

Field-Verifiable Passive Loop Seal

1 Who we are

One of the roles of the International Atomic Energy Agency (IAEA) is to deter the proliferation of nuclear weapons. To do so, the IAEA applies various technical measures referred to as ‘safeguards’ to verify the correctness and the completeness of the declarations made by the Member States about their nuclear material and activities. The IAEA Safeguards are an essential component of the international security system.

The Division of Technical and Scientific Services (SGTS) is responsible for providing scientific, technical and logistics support within the IAEA, including design, development, testing, calibration, installation and maintenance of safeguards equipment.

2 Background

Since 1980, the IAEA has relied upon a CAPS Seal (or “Type E Metal Seal”) to assure the integrity of containment for nuclear material under Agency safeguards. The seal provides continuity of knowledge over the containment status of the sealed object. The CAPS seal is robust, inexpensive, and capable of maintaining integrity across a wide variety of temperature, humidity, and radiation environments.

The seal consists of a circular metal seal and multi-stranded stainless steel wire. The metal seal captures a knot or crimp of the sealing wire, along with unique identity markings inside each seal. Fingerprinting and verification operations are performed by IAEA staff at the IAEA Headquarters in Vienna, Austria.



Figure 1. CAPS seal shown attached to an electronics housing. (The handle and seal covering are placed over the seal and seal wire to prevent inadvertent damage.)

For additional background on the IAEA’s use and implementation of seals, please see the Safeguards Techniques and Equipment: 2011 edition, Sections 4.2 and 4.3, available from here: https://www-pub.iaea.org/MTCD/Publications/PDF/nvs1_web.pdf .

The existing CAPS seal is described in a previously published IAEA Statement of Work, the Procurement for Optical Copper Brass Seal Verification, listed here: <https://www.ungm.org/UNUser/Documents/DownloadPublicDocument?docId=264710> .

3 What we want to improve

The security of a passive loop seal is of paramount importance to the IAEA, where the seal body, seal wire (of any material), and act of verifying the seal form a composite operation to provide assurance

that the item under seal has not been tampered with since the seal was applied. The IAEA desires a passive loop seal with the following features:

- In-field verification: While some forms of tamper indication can be performed in the field with the existing CAPS seal (e.g., metal seal is broken open, wire is cut), additional verification is necessary through inspection at a laboratory in Vienna. The seal integrity and identity should be verifiable, in the field, and without detachment.
- Better attachment convenience: The current attachment technique relies on knots (which can be tied incorrectly) or on the use of a metal crimping tool. A more reliable method of attachment, preferably without the use of tools, is desired. Other tamper indicating flexible loop materials (fibers, etc.) may be considered.

The IAEA seeks new and innovative technology, materials, and solutions for an improved passive loop seal.

4 EOI Deliverables

Interested participants shall submit a proposal by the due date indicated in Section 6, Roadmap.

Response to Expression of Interest

Responses to this Expression of Interest shall contain the following:

1. A technical description of the proposed design, not to exceed eight (8) pages. Sections of the technical description shall include:
 - a. A company overview, explicitly including the company's history and maturity with the material and solution being provided and relevant details of key personnel's skills and abilities.
 - b. A description of the seal, including: dimensions of the seal body, mass of the seal body, and a description of the material used to form the sealing loop.
 - c. A description of the method used to close the seal.
 - d. A description of the method used by the seal to show evidence of tampering. Tampering can include, but is not limited to, the following: drilling, prying, cutting, or dissolution.
 - e. A description of the method used to uniquely identify the seal. If an electronic device is necessary for verification or identification of the seal, a description of the electronic device (size, weight, power requirements, cost) is also necessary.
 - f. A high-level manufacturing plan, including a brief description of how the offeror envisions manufacturing production-level quantities of seals (e.g., manufacturing partnership/subcontracting, manufacture in-house, licensing the design).
2. A commercial description and evidence of the company's financial standing, including appropriate documentation and statements, certificate of establishment.

Level of Effort

Participants may submit Commercial of the Shelf (COTS) solutions or propose solutions that require engineering development. The extent of that development should not exceed the time required for delivery of the Conceptual Prototypes.

4.1 Technical Evaluation 1:

A panel of IAEA experts will evaluate the proposed technologies against the criteria outlined below:

- a. The degree to which the dimensions are compliant with the User Requirements;
- b. The level of key security features provided by the seal;
- c. The ease with which inspectors can identify and verify the seal in the field;
- d. The ease with which inspectors can safely carry and close the seal; and,
- e. The seal's ability and ruggedness to withstand harsh environments.

The importance of all five categories are weighted equally. After a technical review of proposals, the IAEA may consider proceeding further with proposals which are deemed technically compliant to provide approximately 20 Conceptual Prototypes.

5 Procurement (Prototypes and Request for Proposal)

The IAEA will invite Participants whose proposals/products have been evaluated technically acceptable at the end of Technical Evaluation 1 to provide a commercial proposal for both the procurement of Prototypes and future seals based on the updated specifications after testing. In accordance with IAEA procurement policies, the commercial proposals will be evaluated based on the technical scores as well as commercial acceptability of the Financial Proposal and Contractual compliance.

If the selected designs require any significant customization level of effort, the IAEA may consider to finance some of the associated development cost to be agreed between the Parties in providing 20 Conceptual Prototypes to the IAEA for further testing.

Following the evaluation of 20 Conceptual Prototypes, the IAEA shall invite Offerors with technically compliant Prototypes that have successfully passed Technical Evaluation 1 to provide approximately 100 Test and Evaluation (T&E) Prototypes for testing in harsh radiological environments and for in-field testing.

Should the T&E Prototypes prove successful, the IAEA may consider to award Agreement/s (a.k.a. IDIQ, Indefinite Delivery/Indefinite Quantity) for the procurement of production-quantities to the Bidder/s that submit the best value for money combining “cost and quality”.

The IAEA may award multiple Agreements related to this project. The issue of an EOI, whether public or not, does not commit the IAEA to award a Contract/Agreement as a result of the process. The IAEA shall not pay any costs incurred in the preparation or submission of a Proposal.

The IAEA may consider the ownership of the Intellectual Property Rights (IPR) of the newly developed designs. Furthermore, the IAEA requires the awarded Contractor/s to accept the IAEA’s General Conditions of Contract.

6 Roadmap

The selection process will include the following seven (7) stages as outlined below.



Table 1. Roadmap and due dates

Phase	Milestone	Preliminary due date (by COB CET)
1. EOI Release and Proposal Submission	Start of the EOI	23 June 2020
	Questions and Answers	14 July 2020
	Submission deadline	27 July 2020
2. Proposal Evaluation (Paper-based)	Submissions Evaluation of by IAEA experts <ul style="list-style-type: none"> • <i>Technical Evaluation 1</i> 	Results announced 1 September 2020
3. Procurement for 20 Conceptual Prototypes	Participants that have submitted technically acceptable proposals (Technical Evaluation 1) shall provide 20 units delivered to IAEA premises. <ul style="list-style-type: none"> • IAEA Request for Proposal 	Conceptual Prototypes arrive at IAEA January 2021
4. In-house usability testing (Concept. Prototypes)	Test report and updated specifications <ul style="list-style-type: none"> • <i>Technical Evaluation 2</i> 	Results provided April 2021
5. Procurement for 100 T&E Prototypes	Participants that have submitted technically compliant (Technical Evaluation 2) shall provide additional 100 units delivered to IAEA premises.	Prototypes delivered September 2021
6. Field evaluation and testing (T&E Prototypes)	Conduct detailed in-house and in-field evaluation of prototypes <ul style="list-style-type: none"> • Test report and updated specifications • <i>Technical Evaluation 3</i> 	Evaluation complete December 2021
7. Contracting	<ul style="list-style-type: none"> • Financial Evaluation • Contract Award to selected participants 	Q2 2022