

TRIAL DIRECTIVES OF APCO - 25 RADIO PHASE-I (FDMA)**1.1 General Specification (PORTABLE RADIO 5W) Adjustable 1,2,3 And 5Watt :-**

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(762-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(762-776 MHz; 851-871 MHz)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channels/Zones	Minimum 100 channels for 10 zones	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than firm must produce certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) approved laboratory or International Laboratory Accreditation Corporation (ILAC) approved laboratory .
3.	Channel spacing	12.5 & 25 kHz	
4.	Frequency stability	±0.5ppm (-30°C to +60°C)	
5.	Protocol	12.5 KHz P25 Phase 1 FDMA	
6.	Type of Emission	FCC and IC compliances	
7.	Type of Operation	Simplex/Press-to-Talk (Phase-1)	BOO will check practically and will ensure that, at a given point of time, set either works and receive mode or in transmit mode.
8.	Dimensions (DxWxH) With Li-ion standard battery.	45x65x136mm – excluding knobs.	BOO will measure dimensions practically with the help of measuring instrument.
9.	Weight with Li-ion standard battery.	372g max – No antenna.	BOO will measure weight practically with the help of weighing machine and will ensure that it is not more than 372g.
10.	Power source	Li-Ion / Li-polymer Battery pack of 2000 mAh or more.	BOO will check physically/ practically the batteries, there should not be any damage, terminals should be fresh and separately marked as positive and negative and providing the charge properly to the radio set.

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Environmental Specifications			
11.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. accredited Lab. Or NABL or ILAC approved laboratory.
12.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Immersion, Vibration, Shock)	MIL 810 C,D,E,F & G	
13.	IP standards	IP-67	BOO will practically check the equipment as per IP standard.
Transmitter:-			
14.	RF power output	1,2,3 & 5 watts.	BOO will check one by one with the help of standard testing instrument. Output power:- Selectable/programmable from 1 to maximum value.
15.	Audio Distortion	Less than 3% at 1 KHz	
Receiver:-			
16.	Analog sensitivity	0.3 μ v or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
17.	Digital sensitivity	0.3 μV or Better at 5% BER	
18.	Audio O/P	>500 m W @ 5% Distortion.	
19.	Hum and Noise	-35db @ 12.5 KHz, -37db @ 25KHz	
20.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -70db @ 25 KHz	
Features			
21.	Support GPS	Inbuilt GPS transmit location over conventional voice network.	Firm will demonstrate feature related with GPS to BOO during trial.
22.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. 4 and 16 keypad options. Four programmable function keys and three way selector.	Practical/physical check by switching on the Radio Set, there should be display on front panel LCD screen.
23.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio to transmit GPS location.	BOO will check it practically by pressing button.
24.	Scanning modes	Includes priority, dual priority, editable zone & background scan.	Radio sets programmed with priority scanning on pressing the scan button will start scanning channels with the priority.
25.	Radio Remote Kill	To allow management of misplaced or stolen radio.	BOO will check practically/physically on ground.
26.	Over-the-air-rekeying (OTAR)	Should be possible without trunking system.	Firm will demonstrate about OTAR in brief and provide the key management facility for more information.
27.	Key field device (KFD)	For quick, reliable encryption key programming.	BOO will check it practically.
Accessories			
28.	Audio	Speaker-microphones, earpieces.	BOO will check physically & practically that speaker-microphones, earpieces is supplied with radio and is working properly.

29.	Chargers	In-vehicle, single fast and 6-way multi chargers.	BOO will check physically and practically In-vehicle, single fast and 6-way multi chargers is supplied with radio and is working properly.
30.	Antenna	Flexible helical antenna	BOO will check that antenna should fit in the given slot with ease and should be found firm stable.
31.	Literature	<ol style="list-style-type: none">1. User manual with each radio sets2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured.3. Firm should train teams of four operator and mechanics in handling, operating and repairing of rdio receiver free of cost after procurement.	physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also and also provide training for a team comprising of four operator for handling of sets. The same to be mentioned in the contract documents.

1.2 General Specification (MOBILE RADIO 25W) Adjustable 5,12 & 25W:-

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range Tx Frequency Range: Rx Frequency Range:	For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(762-870 MHz) For VHF:-(136-174 MHz), For UHF:-(400-470 MHz; 450-520 MHz) 700/800 MHz:-(762-776 MHz; 850-870 MHz)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channels/Zones	Minimum 100 channels for 10 zones	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than firm must produce certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) approved laboratory or International Laboratory Accreditation Corporation (ILAC) approved laboratory.
3.	Channel spacing	12.5 & 25 kHz	
4.	Frequency stability	±0.5ppm (-30°C to +60°C)	
5.	Protocol	12.5 KHz P25 Phase 1 FDMA	
6.	Type of Emission	FCC and IC compliances	
7.	Type of Operation	Simplex press to talk (Phase-1)	BOO will check practically and will ensure that, at a given point of time, set either works and receive mode or in transmit mode.
8.	Dimensions (DxWxH) With Li-ion standard battery. 1. control head 2. radio body-25W	35x184x71mm max 175x160x52mm max	BOO will measure dimensions practically with the help of measuring instrument.
9.	Weight 1. control head 2. radio body-25W	0.33Kg max 1.2 Kg max	BOO will measure weight practically with the help of weighing machine and will ensure that it is not more than 0.3/1.2 kg.
Environmental Specifications			
10.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. accredited Lab. Or NABL or ILAC approved laboratory.
11.	Environmental Standard (Low Pressure, High Temp., Low Temp., Temp. shock, Solar Radiation, Rain, Humidity, Salt fog, Dust, Vibration, Shock)	MIL 810 C,D,E,F & G	
12.	IP standards	IP-54 or better	BOO will practically check the equipment as per IP standard.
Transmitter			
13.	RF power out put	25 watt +/- 0.5 dB for full band.	BOO will check one by one with the help of standard testing instrument. Output power:- Selectable/programmable from 1 to maximum value.
14.	Frequency Deviation :	+/- 2.5 KHz @ 12.5 KHz +/- 5 KHz @ 25 KHz	
15.	FM Hum Noise	-33 dB @ 12.5 KHz -37 dB @ 25 KHz	
16.	Audio Distortion	Less than 3% at 1 KHz	

Receiver			
17.	Analog Sensitivity	0.3 μ V or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
18.	Digital sensitivity	0.35 μ V or Better at 5% BER	
19.	Audio O/P	> 3 W @ 5% Distortion in Internal Speaker	
20.	Hum and Noise	-40db @ 12.5 KHz, -43db @ 25KHz	
21.	Adjacent Channel Selectivity	-60 db @ 12.5 KHz, -75 db @ 25 KHz	
Features			
22.	Front Panel LCD Display	Large four line LCD with icons to display key parameters. Four programmable function keys on the standard mobile head.	Practical/physical check by switching on the Radio Set, there should be display on front panel LCD screen.
23.	Emergency key	Programmable emergency key should be easily accessible & highly visible on the radio to transmit GPS location.	BOO will check it practically by pressing button.
24.	Scanning modes	Includes priority, dual priority, editable zone & background scan.	Radio sets programmed with priority scanning on pressing the scan button will start scanning channels with the priority.
25.	Radio Remote Kill	To allow management of Radios during vehicle servicing.	BOO will check practically/physically on ground.
26.	Over-the-air-rekeying (OTAR)	Should be possible without trunking system.	Firm will demonstrate about OTAR in brief and provide the key management facility for more information.
27.	Key field device (KFD)	For quick, reliable encryption key programming.	BOO will check it practically.
Accessories			
28.	Literature	<ol style="list-style-type: none"> 1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement. 	Physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also and also provide training for a team comprising of four operators for handling of sets. The same to be mentioned in the contract documents.

1.3 General Specification (REPEATER):-

S.No.	Parameter	Specifications	Trial Directives
1.	Frequency range VHF UHF	136-174 MHz 380-520 MHz 700/800 MHz :(762-870MHz)	Functional check: BOO will check operation of radio set by programming the lowest highest and any random frequency with help of measuring instrument.
2.	Channels/Network Capacity	255 min	BOO will check all the parameters one by one with the help of standard testing instrument. If the standard test instruments are not available than firm must produce certificate of National Accreditation Board for Testing and Calibration Laboratories (NABL) approved laboratory or International Laboratory Accreditation Corporation (ILAC) approved laboratory .
3.	Channel spacing	12.5/25 KHz	
4.	Channel increment	0.125 KHz	
5.	Frequency stability	±0.5ppm	
6.	Dimensions (HxWxD) 1. Including front panel	177.8x482.6x16.1mm	
7.	Weight (With AC & DC PMU) 100W base station system	Not more than 22 kg	BOO will measure weight practically with the help of weighing machine and will ensure that it is not more than 22 kg.
8.	Power supply	80 to 260 V AC 12/24 V DC	BOO will check practically.
9.	Audio interfaces	I/P 600 ohms balanced (microphone) O/P 600 ohms balanced (speakers)	
10.	Frequency response	+0.5/-2.0 dB	
11.	Audio distortion	Less than 3%	
Environmental Specifications			
13.	Operating Temp.	-30°C to +60°C	Firm must produce certificate of any Govt. accredited Lab. Or NABL or ILAC approved laboratory.
14.	Environmental Standard	MIL 810 C,D,E, F & G Tests	
Transmitter			
15.	RF power output	10-100Watt +/-0.5 dB for full band, programmable in steps.	BOO will check one by one with the help of standard testing instrument.
16.	Frequency Deviation	+/- 2.5 KHz @ 12.5 KHz. +/- 5 KHz @ 25 KHz.	
17.	Spurious & Harmonics	Better than 60 dB.	
18.	FM Hum Noise	-45 dB @ 12.5 KHz -50 dB @ 25 KHz	
19.	Audio Distortion	Less than 3% at 1 KHz.	
20.	Transmit rise time	Less than equal to 2.5 ms	

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Receiver			
21.	Analog	Sensitivity 0.25 μ v or Better at 12 dB SINAD	BOO will check one by one with the help of standard testing instrument.
22.	Digital sensitivity	0.25 μ V or Better at 5% BER	
23.	Audio Output	0.5 W or more @ 5% Distortion in Internal Speaker.	
24.	Adjacent Channel Rejection	-60 db @ 12.5 KHz -75 db @ 25 KHz	
24.	Selectivity	79 dB @12.5 KHz, 84 dB @ 25 KHz	
Features			
25.	BITE (Built-in Test Equipment)	Provides self moitoring with local and remote logging of alarms.	BOO practically check by switching on the Receiver, there should be BITE (Built-in Test Equipment).
26.	Console	Digital console interfaces should be available	BOO will check it practically/ physically.
Accessories			
27.	Literature	<ol style="list-style-type: none"> 1. User manual with each radio sets 2. Technical repairing manual with complete block diagram, circuit layout etc at a scale of 10% of equipment being procured. 3. Firm should train teams of four operator and mechanics in handling, operating and repairing of radio receiver free of cost after procurement. 	Physically check to confirm that User and Technical manual are available in Hard as well as in Soft Copy and also and also provide training for a team comprising of four operators for handling of sets. The same to be mentioned in the contract documents.
28.	Antenna	6.5 dB Omni-Directional Antenna- Qty Two shall be provided for each repeater with necessary connectors, installation kit and low loss RF cable (RG217) suitable to install the antennas on vehicle.	BOO will check that antenna should fit in the given slot with ease and should be found firm stable.
29.	Power Cables	Mains Power cable and Battery cable with fuse.	BOO will check physically that cable should not be damaged and perfectly connected in this respected slot given in the radio.
30.	Handset	Standard Microphone with Clip	BOO will check practically and physically that the microphone should provide a clear and audible voice and clip should not be damaged.