Government of India
Ministry of Home Affairs
Directorate General National Security Guard
(Provisioning Branch/Ord Section)
Mehram Nagar, Palam, New Delhi – 110037
Fax No. 011-25663258/25671639

No. P/604/21/389/CISR/REV/27 SCG /Prov (Ord)/HQ NSG/ Dated : 01 Dec 2022

FORWARD OF FINAL QUALITATIVE REQUIREMENT (QRs) AND TRIAL DIRECTIVES (TDs) OF COMPOSITE INDOOR SHOOTING RANGE (CISR) ON TURN-KEY BASIS

The final QRs and TDs alongwith OSAT in respect of Composite Indoor Shooting Range (CISR) on Turn-Key Basis duly approved by competent authority is forwarded herewith for your information and necessary action please.

01/12/22

(PC Sharma)
Group Commander (Proc)

30/11

Enclosures : As above

Distribution :-

1.	JS (PM), MHA, Jaisalmer House, New Delhi	- For information please.
2.	वरिष्ठ तकनीकी निदेशक, रूम न0–10, (IT Cell), एनआईसी, नार्थ ब्लॉक, नई दिल्ली Email : soit@nic.in	- You are requested to upload the same on MHA website in approved QRs/TDs please.
3.	IG/Director (R&D), BPR&D, Mahipalpur, New Delhi Email : igmod@bprd.nic.in / dd-mod@bprd.nic.in / sushilkumar@bprd.nic.in	
4.	ADG, PP & T, Room No 37, H Block, DGQA, Govt of India, Min of Defence, Department Defence Production, Directorate of Quality Assurance, New Delhi-110011, Email : saarmt-dgqa@gov.in	
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8.	DIG (Prov), ITBP, CGO Complex, New Delhi, Email : digprov@itbp.gov.in	
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11.	JDSR, Room No, 49-T, Directorate of Staff Requirement (DSR) A Block Hutments, Dalhousie Road, New Delhi-11, Email: dsr@navy.gov.in	
12.	Shri Paritosh Singhal, ACEO (GeM), Government of India, Ministry of Commerce & Industry, Government e-Market Place, Jeevan Tara Building, 5 Parliament Street, New Delhi-110011, Email : paritosh.singhal@gem.com.in	
13.	Ops (WE), HQ NSG	
14.	27 SCG	

QRS AND TDs OF COMPOSITE INDOOR SHOOTING RANGE (CISR) ON TURNKEY BASIS : 04 OCT. 2022

OPTION 'A'- RANGE SUB SYSTEM

S.No	QRs	Trial Directives
General		
1.	A complete solution for setting up a Composite Indoor Shooting Range. The CISR should be safe, durable, cost effective, seepage proof, termite proof, rust proof and weather/sea weather proof to meet requirements of CAPFs. **Note** Wherever Plywood is used it should be anti termite, BWP(IS 1659) and fire resistant and certificate from national accredited lab conforming to the same to be provided by the firm.	A Board of Officers (BOO) from user department along with reps from Engineering Branch will monitor the project.
2.	The target system will encompass various types of target (moving axially and horizontally, turning, pop up and static) firing bays, ricochet proofing, lighting, sound ballistics, interactive audio interface, shot analysis component and ventilation in addition to setting up the control room **(as per user requirement)**. CISR will have feedback and monitoring systems installed for continuous monitoring of lead content in air, noise level, humidity and temp with data extraction facility.	BOO will physically check the same.

S. No	QRs	Trial Directives
CISR Dimensions		
3.	The CISR has been designed for firing in 7.62x51 mm Assault rifle, 5.56x39mm/45mm of range 25 to 100 mtr **(user to specify)**. User defined 06 to 10 stalls for firers standing alongside to simultaneously engage targets ahead. A central control room behind the line of firers with glass panels overlooking the firers/ shooting gallery and the targets must be provisioned.	Weapons (7.62x51 mm and 5.56x39mm/45mm caliber Rifles), one main and one reserve, of the latest vintage alongwith commensurate amount of ammunition will be set aside. Ammunition of one lot will be set aside by the user and shall be used for trials.

S.No	QRs	Trial Directives
Target Specification:-All targets mentioned below can be summed up in one projection based solution to avoid any repair or change of target and procurement of new target.		
4.	The target specifications are outlined in the succeeding paragraphs. The targets should enable the shot hit display in real time including the sequence/ fall of hits at the firer as well as the instructor end in the control room for all types of target. **The type of target should be as under**:- (a) Precision Target- Self Sealing. (b) To and Fro Target -Cardboard/self sealing/plywood (For enabling shift) (c) Horizontal Move Target-self sealing/ Steel. (d) Pop up and Turning Target -Steel or self sealing **User to specify target board/ backer types**	The OEM/ vendor will show each type of target as mentioned in the QR to the Board of Officers. The Board of Officers will select one or more targets to be fired upon each lane. The shot display will be checked at the time of firing. Firing will be carried out in each lane/ bay.

S.No	QRs				Trial Directives	
Ser No	Target Type	Qty		Target Description	Remarks	
		Installed	Reserve			
(a)	**Static Target**				Test procedure as per OSAT **Annexure 'I'**.	
	Precision/ zeroing Target **Target Description** User to specify	Upto 10 (one each for one firing lane)	Upto 10 (one each for one firing lane)	Electronic precision target with facility for hit indication and fall of hits at each firer end and also at the control room. The target should be self-sealing or enable repeated firing of at least 100 rounds without repair.	A suitable timer mechanism to enable pre programmed timed practices should also be provided. The hit indicator at firer end should give number of hits, Group diameter or Group size. The hit indicator at the firer and instructor end should have zoom in facility. Timer gadgets for displaying time between each shot and total time taken to complete a particular firing practice.	

S.No	QRs				Trial Directives
(b)	**Moving Target**				Test procedure as per OSAT **Annexure 'I'**.
(i)	To and fro (Advancing and receding targets)	Upto 10 (one each for one firing lane)	Upto 10 one each for one firing lane	**User to specify** - Roof or floor mounted targets for each firing lane with facility for variable speed and stopping the target enroute both singly or in groups in various combinations. These should be controlled from the control room. They may have turning and pop up facility while in static mode.	The speed should be able to be preprogrammed. The system should allow mounting of Fig 11, 12 and Rubia Targets. The system should have Hit indication facility which can be displayed at firer end and in control room and facility of customization of final score of the firer.
(ii)	Horizontal movement Target (Friend and Foe Targets)	2 sets	2 sets	Each set having two pair of targets, one moving left to right and other right to left with facility for variable speed to be controlled from the Control Room.	Hit indication to be displayed at the each firing point in the firing stalls and also at control room.
(iii)	Pop up and Turning Targets (360 and 90 degrees Fig 11)	Upto 10 (1 for each firer at different ranges in one lane) & One reserve per lane	One reserve per lane	The target sub system should enable popping up/turning in variable time and controlled individually or in combination.	Hit indication to be displayed at the each firing point in the firing stalls and also in control room. The system must be easy to program and should have preprogrammed set.

S.No	QRs		Trial Directives
Firing Bays/ Stalls			
5.	The inter firer partition panels should be rugged, bullet proof, see through panels with provisions for the followings:-		
	(a)	Pull up/ pull down/ side hinged/ fixed suitable supporters for lying, unsupported and lying supported fire and facilitating left shoulder or right shoulder fire.	The inter firer partition panels should conform to NIJ level III or any equivalent standards Ballistic protection for the glass/ transparent portion. The side walls (frame) should be made from non transparent Grade S275 mild steel. Copy of certification from an accredited laboratory that the ballistic glass conforms to NIJ level III or any equivalent standards protection and steel used for the frame is S275 compliant will be checked. (class R2 for BS 5051 1988, NIJ level III or FB6 for EN 1522 or equivalent class shall be the acceptable standard). The OSAT procedure is att as **Annexure 'II'**.
	(b)	Provision for firing from standing, kneeling, lying and CQB mode.	
	(c)	Provision for mounting individual firer display monitors for hit and score indication with zoom in facility.	
	(d)	Suitable assembly/ fitment for communication system for each lane as voice interface between the firer and the instructor. This would include the stall panel mounted microphone on an extended (one feet) flexible pipe. Headphones (wireless) in each stall and control room should be electronically reduce the noise level NRC 30.	
6.	The partition panel's material should be of Acrylic, Prospex or toughened glass. All mountings and panels and material used should be sea weather, termite, rust proof and decay proof.		A copy of certificate from an accredited lab regarding material and bullet proof nature of panel will be provided by OEM and should not be older than 03 years from date of publishing of tender and should be valid at the time of OSAT or else fresh certificate to be provided and will be checked by the BOO.

S.No	QRs		Trial Directives
Bullet Proofing			
7.	**Butt** Type of butt required to be specified by the user at the time of tender.		The OEM/vendor will show a sample of minimum single lane Butt as mentioned in the QR to the Board of Officers. The BOO will conduct a firing test by firing 10 rounds each of 9x19mm parabellum, 5.56x45mm and 7.62x39mm. **(Pistol/ SMG/Assault Rifle)**
	(a)	A suitable system of "Firing Butt" to trap the bullets at the far inside end of the CISR. The 'Firing Butt' should enable recovery of the bullets rather than the bullets getting embedded to minimize the risk of lead contamination within the CISR. The firing butt should cover the area behind the targets in a manner that it absorbs all hits fired including on the target configuration given in the "Target Specifications". A lead concentration measuring system and display for continuous monitoring of lead present in air with alarm system for alerting if prescribed limit is crossed.	Test procedure will be as per OSATs att at **Annexure 'III'**. The lab certificates for qualities specified in the OSAT will be checked by the BOO.
	(b)	The 'Firing Butt' should be able to sustain extensive/ daily firing of upto an average 3000 rounds daily (100 firers in 10 details firing 10 round each, thrice).	Apart from the ammunition used for firing, a total of 2000 rounds will be fired at the time of OSAT. A certificate will also be obtained from the vendor to this effect.
	(c)	The 'Butt' should have the capacity of stopping/ absorbing trapping bullets of muzzle velocity of upto 1000m/ sec (This includes rounds from all SMG, pistols & Assault rifle).	A test certificate, from lab/ test report from an National/international accredited lab that the firing butt has the capacity to Stop/ absorb bullets of muzzle velocity up to 1000 meters per second will also be provided by the firm. The certificate should not be older than 03 years from date of publishing of tender and should be valid at the time of OSAT or else fresh certificate to be provided and will be checked by the BOO.

S.No	QRs	Trial Directives
8.	**Side Walls/ Roof/ Floor**. Suitable non ricochet proofing of side walls, roof and floor to prevent accidental fire hit/ ricochet. **Note** Wherever Plywood is used it should be anti termite, BWP(IS 1659) and fire resistant and certificate from national accredited lab conforming to the same to be provided by the firm.	**Side Walls/ Roof/ Floor**. The complete floor, side walls ceiling and baffles and near the bullet trap will be provided with non ricochet solution/ tiles/ arrangement. The solution may be in terms of tiles or baffles. In addition to this the side wall should have 6mm thick AR 500 steel plate The solution may be in terms of tiles or baffles. (a) The tiles/ arrangement used should be of a tensile strength 01 N/ mm^2 at least. A copy of the laboratory test report in terms of ASTM 412 or DIN EN ISO 1798 2008-4 should be provided. Certification should be provided for:- (i) The tiles must conform to at least Flame Spread rating 3 and Smoke Spread rating 84 as per ASTM E84 (Class 1) or Class B2 of DIN 4102 or Class 3 of BS 476 : Part 7 : 1997.
		(b) Baffle plates where used and installed should utilize 10 mm thick AR 500 steel plate with attached turning and rubber facing with an air gap. The BHN of the steel should be 470-530 tested as per ENISO 6506. The rubber face should be minimum 43mm thick rubber tiles. One such panel will be displayed to the BOO for STEC and OSAT. (c) OSAT for side walls/ roof/ floor are att at **Annexure 'IV'**. (d) **Durability performance of Ballistic And Acoustic Panels/Material Test performance In Humid Environment to be as per JSS 0256-01**

S.No	QRs		Trial Directives
9.	**Protection of the Target System Equipment and Rails**. Exposed equipment of the target system and the rails including roof mounted rail should have suitable bullet protection to prevent damage by direct bullet hit or ricochet. Tensile strength and thickness of wire used for operating target system should be of requisite strength.		To be physically checked by the Board of Officers. Smooth breakage free operation to be ensured.
10.	**Ventilation System**		
	(a)	A suitable non AC weather proof ventilation system to pump in fresh air and flush out indoor air to ensure lead poisoning is within laid down permissible limit and maintain cool/ fresh atmosphere within the indoor range.	**Ventilation System**. The values of Lead-In-Air and Air Flow are given below. The On Site Acceptance Test (OSAT) of the ventilation system to be performed by the Board of Officers (BOO) is given at **Annexure-'V'**. (a) **Lead**. The Lead-In-Air Assessment should be less than the Permissible Exposure Limit i.e. 50 microgram (mg) of Lead per meter cube of air (50 mg/ m^3) based on an eight hour Time Weighted Average (TWA)-in accordance with NIOSH (US National Institute of Occupational Health and Safety, April 2009) Guidelines.
	(b)	This would also include necessary wiring/ fuse MCB from the nearest electric point to the system.	
	(c)	The system should have dual controls one in the control room and other at point near to the said system. Ventilation state display like air flow, humidity and temperature etc should be displayed and monitored from control room.	

S.No	QRs		Trial Directives
			(b) **Air Flow**. The system should provide 100% outside air. The air flow of the range will be based on a laminar pattern with exhausted air to exceed inlet air by at least a factor of 10% (as per US NIOSH, 1975). The air flow at the firing line should be at least 50 feet per minute (0.254 meters per second) and air flow down range should be maintained at a minimum of 30 feet per minute, (as per US NIOSH, April 2009) over the cross sectional area at the firing line. The exhaust discharge must be separate from the supply air intake. Filtration of the exhaust air will be done by High Efficiency Particulate Filters (HEPA) A suitable mechanism or meter will be provided to indicate when filter change is required. The range will be maintained at a negative pressure of 0-0.04± 0.02 inches water gauge. The Air flow shall be evenly distributed across the width of the firing range. The OEM/vendor will also provide a copy of certificate about the capability of the ventilation system from a national/international accredited laboratory. The certificate should bring out the capability of system to provide lead in air levels and negative pressure as given above. (c) The ventilation system will include equipment pads, structural engineering and supports, roof patching and supports if the equipment is located on the roof. Cutting and patching as required will be carried out Control conduits air locks and vault ventilators will be provided as required. All cutting/patching of building will be carried out. Control conduits, air locks and vault ventilators will be provided as required. All cutting/ patching of building will be carried out by the vendor. All doors to the negative pressure area should have air locks.

S. No	QRs	Trial Directives
11.	**Acoustic Reduction System**. A suitable sound absorbing paneling of the range interiors to minimize the sound of gun fire. 50 **Units** of noise reduction earmuffs with adjustable left and right arm and flexible ear muffles to be provided by the vendor. One noise monitoring system/sensor with noise level display should be placed.	**Acoustic Reduction System**. Noise abatement will be carried out by providing acoustic panels on baffles, side walls and ceiling systems. The finish should be smooth, joint free and withstand frequent cleaning and wet scrubbing with agents to remove and neutralize lead-dust and unburned propellant. It should be sea weather, termite and humidity proof. It must be secured properly and should not decay with time. (a) The peak impulse sound should not be greater than 100 Decibels (dB)(to be checked for 7.62x51mm Assault rifle). Further on an eight hour Time Weighted Average (TWA) noise level in the range should not be greater than 50db (as provided in NIOSH, Apr 2009). The reverberation time of sound waves inside the range should be less than 0.2 seconds. Test for ambient noise, noise during firing, reverberations will be carried out as per On Site Acceptance Test (OSAT) attached at **Annexure-'VI'**. (b) Characteristics of the Noise Reduction Panels/ Tiles which are used should be:- (i) Fire Retardant rating Class A (as per ASTME84) - A copy of certification from an accredited national/ international lab that the eqpt is class A will be checked. (ii) Noise Reduction Coefficient (NRC). The NRC should be at least 0.75 checked in accordance with ASTMCU23-90a – Certification from an accredited national/ international lab regarding compliance with NRC value in terms of the ASTM mentioned will be checked. (iii) Flame spread Rating 3 to 5 (as per ASTME84) – Certification from an accredited national/ international lab regarding Flame Spread in terms of the ASTM mentioned will be checked.

S.No	QRs	Trial Directives
		(iv) Smoke spread level 94 to 90 (As per ASTME84) – Certification from the accredited national/ international lab regarding Smoke spread in terms of the ASTM mentioned will be checked. (v) Should satisfy UL 1715 standard – Certification from an accredited national/ international lab regarding compliance to UL 1715 standard will be checked. (vi) Resistant to:- (aa) **Microbial Growth**. Should pass |UL 181, Section 11 (resistance of synthetic polymers to fungi) – Certification from an accredited national/ international lab regarding compliance of the product to the rating specified under ASTM G 21 will be checked. (ab) **Fungal Growth**. (Rating No 0) as per ASTM G21–Certification from an accredited national/ international lab regarding compliance of the product to the rating specified under ASTM G 21 will be checked. (ac) **Ear Muffs**. These should be able to bring down noise levels by NRC 30 for the wearer. A certificate from the OEM will be enclosed which clearly brings out that the ear muffs will bring the sound level by NRC 30 . (ad) In case Steel Butt Trap is used, the vendor will also provide a damping layer on the outer side of the collection 'cone' of the butt trap. (vii) **Cyclic environment test durability performance of Ballistic And Acoustic ``Panels/Material to be as per JSS 0256-01**

S.No	QRs		Trial Directives
Control Room			
12.	The control should have all facilities for:-		
	(a)	Real time score controlling all targets being installed in the range in the manner indicated in the 'Target Specifications individually and jointly.	All control room attributes will be checked physically by the Board of Officers.
	(b)	Master control for ventilation system	
	(c)	Communication system to provide interface between individual firer and control room. Also the system should double as central announcement system (The speakers being installed in the firing stall area should be of appropriate wattage **(To be specified by the user)**.	
	(d)	One master computer for shot analysis capable of giving feedback for each target alongwith a heavy duty printer with spare computer. In addition four 27 inch LCD/ TFT monitors for instructor to watch all the firers and the target simultaneously with facility to zoom in on to the target. A complete backup system for same to be also installed to cater for redundancy.	
	(e)	Master control of the electronic precision cum zeroing target. Also the facility to view all or individual targets in real time with zoom in facility.	
	(f)	Provision for Recording, Analysing, Maintaining and Storing of firing data for firers to be provided by vendor in control room. Also record for total rounds fired on daily basis to be maintained in database of master computer.	

S. No	QRs		Trial Directives
13.	**Post installation Warranty and Maintenance**		
	(a)	Post installation comprehensive warranty of at least 2 year.	OEM/firm to provide undertaking required to be given to the Board of Officers are:- (a) Firm will provide Uninterrupted product support for min 10 years (b) Maximum time to repair shall not exceed 15 days from the date of intimation by any communication means to make the system functional during the guarantee period.Further Mean time between failure(MTBF) shall not be less than 30 days for the same equipment. (c) Commencement of project within the stipulated time. (d) Replacement of target system due to failure of "Target system/ Target System Protection". (e) Type/ Make and design of ventilation system should adequately suit the requirement of the international dimensions of the CISR. (f) Make of the partition panel material must be bullet proof. (g) The following equipment will be supplied by the firm:- (i) One explosion proof vaccum cleaner will be supplied by the firm. (ii) vaccum cleaner to remove rubber granulate from Granulated Bullet Trap, in order to recover fired bullets.
	(b)	Fortnightly, Monthly and quarterly maintenance commitment for duration of warranty period should be incorporated in the bid including uninterrupted supply/ replacement of electronic targets and target carrier mechanism. Commitment to supply the following quality targets/per year for five years as consumable:- (i) Precision Target- One each for number of lanes. (ii) To and Fro Target- One each for number of lanes. (iii) Horizontal Move Target- 2 sets. (iv) Pop up and turning target- One each for number of lanes.	
	(c)	MTTR and MTBF should be clearly committed for in the tender.	

S.No	QRs	Trial Directives
Miscellaneous		
14.	The system should have latest licensed WINDOWS OS and software being supplied should be compatible to OS.	To be physically checked by the board of officers.
15.	The IT hardware including peripherals and monitors should from a reputed company readily available in India like HP, HCL, Lenovo, LG etc.	To be physically checked by the board of officers.
16.	All monitors should be 'LED or better". The monitors should be minimum 27 inches.	To be physically checked by the board of officers.
17.	Computer chairs from reputed national manufactures numbering six will also be provided for the control room.	To be physically checked by the board of officers.
18.	OEM/firm should provide 01x sealed sample of each items/material required to be instalied in CISR and requires certification from National/International accredited lab for technical evaluation.	BOO to physically check the same.
19.	A copy of all certificates from a national/ international accredited lab provided by OEM should not be older than 03 years from date of publishing of tender and should be valid at the time of OSAT or else fresh certificate to be provided and will be checked by the BOO	BOO to physically check the same.

S.No	QRs	Trial Directives
20.	**Lighting**. All cabling/ wiring with check joints every 10 meters at appropriate place should be concealed and laid in a cable tray. In addition, facility for night firing in all static targets with dimmer lighting should be provided. The software computer controller dimming system should have minimum 4 pre-sets (to be controlled from the control room).	To be physically checked by the board of officers.
21.	**Power Backup**. A silent generator from reputed Indian manufacture that could take the operational load of the entire CISR is also required to be installed.	To be physically checked by the board of officers.

OPTION 'B'- RANGE SUB SYSTEM ALONGWITH BUILDING STRUCTURE

It will include Range Sub system (Option A) alongwith Building infrastructure as elaborated below:-

1.	The **Detailed Project Report (DPR) for CISR Building designs will be provided by the user during tender stage**. However, some special requirements of building are as under :- (a) The building width should cater for 06 to 10 lanes with 25 to 100mtr firing range.(**As per user requirement**). . (b) Building must ensure proper aeration to maintain air inflow and out flow to cater for 06 to 10 lane firing range. (c) Special provisions needs to be kept in design of roof and structures to avoid ricochet of all bullets of 9x19mm, 7.62x51 mm Assault rifle, 5.56x39mm/ 45mm. (d) There should be provision of store room, waiting area, Amn bay, Wpn bay, space for visitors to witness firing, Toilets (gents & ladies both), simulation room or any other requirement of user in the building complex.	The BOO will also act as the Project Management Group (PMG). A detailed presentation by vendor on all aspects of QR and TDs and showcasing the final project in 3D or model based system should be shown highlighting all the customization done as per user requirements along with all the relevant certificates from ILAC/NABL accredited Lab. Detailed structural and architectural design to be provided by vendor as per DPR and to be approved by user. This will bring user and vendor on same page and minor details can be discussed prior to award of work. The presence of firing bays and control room will be physically checked. A set of average firers will be provided to the Board of Officers by the Force/ Trg Centre for the firing practices.

S.No	QRs	Trial Directives
	(e) Special provision required to arrest seepage, termite control, rust proofing and sea weather proofing. The building should be protected from Microbial growth and fungal growth.	
	(f) The design of roof should deny sticking of fired cases in to the roof and any other surface.	
	(g) Provisions of overhanging baffles, acoustics linings, arrestor butt wall and floor linings, firing booths and air ventilators/filtrations system should be catered in the vendor technology.	
	(h) Provision of site development / approach road and drainage system to be incorporated.	
	(i) Adequate fire fighting equipment shall be provisioned. The fire detection system shall be provided within the building connected with the fire alarm system. The vendor will ensure compliance with applicable national/international safety standards.	

S.No	QRs	Trial Directives
	(k) The vendor will ensure compliance with applicable national/international standards of safety signs.	
	(i) Range status lighting to be provided at all ingress and egress points.	
	• **CISR will be executed as a turnkey project and handed over as a fully operational facility to User.**	

NOTE: The user as per their requirement can Opt for either **Option 'A'** or **Option 'B'**.

(SC (Arch) AK Sahu)
Engrs Branch, HQ NSG

(Sushil Kumar)
PSO, BPR&D

(DC Sunil Kumar)
SSB

(AC Sarvesh Tomar)
CRPF

(AC DK Sharma)
CISF

(AC (Arch) Anupam Sharma)
BSF

(AC Ramcharan Singh)
ITBP

(Nb Sub DP Mishra)
LOAR

(Major Ankit Duhoon
HQ NSG

(Shri Amit Kumar Rai, Scientist 'E')
TBRL, Chandigarh

APPROVED/NOT APPROVED

(MA Ganapathy, IPS)
DG, NSG

ON SITE ACCEPTANCE TEST (OSAT)

***ON SITE ACCEPTANCE TEST (OSAT)** - All installation will be as per specification in QRs & TDs.

Annexure 'I'
(Ref S No12 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR TARGET SPECIFICATIONS

1. **On Site Acceptance Test Procedure**. Objective is to test and verify the functioning of Targets System. Steps will be as under for each lane/ range number:-

(a) All system devices to be installed.

(b) Turn master targetry machine from control room.

(c) Run RCS (Range Control Software).

(d) Initialize Retrievable Target system & Test absolute sensor on each lane.

(e) Run Respective target system via RCS master computer to end and from zero to range maximum on each lane.

(f) Test each lane for turning operations with settings friend/ foe and neutral.

(g) Test each lane for operations of hit sensor using manual operation on each facing target.

(h) Test LED lamp for operation (where applicable), simulation with flashing and police lights on each target (where applicable)

(j) Test moving target and rotary target operation via hand held controller.

2. Testing will form part of contract delivery period and 5 rounds of 9mm, 5.56mm and 7.62x51mm each shall be fired on each target.

3. **Static Target (Precision/ Zeroing Target)**.

(a) The installed and reserve target will be shown by the firm. The Board of Officers will also check the functionality of the reserve targets, which will be demonstrated by the firm after replacement of the main targets.

(b) Five rounds of 9mm, 5.56mm and 7.62x51mm each shall be fired on each target.. The timer mechanism hit indicator, group size at firer and instructor end will be physically checked.

(c) A certificate from vendor/ OEM that targets are capable of being subjected to at least 100 rounds without repair will be checked.

(d) The target should consist of a box target and covering frame with a target picture. The target frame should be wooden/ suitable material which should be replaceable. The target should provide fall of shot with an accuracy of less than 2mm at the target centre.

4. **Moving Target (TO and Fro Advancing and Receding Targets)**.

(a) Roof or floor mounted installed and reserve targets will be shown by the firm. The Board of Officers will also check the functionality of the reserve targets, which will be demonstrated by the firm after replacement the main targets.

(b) 5 rounds of 9mm, 5.56mm and 7.62x51mm each shall be fired on each target.

(c) The control variable speed of single or group of targets from the control room will be done from control room by the Board of Officers with OEM representative. The pop-up and turning movement while in static mode as also programming of speed and ability to mount Fig 11 and Fig 12 targets and Rubia targets will be checked.

(d) Material of targets as specified in QR Para 5 (b) will be checked.

(e) The target trolley/carrier should have at least 6mm AR 500 steel fairingfor protection from bullet impacts. Primary frontal section bearing target carrier body shall made from at least 6mm AR 500 armor plate. Carrier body should be completely protected to protect its components. Lightening components should be integrated with the carrier and should provide dimmable white light. A full 180 degrees or 360 degrees target turning should be available. Ceiling rails should be made from galvanized steel or equivalent.

5. **Horizontal Movement Target (Friend and Foe Targets)**. Two sets of installed and reserve targets will be shown by the firm. The Board of Officers will also check the functionality of the reserve targets which will be demonstrated by the firm after replacing the main targets. The control and functionality of the target, as specified in QRs will be checked.

6. **Pop up and Turning Targets (360 and 90 degree Fig 11)**.

(a) The target should have a 360 degrees turning, pop-up actuator with ability to expose from multiple angles, sensing impacts. The operator should be able to program target attributes such as ammunition sensitivity and hit reaction (hit-hold, hit-fall hit-bob). The system should be with water-tight connectors.

(b) The installed and reserve pop-up and turning targets will be shown by the firm. The Board of Officers will also check the functionality of the reserve targets which will be demonstrated by the firm after replacing the main targets. The control, hit indication and functionality of the target, as specified will be checked.

Annexure 'II'
(Ref S No13 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR FIRING BAYS/ STALLS

1. **QR Para 5 (a)**. The partition panel alongwith various accessories/ fitments as given in Para 6 of the QRs and fixing methodology on the floor/ roof will also be checked to ascertain the strength and ruggedness. The said bay/ stall should be able to withstand heavy pushing/ leaning by weighty material, pushing/ jolts without moving that is to say that the fixing methodology should be very strong. One firer with weapon (pistols, SMGs and Assault Rifle in turn) will check the presence of supports for various positions as specified. Displays will be checked physically. The communication system will be checked by providing orders for firing or verbal orders as prevalent in ranges on both panel mounted microphones as well as headphones for each firing stall.

2. **QR Para 5 (b)**. One firer with weapon (pistols, SMGs and Assault Rifle in turn) will check the presence of supports for various positions as specified.

3. **QR Para 5 (c)**. Displays will be checked physically for functioning.

4. **QR Para 5 (d)**. The communication will be checked by providing orders for firing or verbal orders as prevalent in ranges on both panel mounted microphones as well as headphones for each firing stall.

Annexure 'III'
(Ref S No15 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR BULLET PROOFING

1. The type of bullet trap **will be specified by the user**. Acceptable bullet traps are as under:-

(a) **Steel Total Containment Traps with Automatic Dust Collection Unit & Air Flow Management**. The standards acceptable are:-

(i) The traps should be either independent (free-standing) requiring no additional support or secured with steel chains/ minimal support from existing range walls. This will be visually checked by the BOO.

(ii) Every component exposed to potential impact should be made of AR 500 or AR 550 steel. The surface should comply with SP6 paint specifications. The vendor should provide a copy of certificate from on accredited lab regarding compliance with AR 500/ AR 550 steel and SP6 paint specifications.

(iii) The traps should eliminate dangerous ricochet and lead dust build up:-

(aa) **Lead Build-up**. A dust collection unit (vacuum based) will be provided. Lead fragments should be collected into steel containers by vacuuming and filtering lead dust. There should be no oil, rubber or water used to eliminate Lead dust. Suitable HEPA filters should be provided at the exhaust.

(ab) There should be no ricochet.

(iv) The mouth of the bullet trap should lead to a deceleration chamber from which it should lead to the bullet collection system. The collection system may be vacuumbased, screw conveyor system (where bullets fall from deceleration chamber to a semicircular through on the bottom of the trap) or canister based (where bullets fallfrom deceleration chambers to suitably placed canisters).

(v) A dust collection unit should be present to remove lead dust.

(vi) All parts of the bullet trap will be visually inspected and physically checked by the BOO.

(b) **Steel Bullet Trap with 'Snail' Bullet Trap System**.

(i) Low angle ramps guide bullets to the declaration chamber where they lose energy. A mixture of bio-degradable oil and water encapsulates Lead dust. No vacuum is used. In case dry snail trap is used an air barrier develops positive pressure at the throat of the trap to keep lead particles inside the deceleration chamber should be used. A bullet collection system (auger or drag converter for automatic systems or bucket/ perforated tray system for dry/ wet trains respectively should be available. The choice of the snail trial (wet/ dry) and collection system will be **specified by the user**.

(ii) The snail trap, air barrier all parts will be demonstrated by the vendor and physically checked by the BOO.

(c) **Granulated Rubber Trap**

(i) The trap shall have a sloping front surface and be constructed with:-

(aa) **Support Frame**. The support frame should be made of hot rolled steel and should support a 32 degree angle when the trap is filled with recycled rubber (described later), or plasticized media.

(ab) **Steel Bed Plate**. The steel bed plate provides a safety barrier and should not be relied upon to terminate the bullets flight.

(ac) **470 to 530 BHN Armour Plate Trap Battle**. To protect the wall above the bullet trap up to the ceiling from accidental hits at 10mm, 470 to 530 BHN steel armour plate with appropriate splinter protection should be attached.

(ad) **Self Feeding Hopper**. The bullet trap should incorporate a self feeding hopper with additional media within.

(ae) **Rubber/ Media**. The rubber/ plasticized granules or granulate inside the trap, consisting of chopped rubber, should be free from cording, threads, steel belting pieces and cotton fibers. This rubber/ plastic media should be treated to make it fire retardant. The front layer should be treated to make it fire retardant. The front layer should consist of replaceable rubber blocks or flame retardant plastic/ PNC blocks.

(ii) The impact area depth, measured perpendicular to the bed plate should not be less than 24 inches.

(iii) All metal parts not otherwise finished or plated shall be prime painted.

(iv) The granulate trap should be able to handle a temperature range from minus 24^0C to plus 60^0C and should last about 2000rds per day before first maintenance is required.

(v) The bullet trap should allow recovery of largely intact spent rounds. The projectiles should be removable by draining or vacuuming thegranulate. A suitable vacuuming machine should be supplied by the vendor as part of CISR equipment.

(vi) All parts of the trap will be physically checked by the BOO.

(vii) The slope ofrubber granulates and its depth will also be measured.

(viii) The vendor will demonstrate the extraction of granulate and removal of bullets to the BOO after firing. A certificate regarding hardness of the steel used will be obtained by the vendor from an accredited lab and deposited to the BOO.

(ix) The bullet trap shall be self-supporting and assembled by mechanical fasteners. The self feeding hopper bin shall be supported by chains/ cables. The trap baffle/ hopper shall ensure no bullets are able to strike the roof or rear wall.

(x) Certificate from an accredited national/international lab regarding the BHN and grade of steel used for construction of the trap frame and bed plate, certificate from a lab regarding flame retardancy of the rubber media and certificate from the OEM that rubber media is free from cording, threads; steel belting and cotton fibers will be checked apart from physical checking.

Annexure 'IV'
(Ref S No16 (c) of Trail Directives)

ON SITE ACCEPTANCE TEST (OSAT) ANTI RICOCHET SOLUTION/BAFFLES

1. **Anti Ricochet Tiles.** Ricochet proofing will include providing protective baffles to eliminate backsplash. Presence of ricochet proofing by means provided by the firm/OEM will be checked by the Board of Officers on all relevant surfaces as specified in the QRs. The firing will be carried out by 9mm SMG , Pistol, 5.56mm Assault Rifle, 7.62mm AR by firing one round on a marked anti ricochet panel each on the both side walls, one on the floor and one on the roof as specified. The shot will be made at an angle of 30degrees or more (which will be measured by the Board of Officers). Damaged tiles/floor portion will be replaced by the vendor:-

Weapons	**Distance of anti Ricochet Panel to be Fired at**
Pistol	5 meters
9mm SMG	10 meters
5.56mm assault Rifle	20 meters
7.62mm assault Rifle	30 meters

Note: Burst firing with two/three rounds each will also be carried on marked anti-ricochet panel by weapons specified in the table above less pistol.

2. **Baffles.** The Baffles being provided will be visually inspected by the BOO. In addition to the ones being installed one baffle will be provided and subjected to the tests specified above. There should be no ricochet/backsplash of ammunition. Firing will be carried out from a secure location on the panel to prevent chances of injury to firers.

Annexure 'V'
(Ref S No18 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR VENTILATION SYSTEM

Lead Control

1. Ventilation system will be checked after firing 1000 rounds as well as after 2000 rounds in one day. Air samples will be tested for all lanes.

2. **Procedure**. Air samples will be extracted through a membrane filter in a cassette by means of sampling pump calibrated at 2.0 L/min. The membrane filter digested with acids and lead elements will be analyzed by Inductively Coupled Plasma Spectroscopy (ICP) at vendors cost.

3. For checking lead, air filters will be placed by firm/OEM at the firers end and at several points down range during firing in the range. An air sample will also be taken from the places above where filters are placed. The amount of lead collected in these filters will then be measured at a laboratory certified by the Central Pollution Control Board (CPCB) and National Accreditation Board for testing and calibration Laboratories (NABL). Lab/(s) identified by the OEM/firm and chosen by the NSG for trails. The lead-in-air assessment should be lesser than 50 micrograms per meter cube of air.

4. In case the procedure/technology above is not available in India, a suitable method/technology specified by the selected lab will be chosen in consultation with user, vendor and lab reps.

5. **Smoke Test.** Using either a smoke tube or smoke candle, observe air flow currents and patters throughout the range. This should identify disturbances and direction of airflow. Unnecessary personnel should not be present in the range or near the supply air plenum during the assessment. Prior to activating the tube or candle, ensure that the ventilation system is on and operating. If a smoke candle is used, steel can with some type of a handle fabricated (pliers) should be used to handle the candle. At the firing line, smoke tests each firing station (booth). Test from the floor to about 6 foot level. Observe the smoke pattern. The smoke should move down range and demonstrate laminar flow. Document unusual smoke patterns or where smoke swirls and returns to the shooters position. Eddies or swirls near the floor, or other obstructions area a concern and should be noted. If turbulence is observed, air velocities may be high in that area. Note that air velocity measurements conducted later in this area may not truly indicate the direction of the flow (turbulence and eddies may have flow directions other than down range but will be reflected only as a measured value). Conduct additional smoke measurements down range to ensure adequate air velocities and patterns are maintained down range towards the bullet stop. OEM/vendor to carry out test by national/international accredited laboratory. The BOO to check the same.

6. Measure the cross sectional area for the range and calculate the necessary volumetric air flow. Measure the ceiling height and width of the range at the firing line.

7. **Air Flow**. At the firing line, place the probe (or a grid meter if available) so that it is perpendicular to the floor at the firing line. Make sure no unnecessary personnel are present or near the supply air plenum during the assessment. Take three measurement at the same level in three locations from the floor approximately 1 foot (prone level firing), approximately 3 feet (kneeling position), and approximately 5 feet (standing position). This will result in 9 readings for each firing position (or three grid meter readings). Average the 9 (or 3) readings and apply to the design criteria (50-75 feet per minute, with preference for 75 feet per minute). Optional measurements may be conducted down range at the 1,3 and 5 foot high levels to ensure adequate air velocities are maintained (30 – 50 feet per minute). This can be conducted at 15 to 20 foot intervals.

8. **Static Pressure Measurements**. Since it is desirable to have the range under negative pressure related to other occupied spaces, static pressure measurements should be conducted in one of two ways. A manometer or magnahelic gauge can be used to check the pressure in relation to areas outside the range. A hose can be placed outside the door (careful not to crimp) with at least 6 inches of the hose outside the door. The result can be compared to the desired criterion level (-0.04 $\pm$0.02) inches water gauge). Another way to ensure range negative pressure is to use the smoke tube at all entrances or openings into the range doors may need to be "cracked" a little to demonstrate. Smoke should enter into the range from outside areas. Excessive negative pressure will make doors difficult to open (or to keep closed) and can be safety hazard (slamming doors (-0.05-0.10 inches water gauge). Excessive negative pressure also indicates insufficient supply air for the amount being exhausted.

9. The values of Lead, air flow and pressure will be measured by a laboratory certified by CPCB and NABL, specified by the user, at the cost of the vendor. All real time monitoring systems for lead concentration, air quality, humidity, air flow, temp should by checked physically by BOO for accurate working.

Annexure 'VI'
(Ref S No19 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR ACOUSTIC REDUCING SYSTEM

1. **Noise characteristics.** Tests will be carried out by national/International lab specified by the user at the cost of the vendor for:-

   (a) Ambient Noise Levels without firing.

   (b) Noise level during firing.

   (c) Reverberation characteristics.

2. The procedure for the above tests will be as per international norms. A pre-test meeting to coordinate the procedure will be held between the user, vendor and lab representatives.

3. **Ear Muffs.** All ear muffs supplied will be worn by firers in the practices carried out to check the systems. The ear muffs should dampen the sound of firing inside closed CISR to NRC 30 for the firer for both individual firers as well as for entire detachments. These orders should be clearly audible to firer/(s) while they are wearing ear muffs.

4. A surface provided with sound attenuation will be checked to see if it is durable to withstand repeated washing and cleaning. Real time monitoring system for peek noise and residual noise should be checked by BOO. All ear muffs should by checked for 7.62mm Assault rifle.

(SC (Arch) AK Sahu)
Engrs Branch, HQ NSG

(Sushil Kumar)
PSO, BPR&D

(DC Sunil Kumar)
SSB

(AC Sarvesh Tomar)
CRPF

(AC DK Sharma)
CISF

(AC (Arch) Anupam Sharma)
BSF

(AC Ramcharan Singh)
ITBP

(Nb Sub DP Mishra)
LOAR

(Major Ankit Duhoon
HQ NSG

(Shri Amit Kumar Rai, Scientist 'E')
TBRL, Chandigarh

APPROVED/NOT APPROVED

(MA Ganapathy, IPS)
DG, NSG