FRONTEX
EUROPEAN BORDER AND COAST GUARD AGENCY

Annex II to the Invitation to Tender

Frontex/OP/48/2019/RS

Terms of Reference

Framework Contract for purchase of cooled handheld thermal camera for border surveillance

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1. Acronyms

Acronym	Definition
CM	Contract Manager
DDP	Delivery Duty Paid (incoterms)
EU	European Union
FCM	Frontex Contract Manager
FWC	Framework Contract
GNR	Global Navigation Receiver
GPS	Global Positioning System
HFOV	Horizontal Field of View
IR FPA	Infrared Focal Plane Array
LFR	Laser Range Finder
MS	A Member State of the European Union
MTR	Minimal technical requirements
NFOV	Narrow Field of View
SAC	Schengen Associated Country
SO/SOs	Specific Order/Specific Orders
ToR	Terms of Reference
TS	Tender Specifications
VFOV	Vertical Field of View
VIS-NIR	Visible and Near Infrared
WFOV	Wide Field of View

2. Introduction to Frontex

The European Border and Coast Guard Agency – Frontex (hereinafter referred to as "Frontex") was established by the Council Regulation (EC) Regulation (EU) 2016/1624 with a view to improve the integrated management of the external borders of the Member States of the European Union.

In pursuit of this goal, Frontex plans, coordinates, implements and evaluates joint operations conducted using Member States' staff and equipment at the external borders of European Union.

The Regulation (EU) 1624/2016 laid down in Article 8 that the Agency shall contribute to an efficient, high and uniform level of border control and return including by setting up a technical equipment pool to be deployed in joint operations, rapid border interventions and in the framework of migration management support teams, as well as in return operations and return interventions.

In addition, the Article 39 defines the composition of the technical equipment pool into equipment owned either by the Member States or by the Agency and equipment co-owned by the Member States and by the Agency for its operational activities. In the same time, the Article 38 of the abovementioned EU Regulation provisions, ensures the legal basis for Frontex to develop its own operational capacity by acquiring itself or in co-ownership with a Member State or to lease technical equipment for external border control in accordance with the financial rules applicable to the Agency.

Further information about Frontex origin, organisation, its mandate, fields of activities, strategy and planned activities can be read on the Agency's web site: www.frontex.europa.eu

3. General Information

3.1. Aim of the document

This document defines terms and conditions to procure cooled handheld thermal camerafor border surveillance. It describes the minimum requirements for the requested devices and it ensures that the offered and then delivered goods comply with Frontex requirements.

These terms of reference shall become an integral part of the contract that may be awarded as a result of this open tender procedure.

All the information delivered in this document, its annexes and other referred documents shall be taken into consideration by the Tenderers in preparation of their offer and by the Contractor during the contract's implementation.

3.2. Target situation

In order to achieve the optimal technical equipment availability Frontex intends to establish a single FWC for purchasing handheld equipment to be used for border surveillance and border check purposes. The overall maximum duration of the FWC shall be limited to four (4) years.

The quantity of equipment to be ordered during the lifetime of the contract is estimated to be as follows:
Table 1.

1st year:	20
2nd year:	10
3rd year:	10
4th year:	10

The forecast presented in the table above is indicative and cannot be considered as automatically constituting any form of commitment by Frontex.

4. Scope of the FWC and Lots

The objective of this framework contract is to provide Frontex with the capacity to obtain different quantities of equipment, as listed below, each time the need arises, according to the terms and conditions described here below.

The tender is not divided into lots.

5. Minimum technical requirements

5.1. Cooled handheld thermal camera for border surveillance

5.1.1. Basic description

- Required handheld thermal camera is portable, rechargeable battery operated surveillance systems built by integration of thermal imager, VIS-NIR camera (typically called CCD camera), laser range finder, GPS module and binocular image projector into a single portable body;
- The handheld thermal camera should enable long/medium range surveillance capabilities during foot or vehicle patrols at European climatic conditions;

- The handheld thermal camera shall be delivered in form of a set comprising at least: binocular body, two sets of rechargeable batteries, battery power supply, portable tripod, service/cleaning set, transport case;
- Handheld thermal camera of low mass, ergonomic design for hand held operation are required;
- Estimated time of work during warranty period is about 4 hours per day.

5.1.2. Requirements on thermal imager

- Thermal imager module should be built using cooled staring IR FPA imaging sensor of resolution at least 640x512 pixels;
- The thermal imager shall be sensitive in one of two main spectral bands: LWIR (7÷14 μm) or MWIR (3÷5 μm) or in more narrow sub-band;
- User should be able to regulate FOV. At least two FOVs should be available: wide FOV coded as WFOV and narrow FOV coded as NFOV. Both continuous and step regulation of FOV are acceptable;
- Minimal acceptable horizontal WFOV is not less than 8°;
- Maximal acceptable horizontal NFOV is not more than 3°;
- Ratio of horizontal field of view (HFOV) to vertical field of view (VFOV) should be in range 1.25 to 1.33;
- User can control contrast (gain) and level (offset) in manual and automatic mode, and to change polarity of the image.
- The thermal imager shall have a minimum 2x electronic zoom;
- Effective frame rate of images generated by thermal imager should be at least 25 frames per second;
- NETD of thermal imager shall be less than 45mK;
- The thermal imager shall deliver a sharp clear image of scenery under surveillance in full range of regulated field of view without any image defects (Narcissus, halo effects etc.);
- The thermal imager shall automatically keep proper focus during operation of changing field of view;
- When changing FOV the target indicated by the aim mark located in the centre shall not move more than 1 pixel;
- Thermal imager should fulfil requirements on ranges of detection range of human target presented in Table 2. The ranges should be calculated using methodology presented in Stanag 4347 standard. MRTD function used for calculations should be measured when image from thermal imager is acquired and presented by on the internal display.

Table 2. Requirements on ranges of effective surveillance (detection, recognition, identification) of human type target

No	Parameter	Value
1	Range calculation method	As in STANAG 4347
2	Atmospheric conditions	0.2 extinction coefficient
3	Target size	Square of 0.95m size as equivalent to human figure1.8m x 0.5m.
4	Temperature difference of the target to background	2°C.
5	Minimal detection range at HFOV=3°	5.1 km
6	Minimal recognition range at HFOV=3°	1.75 km
7	Minimal identification range at HFOV=3°	0.85 km

5.1.3. System requirements

- Handheld thermal camera are to be battery powered. Two sets of rechargeable batteries are to be delivered;
- Design of handheld thermal camera should enable easy exchange of the battery even in total darkness;
- Protective case for the handheld thermal camera, batteries and charger is to be delivered;

- There should be indicator of low voltage battery seen in ocular of the handheld thermal camera;
- The handheld thermal camera shall be protected against reversed power polarity and reversed battery insertion;
- Identification numbers should be easily seen and durable;
- Noise emitted by the handheld thermal camera should not be audible from distance longer than 10 m;
- Handheld thermal camera should be painted with matte paint of low contrast colour comparing to typical EU outdoor scenery;
- All parts must be manufactured from material resistible to corrosion;
- The case and lenses of handheld thermal camera should be scratch resistant;
- It shall be possible to control handheld thermal camera switches by a user wearing gloves in any atmospheric conditions;
- The handheld thermal camera shall be easy for cleaning using service set delivered as part of accessories;
- The handheld thermal camera shall be equipped with a strap for hanging it over the shoulder or neck;
- The handheld thermal camera shall have a replaceable eye cover protecting eyes from ambient lighting;
- It is required to have ability to record still images to internal digital memory storage capacity not less then 1MB;
- It is required the handheld thermal camera to have a slot for external memory card, where the recorded still images to be stored. USB slot for a memory stick is also acceptable;
- The external memory card or the USB memory stick has to be provided by the Contractor with storage capacity of not less then 8GB;
- The handheld thermal camera is to be designed using internal display of resolution at least 800x600;
- The initialization time of the handheld thermal camera shall be less than 7 minutes at an ambient temperature of 30°C;
- Operational time with one battery or one set of batteries shall be ≥ 3 hours;
- Weight of the handheld thermal camera including batteries must not be more than 4.2 kg;
- Diopter Adjustment of oculars is to be at least +2 to –4 diopters;
- Conditions on collimation errors between both optical channels of the handheld thermal camera (convergence <1° and dipvergence ≤1/2°) are to be fulfilled;
- Interpupillary adjustment of two oculars is to be at least from 55 mm to 71 mm. Equivalent solutions are accepted;
- When changing imaging sensor (thermal imager to VIS-NIR camera) the target indicated by the aim mark located in the centre shall not move more than 1 pixel.

5.1.4. Requirements on VIS-NIR camera

- VIS-NIR camera should be a camera sensitive in VIS-NIR spectral band to be operated at day conditions in both colour mode and monochrome mode;
- Image resolution should be at least 720 x 576 pixels;
- Cameras of fixed FOV are accepted but cameras of regulated FOV are considered as a better solution;
- Camera of any FOV will be accepted as long as condition on angular resolution is fulfilled;
- Minimal angular resolution (measured against USAF 1951 resolution target of contrast not higher than 30%) shall not be worse than 6.2 lp/mrad;
- The camera shall have sensitivity not worse than 1lx;
- The camera shall have Backlight Compensation;
- The camera shall have a minimum 2x electronic zoom;
- Both manual and automatic regulation of camera settings (at least gain, brightness, exposure, gamma) of the camera shall be possible.

5.1.5. Requirements on LRF

- The laser rangefinder (LRF) shall be eye-safe and at the same time should operate at wavelength of high atmospheric transmittance. In detail, LRF should operate in spectral band from 1530nm to 1580nm;
- The desired range of distance measurement is at least from 100m to 8000m;
- The LRF shall enable proper distance measurement to large size targets (at least five times bigger than beam emitted by LRF) of diffusive reflectivity equal to 0.3 at distances at least up to 8km at atmospheric visibility 10km;
- The LRF shall enable proper distance measurement to a NATO size target (square of size 2.3m) of diffusive reflectivity equal to 0.3 at distances at least 5 km at atmospheric visibility 10km;
- Divergence angle of beam emitted by LRF shall be not higher than 1mrad;
- The laser rangefinder shall provide the measurement accuracy not worse than 10m;
- Resolution of distance measurement shall be not worse than 5m;
- Distance discrimination between two reflections shall be not worse than 50m;
- The laser rangefinder shall provide indication of number of reflections from multiple target – up to 3 targets;
- The laser rangefinder shall have the capability to determine blind distance zone distance. Targets in blind zone shall be disregarded;
- The laser rangefinder shall provide the measurement repeating frequency not lower than 10/minute;
- The aiming mark (cross) of LRF shall be displayed on internal display of binoculars;
- The measured distance to the object shall be presented on internal display of binoculars;
- The MTBF shall not be less than 100 000 measurements.

5.1.6. Requirements on GNR

- Global navigation receiver should generate information about latitude, longitude, altitude of handheld thermal camera and information on current date and time;
- The information about the geographical position from the Global Navigation Receiver shall be displayed in the visual field of the camera screen;
- GNR should determine position of handheld thermal camera with accuracy not worse than 5 m.

5.1.7. Environmental requirements

The handheld thermal camera must be resistible to the environmental conditions listed in Table 3.

Table 3. Requirements on environmental conditions

No	Parameter	Value
1	Working temperature	-30°C to 45°C (water vapour on internal optical parts is forbidden)
2	Storage temperature	-30°C to 55°C
3	Sinusoidal vibrations	Amplitude up to 30m/s^2 at 1-80Hz
4	Drop test of non-active NVG in transport case	Height - 0.5m; surface – concrete or steel; number of drops – 10
5	Relative humidity	Up to 95% at 35C

6. Delivery, training, warranty and maintenance

6.1. Delivery

The Contractor will be responsible for the timely delivery of requested products. The Contractor will also be responsible to address customs and all import related issues if any.

The ordered batches of equipment shall be delivered the soonest possible but not later than 180 calendar days after the Specific Order signature.

The equipment shall be transported (DDP) and delivered to Frontex Headquarters together with all corresponding documentation and, where applicable, certificates.

The delivery address is:
Frontex
Plac Europejski 6,
00-844 Warsaw – Poland

The delivery shall take place during working hours (Monday – Friday 09:00-17:00 excluding holidays).

6.2. Training

6.2.1. Training Manuals

For all products delivered under this contract the respective contractors shall also provide detailed technical and training manuals which shall be available (both in paper and electronic form) at least in the following languages: English, German, French, Spanish, Italian, , Bulgarian and Greek.

6.2.2. Hands-on training

For products delivered the Contractor may also be asked to provide the necessary hands-on training to the staff identified by Frontex on the handling of the purchased equipment. Frontex reserves the right to request such training either together with the delivery of the equipment or at any other moment during the contract duration.

The training location shall be at Frontex HQ premises in Warsaw. The costs of Frontex staff participation will be covered by Frontex. The training shall be carried out in English language. All training related documents (manuals, presentations, etc.) shall be in electronic and paper format in English language, one copy for each participant.

The training shall be ordered via Specific Order. The financial proposal shall outline the cost of a requested training with all contractor's costs included.

6.3. Warranty and maintenance

The purchased equipment shall be covered by at least 2 years warranty.
The warranty shall include all required regular maintenance services, including the re-filling/re-furbishing of disposables if required.

7. Quality monitoring and acceptance procedures

7.1. Quality control procedure

For all products delivered by this contract, the Contractor(s) shall provide the quality certificates. The certificates shall be accompanied by the results of the testing that confirm the requirements set in art. 5 of this ToR.

All tenderers are expected to deliver with the offer the results from the following test:

Manufacturer tests (reports from tests of offered cooled handheld thermal camera done by manufacturer) or external verification tests (test of sample cooled handheld thermal camera tested by an expert laboratory).

Report from these tests should present values of all parameters listed.

Costs of the tests are to be covered by the tenderers.

Frontex will monitor the quality of the products provided by the Contractor. Elements that will be monitored include:

- Compliance of the product to the Minimum Technical Requirements as described in art.5 of this ToR;
- Speed and agility of responding to requests and adherence to deadlines;
- Communication skills and ability to cooperate with users.

The Contractor will be immediately informed in case the quality is not up to expectations in any of the criteria and will be requested to remedy to the identified failure immediately.

In addition, Frontex reserves the right to contract an independent testing, including in the field conditions, on any of the delivered equipment at any moment during the contract duration for the purpose of verification of quality of the equipment and its compliance to the MTR described in art 5 of this ToR. Such tests shall be executed by an independent internationally recognised European Laboratory.

7.2. Acceptance procedure

Based on quality monitoring and control, all products delivered under the FWC will be subject to the Frontex acceptance.

Upon delivery, the Contractor is required to provide together with deliverables the results of a recent (not older than 3 months) external verification test of the delivered cooled handheld thermal cameras, done by an external expert laboratory.

The external verification test is a test of the delivered cooled handheld thermal camera offered by the tenderer that is done by an expert laboratory. Report from this test should present measurement results of critical parameters of cooled handheld thermal cameras as follow:

- ranges of effective surveillance of thermal imager;
- angular resolution of VIS-NIR camera;
- operational range of LRF according to the NATO targets' standards.

The expert laboratory is an organization that fulfils the following conditions:

1) it is independent from tenderers and manufacturers of cooled handheld thermal cameras;

2) it has test equipment needed to carry out required tests;

3) it has already carried out commercially required test services for other organizations;

4) is internationally considered as competent in thermal imaging metrology;

5) is internationally recognised as capable to perform such tests.

Upon delivery of the products which are part of the SCs Frontex shall evaluate them within 30 calendar days and provide the Contractor with written notice of Acceptance, Partial Acceptance or Non-acceptance. Costs of the external verification test is to be covered by the Contractor.

In the event Frontex provided notice of partial or non-acceptance to Contractor, it shall have the continuing right, at its sole discretion, to:

- refuse to pay any fees or other amounts associated with such products;

- accept such products on the condition that any fees or other amounts payable with respect thereto shall be reduced or discounted to reflect, to Frontex' satisfaction, the deficiencies present therein or the costs likely to be incurred by Frontex to correct such deficiencies; or
- terminate the contract and/or seek any and all available remedies, including damages.

The delivered cooled handheld thermal camera is to be accepted using two phase procedure:

- review certificates, as well as test results from the expert laboratory;
- perform functionality tests on all delivered cooled handheld thermal cameras, immediately after delivery to be done by experts delegated by Frontex;

In addition, Frontex keeps the right to perform end warranty tests of all delivered cooled handheld thermal camera before end of warranty period. Frontex may decide on whether the tests would be done by an expert laboratory and/or experts delegated by Frontex.

Minimal end warranty test range:

- Measurement of the critical parameters;
- Checking for any defects in general workmanship that reduce performance of cooled handheld thermal cameras. Costs of both type of test are to be covered by the tenderer. Tests can be carried out in any country of EU.

8. Implementation of FWC

8.1. Indicative implementation plan for the FWC

The indicative plan for the implementation of the FWC is as follow:

- First SC is scheduled to be issued upon the signature of the FWC;
- Estimated number of SCs per year is 2, however it is not binding on Frontex and may be adapted during the contractual period;

8.2. Specific Orders implementation process

The FWC shall be implemented by means of Specific Orders (see the draft contract in *Annex V*).

8.3. Payment

All prices shall be in Euro, excluding VAT.

Pre-payment:

- Upon signature of the Specific Order, the contractor may issue a pro-forma invoice for an advance payment corresponding to 30% of its overall value. Frontex shall pay the pro-forma invoice within 30 calendar days after its receipt;

Final payment:

- After acceptance of all products delivered and upon reception of the final invoice, Frontex will execute the final payment within 30 calendar days.

8.4. Language

All the documentation delivered within the contract shall be in English. Moreover all communication, whether written or spoken, shall be in English.

8.5. Contract management personnel

8.5.1. Contractor's personnel

The Contractor shall be responsible for providing all necessary personnel to ensure the satisfactory performance of its obligations under the FWC and shall supervise and be fully responsible and liable for all the services performed by its personnel and for their compliance with the terms and conditions of the FWC.
During the implementation of the FWC and its SCs the Contractor shall nominate a Contract Manager (CM) for all contractual matters. CM will act as a single contractual contact point. All the correspondence related to the FWC (including the implementation of the SCs) will be addressed to him.

8.5.2. Frontex personnel

For the proper implementation of the FWC and its SCs Frontex will nominate a Frontex Contract Manager (FCM), who will act as a single contact point for all the matters related to the FWC implementation, including the implementation of the SCs.