INVITATION OF VENDOR COMMENTS ON QR/ TDs OF HAND HELD EXPLOSIVE DETECTOR

1. It is intimated that firms/ vendors' comments are invited on the QR/ TDs of Hand Held Explosive Detector. All firms are requested to offer their comments on e-mail address scord@nsg.gov.in or gcproc@nsg.gov.in as per under mentioned format.

QRs	TDs	Comments by the firm

2. You are requested to offer comments within 15 days from the date of uploading on the website. The QR/ TDs of above mentioned equipment/ weapon are being considered by sub group committee meeting for finalization.

Dated : 21 Jun 2023

(Ankit Chaudhary)
Maj
SC(Ord)

DRAFT QUALITATIVE REQUIREMENT (QR) AND TRIAL DIRECTIVE (TD) OF HAND HELD EXPLOSIVE DETECTOR (HHED) : 15 JUNE 2023

S No	Parameter	Qualitative Requirement	Trial Directive
1.	**General**	The said Explosive Detector shall be used to detect and identify **group of explosives** (bulk and trace quantities) in Anti Sabotage operations, Render Safe Procedure Operations (in terms of UXOs, IEDs, Home Made Explosives, etc) and Post Blast Investigations, in addition to other operations related to Bomb Disposal and Explosives	-
2.	**Detection Technology**	Ion Mobility Spectrometry (IMS) or Amplifying Fluorescent Polymer (AFP) or Mass Spectrometry (MS) or Micro Sensor or Gas Chromatography or Chemilumine scence or Thermo Redox or Metal oxide sensor or High Frequency Quartz Crystal microbalance or any equivalent/better technology	OEM to furnish certificate stating the type of technology used for detection – BOO to check the same
3.	**Detection Capability**	(a) The detector should be able to identify group of explosive or explosive precursors as listed in Annex A. The detector should be able to detect all types of organic and inorganic explosives in vapour, liquid, solid/powder, particle and mixture forms. The detector should be able to detect both the positive and negative ion groups of the explosives.	(i) BOO to test by keeping TNT, Nitro methane (in liquid form), RDX, PETN and Ammonium Nitrate (one explosive at a time) - all tested in both particle and vapour mode. For positive polarity explosive (such as TATP/HMTD) undertaking for detection to be provided by the OEM. (ii) Note: This test is purely for testing if the detector is able to detect these explosives and correctly identify them. It is not a test for the minimum threshold quantity of detection. Hence sufficiently high vapour/ particles are to be tested, as desired by vendors during testing.
		(b) The detector should have an open library to add new explosives/ explosive precursors	

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4.	**Sample collection**	The detector should allow Sample collection in both:	Physically check by the BOO.
		(a) Vapour mode by collection of explosive vapour in Group of explosive	The below test is to be conducted for TNT, PETN, RDX, Ammonium Nitrate and Nitro Methane. Hence a total of 5 tests are to be conducted :- (i) In a clean glass container (with volume of container between 100mL to 500 mL) with mouth of container being 1cm to 10 cm diameter, place at-least 10 g of Explosive (eg. TNT) and close the lid of the glass container. (ii) Place the container in the temperature of 20ºC to 30ºC and wait for 8 hours. (iii) Open the lid of the container. Within 1 min from the opening of the lid, the ETD should be placed at a distance less than 5cm without touching the mouth of the container for a duration of 20 seconds or less for collection, analysis & detection of sample from the suspected object. (iv) The result shown in the detector is to be recorded. (v) Separate containers to be catered for participating vendors.
		(b) Particle mode by detecting trace quantities of explosives (by using swabs)	(i) Use a swab and touch over the explosives/ precursors – TNT, PETN, RDX, Ammonium Nitrate and Nitro Methane – one swab per explosive/ precursor. (ii) Test for each of the explosives.
5.	**Auto Calibration**	(a) Adjust/Resetting for further operation should be only automatic. (b) Time for auto calibration should not exceed 30 seconds.	Physically checked by BOO

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6.	**Consumables**	Consumables for swab should be commercially available off the shelf without any specific dependence on the firm. Qty of swab (with a life of 5 years) to be provided along with each equipment to be specified by the user **at the tender stage**.	BOO to physically check the following: (a) Non dependence (on OEM/ vendor) nature of swab (b) OEM undertaking for providing each swab for Rs. 5 or less for a period of **05 years**. (c) 10,000 numbers of swabs provided during initial supply
7.	**Operation Temperature**	(a) The offered Explosive Detector shall operate and detect in the Temperature range of -10°C to 55°C (±3°C). (b) The explosive detector shall be capable of being stored in the temperature range of -20°C to 60°C. OEM to furnish test certificate from a national/ international accredited lab.	BOO to check the lab certificate
8.	**Relative humidity**	The offered ETD shall operate in Relative humidity of upto 95%. OEM/ Firm to provide a test certificate from a national/ international accredited lab.	BOO to check the lab certificate
9.	**False Detection/ False Alarms**	The offered ETD shall have a false alarm rate of less than 3%.	Explosive and non-explosive placebos are to be placed inside identical containers (without lid so as to allow sufficient vapours) separately. The containers are to be numbered on the bottom side (which is not visible during the test). These containers are to be checked with the detector. A minimum of 35 containers are to be used for this test – 33 with placebos and 2 with explosives (1 with TNT, 1 with RDX). The detector should :- (i) Correctly detect and identify the explosives– No error in detection or wrong identification of explosive shall be acceptable (ii) Not identify more than 1 of the placebos as explosives - Upto 1 error in wrong identification of placebo as explosive shall be acceptable **Note**: Placebos should not have any chemical resemblance to RDX/ TNT and care should be take so that the placebos should not contain traces of these or any explosives. Suggested Placebos include Chalk powder, moulding clay, common salt, etc

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10.	**Detection range**	(a) The Explosive Detector shall detect the presence of small quantities of explosive by analysing the explosive vapour or trace available in the container, bag, etc. as well as outside in open in bulk quantities. The detector shall detect and identify the explosive groups. The OEM to provide datasheet / Certificate for the threshold of detection for vapour and trace modes.	BOO to check the datasheet and certificate for the threshold of detection for both Vapor and Trace modes
		(b) Threshold for detecting low-volatile organic substances :	-
		(i) Trace Mode –minimum of $0.5x10^{-9}$ g for 2,4,6-trinitrotoluene (TNT)	**Trace Mode**. Firm to submit National (NABL accredited) lab certificates tested in accordance with ASTM E2677-20/ASTM E2520-21 (or latest versions of E2677/E2520 Standards) specifically mentioning the threshold/sensitivity of detection. In case of absence of ASTM E2520/ASTM E2677 compliant Lab Certificates, following procedure will be adopted :- (i) Take Three glass bottles with one litre of acetone each. (ii) In 1st bottle, add 1 g to 1.5g of TNT and thoroughly shake such that the complete TNT is dissolved. (iii) After previous step, take 0.8 to 1 mL of acetone (mixed with TNT) from 1st bottle and add to 2nd glass bottle. Shake such that the solution is thoroughly mixed. (iv) After previous step, take 0.8 to 1 mL of acetone (mixed with TNT) from 2ndbottle and add to 3rdglass bottle. Shake such that the solution is thoroughly mixed. (v) After previous step, take 0.8 to 1 mL of the solution from 3rd glass bottle and apply on the trace paper. Let the acetone evaporate and then proceed for next step. (vi) Use one trace paper(with trace TNT) and one empty trace paper (without trace TNT) for tests in the explosive detector. The detector should indicate the presence of TNT in each of the swab/ trace paper with TNT and should NOT indicate in the empty trace paper.

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10.		Vapour mode: capable of testing RDX at saturation vapour pressure (as in TD) at 20^0C to 25^0 Celsius.	The below test is to be conducted for RDX since RDX has a low explosive partial vapour pressure. (i) In a clean glass container (with volume of container between 100mL to 500 mL) with mouth of container being 1cm to 10 cm diameter, place atleast 10 g of RDX and close the lid of the glass container. (ii) Place the container in the temperature of 20ºC to 30ºC and wait for 6 hour. (iii) Open the lid of the container. Within 1 min from the opening of the lid, the ETD should be placed at a distance of 5cm or less from the mouth of the container for a duration of 5 seconds or less from the suspected object (vapour collection time of 5 seconds. Analysis and display can take another 15 seconds (5+15)). The result shown in the detector is to be recorded
		Note : The reference explosives are taken for standardization of detection, since different explosives have different explosive partial vapour pressures.	-
11.	**Operational weight**	**QR**: (a) Operational weight (with battery for operation): **Option 1**: Weight of offered explosive detector to be less than 2 kg. **Option 2**: Weight of offered explosive detector to be less than 4 kg. **(Option to be specified at the time of tender)** (b) The total weight of the equipment including accessories in packed condition is to be less than 10 kg.	BOO to weigh and check the parameter

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12.	**Safety – Ionisation Source**	(a) The explosive detector should be with or without radioactive material. (b) In case of equipment with radioactive material, the firm has to provide safe handling certificate from AERB. (c) After completion of shelf life followed by codal formalities of condemnation procedure of the equipment. It is firm's responsibility to dispose of eqpt as per regulations of AERB. The undertaking certificate regarding the same may be obtained by both the firm & OEM	BOO to check the undertaking and Test Certificate
13.	**Initial Warm up time**	Initial Warm up time should be less than 180 seconds	BOO to check by switching on the detector and noting the time the detector is ready – immediately after the detector being ready, it should be checked by detection of a bulk explosive such as a slab of TNT.
14.	**Analysis Time**	Time for analysis and detection shall not exceed 20 seconds (including vapour collection time)	BOO to physically check the same.

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15.	**Power**	Battery Charger should operate on AC mains from 100-260V, 50 – 60 Hz. The battery charger to have the voltage rating clearly mentioned on it. The charger should have a short circuit protection for which an OEM letter is to be provided stating that short circuit protection is available.	BOO to check the voltage rating as mentioned on the battery charger and the OEM letter for short circuit protection.
		A 12V DC car cigarette charger or a 12 V DC (car cigarette Plug) to 230V adapter for charging the equipment using a car cigarette charger to be provided.	BOO to physically use and check the same.
		Equipment should operate with rechargeable batteries	BOO to physically check the same
		Operational Time. The minimum operational time should be 4 hours.	(i) Switch on the equipment (with a fullu charged battery) and set the mode to vapour mode and Note the time. (ii) Keep testing the equipment using bulk explosives (eg. TNT slab) every 5 minutes or until the equipment goes into sleep mode, whichever is lesser in time. (iii) The minimum operational time should be 4 hours. Repeat the above procedure for trace mode, using another fully charged battery – Sufficient quantities of particles are to be present on the swab.
15.		**OPTION 1** One spare set of batteries to be provided (excluding the main battery). OEM to provide undertaking for the same **OPTION 2** Two spare set of batteries to be provided (excluding the main battery). OEM to provide undertaking for the same **USER TO SPECIFY THE OPTION**	BOO to check the OEM undertaking and physically count the batteries provided
		Full Battery charging time to be maximum of 4 hours. There should be a provision to charge multiple batteries simultaneously (either using a single charger or multiple chargers, in which case multiple chargers to be provided) **OPTIONAL** One spare charger to be provided **USER TO SPECIFY**	BOO to physically check the same by using fully drained battery/ batteries

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15.		Reverse polarity protection to be provided (both in charger and in the detector).	BOO the physically try (not forcefully so as to damage the equipment or battery) to charge or insert battery in reverse polarity and check if the equipment has reverse polarity protection.
		Battery warranty shall be inclusive for the instance when the operational time for the battery reduces less than 3 hours. Firm to provide a separate warranty card for the batteries clearly mentioning the above clause, duly laminated with each equipment supplied, as part of the accessories for the equipment.	BOO to check the warranty card provided.
16	**Display**	(a) Equipment should have a full coloured LED/ LCD display. The display should be visible during peak hour of sunlight. (b) Equipment should display the following details (either in the coloured display or using a separate LED):-	Physically check by the user
		(i) Explosive/ Explosive Precursor or its ingredient (i.e. the generic group is acceptable)	
		(ii) Low battery indication/ Battery level indicator	
17.	**Self Cleaning Time**	Not more than 300 seconds	BOO to check the feature and measure the time
18.	**Electromagnetic Interference**	The equipment should not get affected by any electromagnetic radiation or electronic/ magnetic devices in the surrounding.	BOO to check the NABL/ ILAC accredited lab certificate (complaint to either MIL Std-461/ MIL std – 704/ Mil Std-1265/ MIL std – 1399/ DEF STAN 59/411/ FCC part 15 class A/ FCC part 15 class B/ EN61000-6-1/ EN61000-6-2/ EN61000-6-3/ EN1000-6-4/IEC61326-1) for the same.

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19.	**IP rating and Ruggedness**	Explosive Detector) IP rating to be atleast IP53. The carrying case to be atleast tested for build and ruggedness as per mil Standard 810 G. (from a national/ international lab.	BOO to check the IP and Mil Std 810G rating test certificates from ILAC/NABL for both the equipment and carry case.
		The carrying case to be atleast mid Standard 810 G tested. (from a national/ international lab.	
20.	**Indication**	Explosive Detector should give detection alarm by audio or LED indication or video means. **Optional** – Vibration based alarm (to be specified during tender)	BOO to check the same .
21.	**Data Transfer**	Explosive Detector should have the following for transfer of data and updation of library/ database: Wired Connectivity - USB Port (mini/ B type/ C type, etc) or ethernet Port **OPTIONAL** Wireless connectivity – Bluetooth or wifi.	-
22.	**Database/ Library**	The explosive detector should have an upgradable/ extendable database/ library.	BOO to test the feature by upgrading the database/ library
		If the user is not able to upgrade the database/ library, the OEM to provide necessary free of cost assistance for the same, within two weeks of such a request (upto the life of the equipment as in the QR/TD or as in Tender document, whichever is higher) – OEM to provide undertaking of the same	BOO to check the undertaking by the OEM – The undertaking should not contain any conditions for such support

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23.	**Ease of operation**	The result given by the equipment should be self explanatory (i.e. name of the explosive group to be directly displayed) and should not require any reference for assimilation.	BOO to operate the equipment and check the same.
24.	**Training**	OEM/ OEM's representative to provide operational training to minimum 10 bomb technicians/ individuals for a week Optional – User may specify more training during tender stage	BOO will check the OEM undertaking for the same
		OEM/ OEM's representative to provide user level maintenance (for R1, R2 & R3 level maintenances) training to minimum 10 Bomb Technicians/ individuals for a week Optional – User may specify more training during tender stage	BOO will check the OEM undertaking for the same
25.	**Manual**	(a) OEM to provide a user manual (in English) (b) OEM to provide a maintenance manual (in English) (c) OEM to provide a CD/ DVD/ Pen Drive consisting of videos having maintenance and operational guidelines and training (d) OEM to provide print/ digital training manual for updation of database/ library.	BOO to check and ensure all manuals are provided
26.	**Lifespan of the equipment**	(a) The operational life of the equipment shall be atleast 07 years and shall not be limited by the number of hours of operation. If any such limitation exists, the OEM to provide free of cost consumables to bring back the equipment to serviceability within the operational life.	BOO to check the OEM certificate provided
		(b) The operational life of the equipment shall be at-least 07 years.	BOO to check the OEM certificate provided
		(c) OEM shall provide a laminated copy of certificate, clearly mentioning the operational life, shelf life and undertaking to provide consumables free of cost to bring the equipment to serviceability within the operational life. This certificate shall for part of accessories of every equipment supplied.	BOO to check the OEM certificate provided
27.	**Maintenance Support**	OEM/ OEM's representative to provide maintenance support for a period of atleast 07years from the date of supply.	
		OEM/ OEM's representative to provide spare parts availability (within 60 calendar days from date of intimation by user (by email) beyond which the demanded spare parts shall be provided free of cost by the OEM) for a period of atleast 07 years from the date of supply.	

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28.	**Carry case**	There are two types of carry cases to be provided:	BOO to check and ensure the carry cases are available. For shoulder carry case, BOO to also check if the carry case is shoulder carryable
		Shoulder Carry Case: - The equipment and all its accessories should fit into one carry case which can be shoulder carried (by one person) for long duration operations. The carry case can be soft or hard type.	
		(a) Hard Carry Case – The equipment and all its accessories should fit into one hard carry case suitable for transportation by vehicle or aircraft. Note : Wherein the soulder carry case as provided above is itself a hard carry case, a separate hard carry case need not be provided.	

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29.	**Accessories**	(a) OEM to a CD/ DVD/ Pen Drive having software and database/ library for formatting the system and installation of original firmware and database/ library.	BOO to check if all accessories as in QRs are provided
		(b) OEM to provide a laminated copy of warranty card for the equipment and its accessories (excluding battery) and a laminated copy of warranty card for the batteries, as part of accessories along with each equipment.	
		(c) OEM to provide a laminated copy of undertaking of compliance for all these QR/TDs as part of the accessories for knowledge of User regarding equipment's capabilities and compliances.	
		(d) Test samples – As recommended by OEM for operation of equipment compliant to this QR/TD.	
		(e) Any other consumables for operation as required.	
		(f) Manufacturer (OEM) Spare Parts List duly covering the complete list of spare parts.	
		(g) OEM undertaking to provide service and spare parts availability in India for 10 years from the date of supply.	
30.	**Tools**	(a) OEM to provide tool kit with all necessary tools to carryout repair of the equipment at user level (list of tools to be furnished by OEM)	BOO to check the tools and cross-check with OEM list of tools provided.
		(b) OEM to provide cleaning tool kit required for the equipment operation for 7 years (list of tool kit to be furnished by OEM)	
31.	**Spares and Consumables**	(a) Consumables (excluding swabs, but including Sensor element/ Sensors/ energy tubes/ ionization elements, etc which are required to be changed after specific hours of operation/ years of operation). All consumables for operation for a period of 7 years (free periodical provisioning is also acceptable).	BOO to check the OEM undertaking
		(b) **Swabs**. As mentioned during tender stage. If not specified in tender, 10,000 swabs to be provided.	

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32.	**Warranty**	To be specified at the time of tender. Wherever not specified, an all covered warranty of 2 years will be applicable	BOO to check the warranty certificate for the same. The warranty certificate shall not contain any conditional exclusions not mentioned in this QR/TD

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Annexure A

DETECTED EXPLOSIVES / EXPLOSIVE PRECURSORS

S No	Name	Marker	Chemical formula
1	Ammonium nitrate	NIT	NH_4NO_3
2	Dinitrotoluene	DNT	$C_6H_3CH_3(NO_2)_2$
3	Trinitrotoluene	TNT	$C_6H_2CH_3(NO_2)_3$
4	Trinitroresorcinol (styphnic acid)	TNR	$C_6H(NO_2)_3(OH)_2$
5	Trinitrophenol (picric acid)	TNPH	$C_6H_2(NO_2)_3OH$
6	Ethyleneglycoldinitrate	EGDN	$C_2H_4(ONO_2)_2$
7	Nitroglycerine	NG	$CHONO_2(CH_2ONO_2)_2$
8	Pentaerythritol tetranitrate (penthrite)	PETN	$(CH_2ONO_2)_4C$
9	Hexogen (RDX)	RDX	$(CH_2)_3N_3(NO_2)_3$
10	Octogen (HMX)	HMX	$(CH_2)_4N_4(NO_2)_4$
11	Tetryl	TETR	$(NO_2)_3C_6H_2N(NO_2)CH_3$
12	Tetrazole	TZ	CH_2N_4
13	Benzofuroxan	BF	$C_6H_4O_2N_2$
14	Triacetone triperoxide	TATP	$(C_3H_6O_2)_3$
15	Hexamethylene triperoxide diamine	HMTD	$N(CH_2OOCH_2)_3N$
16	Calcium Ammonium Nitrate	CAN	$Ca(NO_3)_2NH_4NO_3$/ $5Ca(NO3)_2{\bullet}NH_4NO_3{\bullet}10H_2O$
17	Urea Nitrate	UN	$CH_5N_3O_4$
18	Octol (HMX+TNT)	HMX, TNT	Mixture
19	Semtex (RDX+PETN+ plasticiser)	RDX, PETN	Mixture
20	Ammonite, amatol	TNT, NIT, (RDX)	Mixture
21	Potassium Nitrate		KNO_3
22	Potassium Perchlorate		$KCLO_4$
23	Nitromethane		CH_3NO_2
24	Mercury Fulminate		$Hg(CNO)_2$
25	Silver Fulminate		AgCNO
26	Lead Azide		$Pb(N_3)_2$
27	(a) Plastic Explosives based on either of the above explosives or mixtures there of Mixture of explosives as above. **Remark** : The detector may show only the base explosive		Mixture