

**Draft QRs/Specifications and Trial Directives of "ROV with Sub Systems for BD Squads"**

QRs		TDs
<b>1</b>	<b>Weight and Dimension</b>	
(a)	Weight excluding all accessories not to exceed 600 Kgs.	BOO to physically check the weight .
(b)	Size of ROV should permit transportation in a mini truck (The ROV, Master Control Station, Accessories and Spares are carried to the site on a specially designed Carrier Vehicle based on a 4X4, 2.5 ton truck. It has designated space to carry the crew (6 seats and one berth), the ROV, MCS as well as other Bomb Disposal stores. PA System with warning light with siren is provided along with a dashboard mounted GPS. Two compact temperature controlled compartments are provided to carry ice for bomb suit.	To be checked physically by BOO.
<b>2</b>	<b>Design Parameters</b>	
	<b>Manipulator Assembly</b>	
	<b>(a) Turret &amp; Arm</b>	
(i)	ROV should have turret mounted Robust six-axis/ (DOF) manipulator arm with gripper for handling suspected objects and reach extending below vehicles.	To be checked physically by BOO.
(ii)	ROV should have a reach of 2.5m vertically and horizontally	To be checked physically by BOO.
(iii)	ROV should have minimum $\pm 90^\circ$ of turret rotation.	To be checked physically by BOO.
(iv)	ROV jaw should have high and precise maneuverability and should be able to manipulate delicate objects. Gripper (Two Fingers & Three Fingers) with maximum opening of 180 mm.	To be checked physically by BOO.
(v)	Minimum or preferably no vibration in the body during movement.	To be checked physically by BOO.
(vi)	Arm Lifting capability 80 Kgs on retractable condition.	To be checked physically by BOO.
(vii)	ROV arm should also feature telescopic extension/function of forearm upto a minimum distance of 30 CM.	To be checked physically by BOO.
(viii)	Lifting capability of 20 kg at 2.5m / 9 kg at 4m with special extension assembly.	To be checked physically by BOO.
	<b>(b) Claw Assembly</b>	
(i)	It should have claw rotation in both clock and anti-clock wise directions.	To be checked physically by BOO.
(ii)	It should be provided with attachments which can fit into the claw and cut, drag, grip, lift, twist, break glass, open and close objects.	To be checked physically by BOO.

	(iii) The claw must have camera with night vision capability and LED or illumination of working area.	To be checked physically by BOO.
<b>3</b>	<b>Performance Characteristics</b>	
	<b>(a) Mobility</b>	
	(i) The ROV should be equipped with all terrain wheels for climbing sidewalks , stairs , train tracks and rough terrain.	BOO to physically check the ROV under various outdoor conditions: a) Sidewalk. b) Road bumps. c) Grass, Sand and Marshy surface. d) Train tracks. e) Stairs. f) Uphill Slope with rough terrain. g) Downhill Slope.
	(ii) Should have all wheel drive with ability to skid/ steer at one place.	To be checked physically by BOO.
	(iii) Wheels of the robot must lock in position when stopped and must not roll back /forth on an inclined surface.	To be checked physically by BOO.
	(iv) ROV should be able to negotiate up and down slope of minimum 40 degree.	To be checked physically by BOO.
	(v) Stair climbing capability up-to 40 deg slope with 200mm riser.	To be checked physically by BOO.
	(vi) On spot turning using skid steering features.	To be checked physically by BOO:
	(vii) Remotely selectable two operating speed 1.25 Km/h and 0.5 km/h.	To be checked physically by BOO.
	<b>Battery</b>	
	(i) Should be capable of operating for min 4 hrs continuously with single set of rechargeable Li-ion battery of capacity 24 V 60 Ah or better and also spare battery set to provided. Battery health indication of ROV and OCU on HMI	To be checked physically by BOO.
	(ii) Should have operating temp. : - 10 deg C to +55 deg C for ROV.	National/International accredited lab certificate to be provided by vendor.
	<b>(c) Wheel with Rim</b>	
	(i) One set of solid wheels with treads for stair climbing (4 main wheels and 2 middle wheels).	To be checked physically by BOO.
	(ii) Additional six nos. of pneumatic wheels with tubeless tyres provided for cross country operations.	To be checked physically by BOO.

4	<b>Camera and Optics:</b>		
	(a)	Vision system must comply with min IP65 certificate standards.	To be checked physically by BOO.
	(b)	One high resolution PTZ camera having PAN (0 - 360) degree, tilt(0 - 90) degree & min 10X optical zoom.	To be checked physically by BOO.
	(c)	4 high resolution fixed cameras located for front , rear , claw & weapon visibility.	To be checked physically by BOO.
	(d)	All cameras must have clear field of view for their respective working area in all configurations .	To be checked physically by BOO.
	(e)	LED lighting for clear illumination in the front min 5 meter area ahead.	To be checked physically by BOO.
	(f)	The robot must have at least have one thermal camera.	To be checked physically by BOO.
	(g)	All camera should have night vision capability.	To be checked physically by BOO.
5	<b>Employment of Equipment:</b>		
	(a)	Carry and fire disruptor with on board remote firing feature.	To be checked physically by BOO.
	(b)	Carry and place RTVS effectively for scanning.	To be checked physically by BOO.
	(c)	It should have Sensor for Radiation and explosive detection (Optional).	To be checked physically by BOO.
	(e)	It should be able to lift object of any shape with a strong grip.	To be checked physically by BOO.
	(f)	Claw should open minimum 180 mm.	To be checked physically by BOO.
	(g)	Multiple tool attachments on the 'claw(cut, drag, grip, lift, twist, break glass, open and close objects).	To be checked physically by BOO.
	(h)	Additional Barrel claws attached be provided	To be checked physically by BOO.
	(j)	Parallel gripper	To be checked physically by BOO.
	(k)	Manual rolling back optical fiber cable	To be checked physically by BOO.
	(l)	Universal mount for weapon(as specified by the user)	To be checked physically by BOO.
	(m)	All joysticks / gamepad controllers should be able to function simultaneously.	To be checked physically by BOO.
	(n)	Should be able to drag/ pull Mahindra Scorpio or equivalent vehicle in neutral gear on plain road.	To be checked physically by BOO.
	6	<b>Payloads</b>	
(a)		Trolley-based independently powered Master Control Station with membrane keypad, touch-screen, and joysticks for ease of control	To be checked physically by BOO.

	(b) It should have universal mount for weapon(as specified by the user)	To be checked physically by BOO.
	(c) Should have laser aiming apparatus for firing the weapon & disruptor accurately.	To be checked physically by BOO.
	(d) Portable X-Ray device to detect IED.	To be checked physically by BOO.
7	<b>Operational Control Unit(OCU)</b>	
	(a) It should be a man-portable OCU in a ruggedized case with IP rating 65. with bi-directional audio-video data connectivity system with ROV	National/International lab certification to be furnished.
	(b) Should have sunlight readable LCD display screen of minimum 10 inches.	To be checked physically by BOO.
	(c) The OCU should have feature video recording cameras and same to be saved in internal or external memory.	To be checked physically by BOO.
	(d) The control of the ROV should be through joysticks or game pad and should also have membrane keypad or optional touch screen facility for controls & functions	To be checked physically by BOO.
	(e) Should have minimum One TB storage capacity for data.	To be checked physically by BOO.
	(f) It should have an arrangement for powering the unit either from its own rechargeable battery or from an external power supply	To be checked physically by BOO.
	(g) Should be able to perform continuous operation for minimum 3 hours with single set of rechargeable battery or better and also a spare battery set to be provided.	To be checked physically by BOO.
	(h) It should have safety feature against accidental firing (Safety alarms and safety hardware lock provided during firing operations).	To be checked physically by BOO.
	(j) Should have AC power charger of CE standard 2015 or above with facility to extend the length of the charger for minimum 15 meters.	To be checked physically by BOO.
	(k) Should have facility to configure the system to control the ROV of same type	To be checked physically by BOO.
	(l) Should have operating temp: -10 deg C to +55 deg C(+/- 3 deg C).	National/International lab certification to be furnished.
8	<b>Communication</b>	
	(a) Bi-directional wireless and wired data communication between the control station and ROV both having operational range of	Compliance certificate to be provided by OEM

	minimum 500 meter & 100 meter respectively	and also to be physically checked by BOO.
(b)	ROV should have wireless operational range up-to 500 meter LOS(line of sight) and up-to 100 meter in urban (NLOS) environment for communication and controlling ROV from operator console.	To be checked physically by BOO.
(c)	ROV should have a portable antenna to relay the wireless transmission in case line of sight is not available.	To be checked physically by BOO.
(d)	It should have two way intercom/broad cast system between ROV & OCU using headset & microphone with ROV having a sensitive microphone to pickup acoustic signature both at base station & target area.	To be checked physically by BOO.
9	<b>Firing System</b>	
(a)	Wireless contact electrical terminals for disruptor firing.	To be checked physically by BOO.
(b)	Secured trigger system	To be checked physically by BOO.
	<b>Spares</b>	
(a)	Solid Wheel set - One set of two front wheel and one middle wheel	To be checked physically by BOO.
(b)	Pneumatic Wheel Assembly set - Two wheels	To be checked physically by BOO.
(c)	Battery - One No. each for MCS and ROV	To be checked physically by BOO.
10	<b>Service &amp; Support</b>	
(a)	The equipment should be provided with the following	To be checked physically by BOO.
(i)	Special Maintenance Tools.	
(ii)	Cleaning Kit	
(iii)	Documents enlisting all tech specifications and capabilities.	
(iv)	Illustrated spare parts list.	
(b)	Technical specification including inspection criteria	To be checked physically by BOO.
(c)	User Handbook & Equipment Log book in English.	To be checked physically by BOO.
(d)	Specifications for Packing / handling / transportation/ storage.	To be checked physically by BOO.
11	Ruggedized and waterproof containers or cover for ROV and control station.	To be checked physically by BOO.

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