automatically redirected to ValidSign where the signature fields are visible. To sign, the Tenderer clicks "click to sign" and then "confirm". Once the documents have been digitally signed by the Tenderer and TNO, the Tenderer can download the digitally signed documents within a timeframe of thirty (30) days.

7 Assessment of supporting and other documents from intended beneficiary

7.1 Requesting supporting and other documents from intended beneficiary

The Tenderer to which TNO intends to award the Contract must submit the supporting documents for the ESPD and any other documents and/or data within seven (7) calendar days after the date of TNO's request.

The following supporting documents must be supplied to TNO by the Tenderer to which TNO intends to award the Contract within seven (7) calendar days after the date of the request:

- Certificate of Conduct for Procurement (not more than two years old as at the date for submission of the Tender): The Tenderer, where applicable: all individual Combination members; all individual Third Parties;
- Declaration of Payment Behaviour from the Dutch Tax and Customs Administration (not more than six months old as at the date for submission of the Tender): The Tenderer, where applicable: all individual Combination members; all individual Third Parties;
- Extract from trade register (not more than six months old as at the date for submission of the Tender): The Tenderer, where applicable: all individual Combination members; all individual Third Parties;
- ISO 9001 Certification or similar measures;
- ISO 14001 Certification or similar measures;
- Insurance policy or Declaration of Readiness as to insurance (Annex **B03**);
- If applicable: Declaration as to Reliance on Financial and Economic Standing of Third Party or Parties (Annex **B01**);
- If applicable: Declaration as to Reliance on Technical and Professional Competence of Third Party or Parties (Annex **B02**).

Certificate of Conduct

The Certificate of Conduct (GVA; Dutch: Gedragsverklaring Aanbesteden) is a statement from the Minister of Security and Justice. The GVA indicates that an investigation into the natural or legal person concerned has not resulted in any objections in connection with the application and tendering for public contracts, special sector contracts, concession agreements for public works and/or services or competitions. After a provisional award, the provisionally awarded tenderer(s) must submit a valid GVA as proof that the grounds for exclusion do not apply to them.

TNO will request the intended beneficiary to submit the supporting documents. TNO will assess the following aspects of these documents:

- ascertain whether supporting documents submitted by Tenderer are submitted in a timely manner
- assess whether all the supporting documents requested by TNO have been submitted and whether the supporting documents received are complete. The absence of all or part(s) of supporting documents and/or other data will result in exclusion if there is no rectifiable omission. Depending on the nature of any deficiency, TNO will assess whether, as a result of that deficiency in the supporting documents, the Tender is invalid after all and will be disregarded, or whether the deficiency is amenable to rectification. The offer of rectification is a discretionary power of TNO and not a (legally enforceable) obligation.
- assess whether the Tenderer demonstrates through the supporting documents submitted that it complies with what it has declared through its Tender.

If the supporting documents are not, not completely and/or not timely received, or if the supporting documents show that the information in the Tender is incorrect, the Tenderer will be excluded after all/the Tender will be disregarded after all. If this is the Tenderer with the lowest price, the score for the sub-award criterion on Price TP will be recalculated, after which a new ranking will be determined. If this was not the Tenderer with the lowest price, the ranking order will be maintained and the Contract will be provisionally awarded to the Tenderers ranked in order of succession.

TNO is also entitled to verify the Tender from the Tenderer to which it intends to award the Contract. If this verification shows that the Tender contains inaccuracies or cannot be fulfilled, the Tender will be disregarded after all. If this is the Tenderer with the lowest price, the score for the sub-award criterion on Price TP will be recalculated, after which a new ranking will be determined. If this was not the Tenderer with the lowest price, the ranking order will be maintained and the Contract will be provisionally awarded to the Tenderers ranked in order of succession.

7.2 Contract subject to condition precedent

If the Tenderer is unable to provide a copy of the policy, nor a satisfactory statement from the insurance company, within the timeframe referred to in the previous section, but has signed the Declaration of Readiness in accordance with Annex **B03** then TNO will notify the Tenderer after a positive outcome of the assessment of the other (supporting) documents and after the standstill period has expired without summary proceedings having been instituted or – where summary proceedings have been instituted within the standstill period – the relevant judgement shows that the Award Decision can be upheld, that TNO will enter into the Contract with the Tenderer subject to a condition precedent. This condition precedent implies that the Contract will only actually be entered into if, after a timeframe of seven (7) calendar days (see Section 7.1), the Tenderer provides TNO with a copy of the required insurance policy or a satisfactory statement from the insurance company showing that the Tenderer is insured as required in the Procurement Documents. The Contract will not be entered into until after receipt of either document.

If the Tenderer is unable to provide the required insurance policy or a satisfactory statement from the insurance company within the set timeframe, the Contract will not come to fruition and TNO will retain the right to award the Contract to the Tenderer which would be ranked in first place after the number one which was eliminated in accordance with the assessment system.

8 Programme of Requirements and Preferences

TNO assesses the Tenders against the Programme of Requirements and Preferences. The Programme of Requirements and Preferences includes Minimum Requirements, Performance Requirements and Preferences. The Minimum Requirements must be met on penalty of invalidity at the time of submission of the Tender, the Performance Requirements only at the time of performance of the Contract and the Preferences must be worked out by Tenderers as part of the award of the Contract.

TNO has the right, but not the (legally enforceable) duty, to ask for clarification as regards meeting the Minimum Requirements and how the Tenderer expects to meet the Minimum Requirements.

As stated in Section 6.1.2 of this Procurement Guide, in addition to the Minimum Requirements and performance requirements, this PoR also contains a number of preferences as regards the quality of the service/supply. The preferences must be answered/elaborated upon by the Tenderer in the Tender in response to the qualitative sub-award criteria.

Any changes to the PoR that may occur during the performance of the Contract will be implemented in accordance with the conditions of the Contract. In this regard, TNO will ensure that no material amendment will be made to the Contract.

The objective and scope of the Contract (including this PoR) as well as a description of the current conditions have been described in Section 1.

This Programme of Requirements and Preferences is laid out in the following sections:

- 8.1 Front side illumination light engine
- 8.2 Rear side illumination light engine
- 8.3 Measurement system
- 8.4 Measurement software / capabilities
- 8.5 System
- 8.6 Facility
- 8.7 Service and support

8.1 Front side illumination light engine

The light engine is one of the core elements of a solar simulator. It must provide uniform illumination from the top on a 30×30cm² area, according to the IEC 60904-9. Next to the IEC norm it should also offer spectral tunability to be able to accurately measure multijunction solar cells.

Requirement 8.1.1 Pulse length 100ms to continuous.

Requirement 8.1.2 Illuminated area at least 300×300 mm².

Requirement 8.1.3 Standard Test Conditions (IEC 60904-9 2020) A+A+A+:

- Reference spectrum AM1.5 (IEC 60904-3 2019);
- Spectral Match using Table 2 (300 – 1200nm) between 0.95 and 1.05;
- Non uniformity A+, < 1%;
- Long-term instability, <0.2%;
- Short-term instability Synchronized;
- Spectral deviation (SPD) < 23%;
- Spectral coverage (SPC) > 98%;
- minimum intensity range between 300 and 1200 W/m².

Requirement 8.1.4 > 25 types of LEDs with different wavelengths.

Requirement 8.1.5 The solar simulator must be equipped with spectral tuning, where the individual wavelengths can be controlled between 10 and 100%.

Requirement 8.1.6 Integrated photo-spectrometer:

- Output calibrated in W/m²/nm;
- Resolution wavelength range 400-1000nm ≤ 1.5 nm;
- wavelength range 300 – 1200nm;
- possibility for recalibration.

Requirement 8.1.7 Spatial non uniformity of individual wavelengths < 2%.

Requirement 8.1.8 AM0 spectrum 1000W/m² (300 – 1200nm).

Requirement 8.1.9 Control of the Light Engine via external software (e.g., Python) must be possible.

Requirement 8.1.10 Minimum lifespan of LED lamp units at least 5 years in laboratory operation assuming 800 hours of use per year.

- Requirement 8.1.11 For longer flashes or light soaking it is desirable that the intensity and spectrum remain stable. Therefore, TNO requires an active feedback loop to control the intensity (and spectrum) during a measurement.
- Requirement 8.1.12 Since LED based light engines only have accurate illumination at a fixed distance from the light engine, and TNO is planning to measure samples with different heights, an indication of the correct height from sample to light engine is a must. Therefore, TNO requires an intuitive system to indicate the measurement plane.

8.2 Rear side illumination light engine

This light engine should provide illumination from the rear of the device under test to simulate bifacial operation.

- Requirement 8.2.1 Pulse length 100ms to continuous.
- Requirement 8.2.2 Illuminated area at least 160×160 mm².
- Requirement 8.2.3 Standard Test Conditions (IEC 60904-9: 2020) AAA.
- Requirement 8.2.4 Minimum intensity range between 200 and 500 W/m².
- Requirement 8.2.5 Spatial non uniformity of individual wavelengths < 2%.
- Requirement 8.2.6 Control of the Light Engine via external software (e.g., Python) must be possible.
- Requirement 8.2.7 Minimum lifespan of LED lamp units at least 5 years in laboratory operation assuming 800 hours of use per year.
- Requirement 8.2.8 For longer flashes or light soaking it is desirable that the intensity and spectrum remain stable. Therefore, TNO requires an intensity sensor.
- Requirement 8.2.9 Measurement pane (focus) same as front illumination.

8.3 Measurement system

The measurement system enables the accurate electrical characterization of the PV device under test. The measurement system should be able to measure a large range of different devices. Therefore, high precision and a flexible range for both voltage and current are required.

- Requirement 8.3.1 Synchronized measurement of Voltage, Current, Irradiance and temperature
- Requirement 8.3.2 4-wire measurement (Kelvin sensing)
- Requirement 8.3.3 Measurement electronics based either on electronic load or Keithleys:

Electronic load:

- High current voltage range at least -5 to +5V;
- Low current voltage range at least -10 to +50V;
- 4 quadrant operation;
- At least 16 bit data acquisition;
- At least 4 different current ranges lowest range below 25mA;
- Maximum current > 16A;
- Noise level / SN ratio less than 0.005%.

Keithley:

Data acquisition with TSP-Link synchronized Keithley measurement equipment:

- max current at least 14A for instance 2 × 2461 in parallel;
- Compatible with all 2400 series Source measure units.

- Requirement 8.3.4 Measurement accuracy for both current and voltage below 0.1% of measurement range. Ranges should be laid out such that they comply with the IEC 60904-1:2020 'measurement uncertainty of 0.2% or less of the Voc and Isc'. Ranges for Isc between 5 mA and 14A, and Voc between 0.5 and 50V.
- Requirement 8.3.5 Repeatability for Isc and Voc measurement of less than 0.1%.
- Requirement 8.3.6 Electrical connections via banana plugs.
- Requirement 8.3.7 Auxiliary measurement channels
TNO would like to have the possibility to record additional signals during the measurement. For instance, to compare a temperature sensor laminated inside the PV device with one taped to the back of the device. Therefore, TNO requires at least two additional voltage measurement channels.

Preference 8.3.1 a, b and c	<p>Mitigation against bad contacts: Experience with TNOs current solar simulator, equipped with high current 4 quadrant power supply, is in case of one of the wires being interrupted it can destroy devices. Currently there are two mitigation measures in place; contact check for device under test and a fuse in the reference cell connector. The contact check measures the resistances between Voltage and Current leads, with selectable pass/fail threshold values, before each measurement cycle. Another option would be to have a hard limit to the current such as for example the compliance current in a Keithley source measure unit. That is why TNO would like to know how the tenderer deals with the assessment criteria 8.3.1 a, 8.3.1 b and 8.3.1 c. As such, the following scores will be awarded:</p>
Assessment criteria 8.3.1 a:	<p>Separate fused connection for reference cells, to protect the reference cells during the calibration procedure (max 40 points):</p> <ul style="list-style-type: none"> • 0 points if there is no fused reference cell connector; • Or, 20 points for other facility of 250 mA fast fuse for measuring the reference cells; • Or, 40 points for separate (LEMO) connector for reference cells with a 250 mA fast fuse in one of the current leads.
Assessment criteria 8.3.1 b:	<p>Automated contact check (max 60 points):</p> <ul style="list-style-type: none"> • 0 points if there is no contact check; • Or, 20 points if separate standalone system; • Or, 60 points if fully integrated in software and measurement routine.
Assessment criteria 8.3.1 c:	<p>Hard current and voltage limit (max 50 points):</p> <ul style="list-style-type: none"> • 0 points if there is no provision against current and voltage spikes in the power supply. • Or, 50 points if the power supply has a selectable limit for current and voltage that can not be exceeded.

8.4 Measurement software

The software determines the functionality of the solar simulator. Since, the system will be used in a research environment, TNO wants to have a versatile and flexible operation of the solar simulator.

Requirement 8.4.1	<p>The LED based Solar simulator must have following measurement modes:</p> <ul style="list-style-type: none"> • Mono and bifacial light IV (LIV), single scan forward and reverse and hysteresis • Dark IV (DIV) • Mono and bifacial light soaking <ul style="list-style-type: none"> ◦ Mppt tracking, I_{sc}, Voc, and fixed bias voltage, at controlled irradiance and temperature • Suns–Voc (See also Preference 8.4.2 and 8.4.3) • Variable irradiance (VIM) and variable temperature LIV measurements • EQE (See also Preference 8.4.4)
Requirement 8.4.2	Independent control of both light engines
Requirement 8.4.3	<p>The LED based Solar simulator must have spectral measurement and adjustment</p> <ul style="list-style-type: none"> • Save + load light engine spectra, name of active spectrum should be prevalent in GUI • Import reference spectrum (eg from an outdoor measurement), and adjust light engine spectrum to best spectral match
Requirement 8.4.4	<p>The LED based Solar simulator must allow user configurable recipes and procedures:</p> <ul style="list-style-type: none"> • Procedure; settings to perform one measurement (eg 10s lightsoak at Voc, 25°, 500W/m² AM0) • Save and load procedures (measurement, light engine settings and temperature) • Recipe; sequence of procedures • Save and load recipes
Requirement 8.4.5	The LED based Solar simulator must have a database for reference cells
Requirement 8.4.6	<p>The LED based Solar simulator must have hysteresis without breaking voltage and illumination at changeover.</p> <ul style="list-style-type: none"> • Perovskite PV cells and modules act like high capacitive devices. Therefore, they don't like large (rapid) fluctuations in voltage ($I=C \times dV/dt$). When the voltage is broken at the changeover the voltage over the cell will go rapidly from I_{sc} to Voc and back again. Resulting in unwanted transient behaviour and in some cases even destruction.
Requirement 8.4.7	The LED based Solar simulator must have control over measurement speed (sweep rate, time delay), number of measurement points, current voltage ranges, current limit, start stop voltage, measurement direction.
Requirement 8.4.8	The LED based Solar simulator must have storage of all parameters and results in ASCII CSV format. Including raw data (of both light engines) for external conversion to STC and further analysis of

	measurement data, and information of measurement procedure, including metadata such as aperture area, and name of spectrum used.
Requirement 8.3.9	The LED based Solar simulator must have determination of Voc, Isc, FF, mpp and slope at Voc and Isc integrated in the software so the user has direct feedback.
Requirement 8.4.10	The LED based Solar simulator must have automated and manual calibration procedure for single junctions and tandem devices: <ul style="list-style-type: none"> Adjust spectrum and intensity based on EQE difference between device under test and reference cell(s).
Preference 8.4.1	Spectral bands (max 30 point): TNO intends to use the system with (mono and bifacial) tandem devices. In order to discriminate between subcells in a multijunction PV device the individual cells should be probed. Therefore, user configurable spectral bands combining multiple wavelengths are desired (for use in suns–Voc, VIR, and temperature dependence).
Assessment criteria	<ul style="list-style-type: none"> 0 points if non or only one spectral band can be configured; Or, 30 points, definition of at least two user configurable spectral bands with multiple wavelengths;
Preference 8.4.2 a, b and c	Suns–Voc and suns–Isc: Changing the illumination intensity while measuring the Voc, or Isc.
Assessment criteria 8.4.2 a	Suns–Voc single junction (max 20 points): <ul style="list-style-type: none"> 0 points if no suns–Voc measurements are possible on single junction devices; Or, 20 points for suns–Voc single junction (full spectrum);
Assessment criteria 8.4.2 b	Suns–Voc multijunction (max 40 points): <ul style="list-style-type: none"> 0 points if no suns–Voc measurements are possible on multi junction devices. Or, 20 points 1 spectral band fluctuating, other band(s) dark; Or, 40 points 1 spectral band fluctuating, other band(s) constant controlled illumination (including darkness).
Assessment criteria 8.4.2 c	Suns–Isc (max 20 points): <ul style="list-style-type: none"> 0 points, if no suns–Isc functionality is included; And/or, 10 points for suns–Isc for single junction devices (full spectrum); And/or, 10 points, for suns–Isc for multijunction devices (with bias voltage).
Preference 8.4.3	Suns–Voc and suns–Isc, minimum intensity (max 20 point): For pseudo Fill Factors above 80%, an intensity of less than 10 W/m ² is desired. In case this minimum intensity cannot be reached it would be possible to perform multiflash with for example a 10% greyfilter. Provide in your answer the offered minimum intensity in a suns–Voc measurement.
Assessment criteria	<ul style="list-style-type: none"> 0 points for minimum intensity >100 W/m²; Or, 10 points for minimum intensity between 10 and 100 W/m²; Or, 20 points for minimum intensity <10 W/m².
Preference 8.4.4	External Quantum Efficiency (EQE) (max 150 point):
Assessment criteria	<ul style="list-style-type: none"> 0 points if no EQE functionality is offered; Or, 30 points single junction (DC controlled OV); Or, 150 points multijunction with bias illumination and voltage.
Preference 8.4.5	Monitoring reference cells in parallel (max 20 point): For multijunction, each junction should be set to a matching reference cell. Therefore, an option to monitor the Isc of two or more cells simultaneous would be nice to have. Especially if this can be used with the automated calibration procedure.
Assessment criteria	<ul style="list-style-type: none"> 0 points if non or one reference cell can be connected and monitored; And/or, 10 points if multiple reference cells can be connected and monitored in parallel (software and/or SMU/DMM); And/or, 10 points if parallel monitoring of multiple reference cells is fully integrated in the automated calibration procedure.

8.5 System

The system part of the solar simulator is the integration of the light engine and measurement system into a complete solar simulator.

Requirement 8.5.1	The LED based Solar simulator must have Lighttight housing.
Requirement 8.5.2	For monofacial measurements the LED based Solar simulator must have a height adjustable removable vacuum chuck: <ul style="list-style-type: none"> • At least 10 cm height adjustment below measurement plane; • Accuracy of height adjustment less than 0.5 mm; • Minimum size 300 × 300 mm²; • Vacuum for a minimum of 3 different substrate sizes, substrate sizes that should fit are 25x25 mm², 100x100 mm², and 156x156 mm².
Requirement 8.5.3	The LED based Solar simulator must have temperature control for the device under test <ul style="list-style-type: none"> • Temperature range 20 – 65°C.
Requirement 8.5.4	The LED based Solar simulator must have freely accessible height above vacuum chuck of at least 300 mm.
Requirement 8.5.6	The LED based Solar simulator must have CE Marking and other relevant certificates.
Requirement 8.5.7	The LED based Solar simulator must have metric fasteners and components.
Requirement 8.5.8	The LED based Solar simulator must include a computer with accessories for system control compatible with W12.
Requirement 8.5.9	The LED based Solar simulator must have an instruction manual in English.

8.6 Facilities

The LED based Solar simulator will replace a current Xenon based solar simulator and will be installed at the same place. There are restrictions on the dimensions and utilities currently available.

Requirement 8.6.1	The LED based Solar simulator (including side equipment and free space for access of measurement and service compartments) must have following maximum dimensions (L×W×H) 300×350×299 cm ³ <ul style="list-style-type: none"> • The system (or parts of) has to fit through a door of (W×H) 180×230 cm².
Requirement 8.6.2	The LED based Solar simulator must have safety features: <ul style="list-style-type: none"> • Electrical safety according NEN 3140; • Safety interlocks where needed; • checks for critical utilities such as cooling water and ventilation; • overtemperature protection of light engine.
Requirement 8.6.3	Due to the long pulse length cooling of the light engines with water is required.

Preference 8.6.1 a, b and c	Installation: System to be installed in the space of the old solar simulator at the TNO location HTC21 Eindhoven. TNO will remove the old system, the new system is preferably installed in less than 5 days, including an on-site training. Furthermore, the candidate should indicate if the solar simulator requires more utilities than present in the lab. Utilities present are: <ul style="list-style-type: none"> • N2, CDA and cooling water (17-19°C 4-5 bar); • Electrical connection max 3 phase 16A (5 pin CEE); • Ventilation maximum 500m³/hour.
Assessment criteria 8.6.1 a	Downtime (max 70 points): <ul style="list-style-type: none"> • 0 points, installation and training more than 10 working days; • Or, 30 points, installation and training >= 5 working days < 10 working day; • Or, 70 points, installation and training < 5 working days.
Assessment criteria 8.6.1 b	Infrastructure (max 20 points): <ul style="list-style-type: none"> • 0 points if TNO must provide additional infrastructure for utilities; • Or, 20 points if no additional infrastructure is required.
Assessment criteria 8.6.1 c	Cooling of light engines (max 10 points): <ul style="list-style-type: none"> • 0 points if cooling with external chiller; • Or, 10 points if cooling through process cooling water.

8.7 Service and support

TNO intends to use the system for over 10 years, and expects the system to be supported by the manufacturer during the time it is in use.

requirement 8.7.1	<p>2 year service and maintenance Included 1 service visit per year for recalibration of light engine and critical components such as photospectrometer. Optional extension of the service and maintenance with periods of 2 year per extension in included.</p>
Preference 8.7.1	<p>Service and support (max 150 point): TNO intends to use the system for more than 10 years and expects the system to be supported by the manufacturer during this period.</p> <p>Specify the service and support, during and after the warranty period of 24 months (as stated in 18.2 General Purchasing Conditions of TNO), addressing the following aspects:</p> <ul style="list-style-type: none">• Repair of instruments and minimized downtime during malfunction;• Delivery and availability of replacement parts;• Service and support on-site and off-site to keep the system operational;• Expected lifespan of the system;• Response time of service department. <p>The complete answer for Preference 8.7.1 must not exceed a maximum of 2 pages A4. If the answer is longer than 2 pages, the excess pages will not be included in the assessment.</p>
Assessment criteria	<p>The assessment will be based on the overall impression given by the answer given. The preference does not involve separate assessment aspects or criteria. However, the continuity of operation over a longer timespan than 10 years will be the most important aspects for assessment.</p> <ul style="list-style-type: none">• Maximum 150 points, in the manner as described in par 6.1.

9 List of Annexes

All the Annexes appended to the Procurement Documents are published with the Procurement Guide at www.TenderNed.nl.
The Annexes are divided into three (3) main groups, namely:

A) Submission of Tender:

- Annex A01** The Tenderer's ESPD, "European Single Procurement Document" (ESPD)
 - *If applicable, this format should be multiplied in proportion to the number individual Combination members; the individual Third Party or for the benefit of one or more subcontractors to be used for the work).*
- Annex A02** Format for Reference Projects
- Annex A03** Format for Price Sheet
- Annex A04** Compliance with Requirements - Answer to Preferences (sub-award criterion: Quality)

B) Submission of supporting documents:

- Annex B01** Format for Declaration as to Reliance on Financial and Economic Standing of Third Party or Parties
- Annex B02** Format for Declaration as to Reliance on Technical and Professional Competence of Third Party or Parties
- Annex B03** Format for Statement of Policy/Declaration as to Insurance

C) Additional information:

- Annex C01** Standard Template for Tenderer Questions
- Annex C02** TNO Supplier Code of Conduct, 2024
- Annex C03** General Purchasing Conditions of TNO, February 2022.

Additional note on Section 2.2.2 Formats

Some of these Annexes are accessible in "editable" MS Excel or MS Word versions. This is with the aim of simplifying the preparation of a Tender by the Tenderer and therefore also forms the basis for the assessment procedure as described in Section 3. Some documents may be, partially, secured to prevent inadvertent and unintentional changes being made to the documents and texts (including format texts). Changes to the formats are not permitted. The premise for these documents is that the text (including format text) as contained in the Procurement Guide and published on www.TenderNed.nl will be the authoritative text at all times.