

QUALITATIVE REQUIREMENTS OF FACILITY FOR INTERACTIVE FIREARMS TRAINING FACILITY

S. No	QRs	Response from the firm	
1.	<p>General : A complete solution for setup, installation, commissioning and maintenance of an interactive tactical training facility in an indoor range is required on turnkey basis.</p>	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
2.	<p>FITT Structure Dimensions : Designed for firing by all small arms using 5.56mm, 7.62mm, and 9mm used by CAPF. FITT should cater to minimum of 12 firers standing in 270 degree formation firing in tandem to simultaneously engage targets ahead. Layout drawing is enclosed at Appendix A.</p> <p>The mode of entry/exit is through the alley which connects to the control room and the live fire arena. A central control room to monitor and conduct all the proceedings of the shooting practices should also be made available.</p> <p>Minimum Structure Specifications :</p> <p>Above ground with a height of 6.5 meters. Minimum depth of foundation of 1.2 meter permanent nature and not of pre-casted structure for better load distribution and long life.</p> <p>Minimum thickness of wall should be 300 mm with inner and outer water proofing and covering with MS sheet (if any). Proper plinth protection needs to be ensured w.r.t. HFL of area.</p> <p>Fabrication of roof and wall joint is to be carried out based on maximum utilization of joint. Roof of pre-casted RCC blocks having minimum thickness of 150 mm with provisions of water proofing and load bearing capacity of baffles/ventilation system should be adopted.</p> <p>Design methodology /layering of roof must be submitted along with provision of water proofing / no sagging / hogging certificate. Details about type of frame being used to retain the pre-casted slab considering all DL/LL/IL of the area based on IS code.</p> <p>Certificate for life span of building which can live minimum 30 years with attached loadings of CISR without failure. Also, the certificate that the building will be fabricated based on National Building Code of India 2016 or latest guidelines.</p>		
3.	<p>Electronic Pop Up Target System</p> <p>General : Electronic Pop up Target are targets, which can be activated remotely so that they can appear and fall at pre-programmed condition. The target system should consist of:-</p> <p>(a) Target Box Mechanism & Target Boards. (b) Wireless Remote Control Unit (c) Sensors.</p>		

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S. No	QRs	Response from the firm	
4.	Target Mechanism	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	(a) Modes of Operation (expose & hide) : The target should be able to move from a horizontal position from the ground i.e zero degrees to 90 degrees while the target face is square to the firer to depict a Pop Up action (refer diagram below). The square face of the target should be able to rotate through 90 degrees on its central axis.		
	(b) Time to Expose Target : 1 sec or lesser		
	(c) Time to Retreat : 1 sec or lesser		
	(d) Time Target remains Exposed/ hidden (for both Pop Up & Rotation on central axis). Exposure time should be controllable as under:- (i) Programmable from one sec up to at least two mins. (ii) Exposure/hide action should be controllable by pressing of switch on remote. (iii) Programmable to take particular number of hits before hide action (as opposed to exposed).		
	(e) Control Unit. Should consist of the target control remote and means to see the bullet hits on the target. This means can be integrated along with the remote or provided separately. (i) Should display, store hit of bullet on the target with provision of printing the result. (ii) Should have a ruggedized display which should be visible in clear day light. (iii) Should control the entire system of sensors of the product as specified (motion, proximity & light). (iv) Control unit should be inter compatible with all kinds of targets (i.e. Pop Up, Turning and Moving) mentioned in this QR. (v) Total Number of Control Units- for every twelve targets one control unit.		
	(f) Target Illumination for Night Firing: (i) The system should provide controlled target illumination for night firing. (ii) Facility to switch lights on/off should be available on the remote control. (iii) It should simulate moonlight (dim white light), hit on target & retaliatory fire. (iv) Light should be dimmable (manually on the target and/or remote controlled).		
	(g) Targets (i) Should be able to hold all types of standard military targets currently in use (Fig 11, Fig 12, Rubia Target, Hostage Target A & Hostage Target B.		
	(ii) Vendor will supply targets specified by the user.		
	(iii) Should not shake or bend when in upright position (in any plane) up to a wind load of minimum 15 Kms per hour.		

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5.	<p>Physical Characteristics</p> <p>(a) Weight : Weight of the complete target system including the accessories but excluding the battery compartment should not be more than 30 Kgs.</p> <p>(b) Colour : Black/ Green/ Camouflage color to be specified by user.</p>	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
6.	<p>Power Source</p> <p>(a) Power (AC/DC as per user requirement)</p> <p>(i) AC Mains : volts to 240 volts.</p> <p>(ii) DC :</p> <ul style="list-style-type: none"> • 12 Volts Sealed Maintenance Free (SMF) rechargeable battery. • SMF battery being used should be commercially available in Indian Market. <p>(iii) Battery Life : Minimum two years.</p> <p>(iv) Charging Time : 6 hrs or less and should last upto minimum 500 cycles of recharging.</p> <p>(v) Ingress Protection : Battery should be separate in a detachable box (weather proof IP 67 encasement) attached to the target with robust connectors.</p> <p>(vi) Operating Temperature : -10 degrees C to +60 degrees C</p>		
7.	<p>Accessories</p> <p>Sensors (as per user requirement)</p> <p>(i) Motion sensors- targets should automatically pop-up or rotate when a person crosses the sensors. Targets should stay exposed for a programmable time after activation by sensors.</p> <p>(ii) Sensors should be separate from the target.</p> <p>(iii) Sensors should have its own power supply & should have wired/wireless connectivity with the target system.</p>		
8.	<p>Interactive Virtual Target System</p> <p>General : System that allows live fire training with 5.56mm, 7.62mm, and 9mm and laser based weapon firing to include the following integrated devices. The System shall provide tactical training video scenarios as follows:</p> <p>(a) The dimensions of the screen should be wide enough to cover the maximum area of the range provided in a 270-degree arc for an immersive training environment.</p> <p>The shooting screen should be capable of taking a minimum of 200,000 live bullet hits before being changed.</p> <p>It should be a self-sealing screen/auto refreshing or any similar technology which does not require repair of target surface.</p>		

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S. No	QR's	Response from the firm	
		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	Video Scenarios (i) Video scenarios with audio included, shall be displayed with an accurate point of view of the scene on a life-size video projection screen.		
	(ii) Video scenarios shall have been filmed in High Definition video with 1920x1080 or higher native pixel resolution, and shall not be stretched/warped/resized to meet the required resolution.		
	(iii) Video scenarios shall be capable of reaction and branching based upon location of shot on the video projection screen. (iv) The system shall allow branching based upon instructor-selected branch options wherever desired, to include: (v) Queued (next to play) branching which occurs after the current scene or display item.		
	(vi) The System shall allow inclusion of new interactive video scenarios in a variety of training topics. (vii) Minimum video pixel resolution : 1920 x 1080.		
	(viii) Minimum video frame rate per screen: 30 fps (or 25 fps for PAL)		
	(ix) The system shall provide an instructor selectable list of scenario sessions for review. (x) Dynamic Shooting Exercises. The system shall provide computer generated graphics applications. Typical plate rack targets, targets that appear at random on the screen, a grid of shoot/no-shoot targets, a moving target. (xi) Lane Based Targets. The system shall provide real-time computer generated graphics for lane-based shooting as follows		
	(b) Hit & Miss System (i) Software shall record and display all hits and misses accurately with a minimum speed of at least 60 hits per second of live ammunition with 90% (+/- 10%) accurate detection. (ii) Hit Detection should work consistently throughout the screen. (iii) The system shall permit a replay of all shots fired. (iv) Software shall provide a printable report for the shooter's performance.		
	(c) Low Light Training & Sound effects (i) System shall provide lowlight training with flashlights. The flashlight feature shall be available all over the screen surface whenever enabled for the session. The opacity (darkness) of the areas on the screen unlit by flashlight shall be adjustable by the instructor. Use of the flashlight feature must not reduce the number of possible laser-based weapons		
	(ii) Must provide instructor selected real-time sound effects in instructor user interface. Real-time sound effects should support user-selected speaker(s) for playback.		

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S. No	QRs	Response from the firm	
		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	<p>(d) Control Unit.</p> <p>(i) Multimedia Computer System, latest generation, Intel Core i7, 8GB RAM, 2 TB HD or higher.</p> <p>(ii) Wireless mouse and keyboard.</p> <p>(iii) Color laser printer</p> <p>(iv) Minimum 46+LED Monitor, Full HD, Integrated Speakers.</p> <p>(v) Additional remote wireless instructor interface via handheld, Touch screen tablet device. User interface of the wireless control device must be the same as primary instructor control interface.</p>		
9.	<p>Firing bays/ Stalls</p> <p>The inter firer partition panels should be ruggedized, , see through panels with provisions for the following:-</p> <p>Provide for firing from standing, kneeling, lying and CQB mode.(move downrange)</p> <p>Provision for mounting individual firer display monitors for hit and score indication.</p> <p>Suitable assembly/fitment for communication system for each lane as voice interface between the firer and the instructor</p> <p>The partition panels material should be of Acrylic or Prospex or toughened glass and should be permanently fixed to the ground.</p>		
10.	<p>Bullet Proofing</p> <p>(a) A suitable system of granulated rubber based %iring Butt+ to trap the bullets at the far inside end of the range. The %iring Butt+ should enable recovery of the bullets rather than the bullet getting embedded to minimize the risk of lead contamination within the range. The Firing Butt should cover the area behind the targets in a manner that it absorbs all hits fired on the target configuration given in the %Target Specification+.</p> <p>(b) The %iring Butt+ should be able to sustain extensive/daily firing of upto average 2000 rounds daily.</p> <p>(c) The %Butt+ should have the capacity of stopping/absorbing trapping bullets of muzzle velocity of upto 985 m/Sec (This includes rds from SG-551, 5.56mm INSAS Rifles).</p>		
11.	<p>Side Walls/ Roof/ Floor</p> <p>Suitable non ricochet proofing of side walls, roof and floor to prevent accidental fire hit/ricochet.</p>		

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12.	Protection of the Target System Equipment and Rails Exposed equipment of the target system and the rails including roof mounted rails should have suitable bullet protection to prevent damage by direct bullet hit or ricochet.		
13.	Ventilation System.		
	a. A suitable NON AC ventilation system to pump infresh air and flush out indoor air to minimize the lead fouling and maintain cool/fresh atmosphere within the indoor range.		
	b. The system preferably should be roof Mounted with provision of iron ladder on either side of the range to access the said system on the roof.		

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	c. The system should have dual controls, one in the control room and other at a point of the system's immediate location.		
14.	<u>Acoustic Reduction System.</u> A suitable sound absorbing panelling of the range interiors to minimize the sound of gun fire.		
15.	Control Room The control room should have all facilities for:-		
	a. Controlling all targets being installed in the range in the manner indicated in the QRs		
	b. Master control for the ventilation system.		
	c. Communication system for interface with individual firer and with the group which should also functions as central announcement system		
	d. One master computer along with a heavy duty printer.		
	e. The software being supplied should be Window based		

QUALITATIVE REQUIREMENTS & TRAIL DIRECTIVES OF FACILITY FOR INTERACTIVE FIREARMS TRAINING FACILITY

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			Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
1.	<p><u>General</u> A complete solution for setup, installation, commissioning and maintenance of an interactive tactical training facility in an indoor range is required on turnkey basis.</p>	The complete solution will be checked after the installation as part of the onsite acceptance Test (OSAT) by BOOs		
2.	<p><u>FITT Structure Dimensions</u> Designed for firing by all small arms using 5.56mm, 7.62mm, and 9mm used by CAPF. FITT should cater to minimum of 12 firers standing in 270 degree formation firing in tandem to simultaneously engage targets ahead. Layout drawing is enclosed at Appendix A</p> <p>The mode of entry/exit is through the alley which connects to the control room and the live fire arena. A central control room to monitor and conduct all the proceedings of the shooting practices should also be made available. Minimum Structure Specifications: Above ground with a height of 6.5 meters. Minimum depth of foundation of 1.2 meter permanent nature and not of precasted structure for better load distribution and long life.</p> <p>Minimum thickness of wall should be 300 mm with inner and outer water proofing and covering with MS sheet (if any). Proper plinth protection needs to be ensured w.r.t HFL of area.</p> <p>Fabrication of roof and wall joint is to be carried out based on maximum utilization of joint. Roof of pre casted RCC blocks having minimum thickness of 150 mm with provisions of water proofing and load bearing capacity of baffles /ventilation system should be adopted.</p> <p>Design methodology /layering of roof must be submitted along with provision of water proofing / no sagging / hogging certificate. Details about type of frame being used to retain the precasted slab considering all DL/LL/IL of the area based on IS code.</p> <p>Certificate for life span of building which can live minimum 30 years with attached loadings of CISR without failure. Also, the certificate that the building will be fabricated based on National Building Code of India 2016 or latest guidelines.</p>	<p>The FITT structure will be checked after the complete installation as part of OSAT by BOOs</p> <p>BOOs to physically verify certificates provided by the firm</p>		

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3.	Electronic Pop Up Target System		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	<p>General : Electronic Pop up Target are targets, which can be activated remotely so that they can appear and fall at pre-programmed condition. The target system should consist of:-</p> <p>(a) Target Box Mechanism & Target Boards. (b) Wireless Remote Control Unit (c) Sensors.</p>	To be Physically Checked by Board of Officers (BOOs).		
4.	<p>Target Mechanism</p> <p>(a) Modes of Operation (expose & hide) : The target should be able to move from a horizontal position from the ground i.e zero degrees to 90 degrees while the target face is square to the firer to depict a Pop Up action (refer diagram below). The square face of the target should be able to rotate through 90 degrees on its central axis.</p> <p>(b) Time to Expose Target : 1 sec or lesser</p> <p>(c) Time to Retreat : 1 sec or lesser</p> <p>(d) Time Target remains Exposed/hidden (for both Pop Up & Rotation on central axis). Exposure time should be controllable as under:-</p> <p>(i) Programmable from one sec up to at least two mins.</p> <p>(ii) Exposure/hidden action should be controllable by pressing of switch on remote.</p> <p>(iii) Programmable to take particular number of hits before hidden action (as opposed to exposed).</p>	<p>To be Physically Checked by BOOs.</p> <p>To be Physically Checked by BOOs.</p> <p>To be Physically Checked by BOOs.</p> <p>To be Physically Checked by BOOs.</p>		

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	<p>(e) Control Unit. Should consist of the target control remote and means to see the bullet hits on the target. This means can be integrated along with the remote or provided separately.</p> <p>(i) Should display, store hit of bullet on the target with provision of printing the result.</p> <p>(ii) Should have a ruggedized display which should be visible in clear day light.</p> <p>(iii) Should control the entire system of sensors of the product as specified (motion, proximity & light).</p> <p>(iv) Control unit should be inter compatible with all kinds of targets (i.e. Pop Up, Turning and Moving) mentioned in this QR.</p> <p>(v) Total Number of Control Units- for every twelve targets one control unit.</p>	To be Physically Checked by BOOs.	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	<p>(f) Target Illumination for Night Firing:</p> <p>(i) The system should provide controlled target illumination for night firing.</p> <p>(ii) Facility to switch lights on/off should be available on the remote control.</p> <p>(iii) It should simulate moonlight (dim white light), hit on target & retaliatory fire.</p> <p>(iv) Light should be dimmable (manually on the target and/or remote controlled).</p>	To be Physically Checked by BOOs.		
	<p>(g) Targets</p> <p>(i) Should be able to hold all types of standard military targets currently in use (Fig 11, Fig 12, Rubia Target, Hostage Target A & Hostage Target B.</p>	To be Physically Checked by BOOs.		
	<p>(ii) Vendor will supply targets specified by the user.</p>	The OEM/ Vendor will give Undertaking for supplying targets specified by the User.		
	<p>(iii) Should not shake or bend when in upright position (in any plane) up to a wind load of minimum 15Kms per hour.</p>	To be Physically Checked by BOOs.		

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5.	Physical Characteristics		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	(a) Weight : Weight of the complete target system including the accessories but excluding the battery compartment should not be more than 30 Kgs. (b) Colour : Black/ Green/ Camouflage color to be specified by user.	To be Physically Checked by BOOs.		
6.	Power Source			
	(a) Power (AC/DC as per user requirement) (i) AC Mains : volts to 240 volts. (ii) DC : <ul style="list-style-type: none"> • 12 Volts Sealed Maintenance Free (SMF) rechargeable battery. • SMF battery being used should be commercially available in Indian Market. 	To be physically checked by the BOO with a multimeter. OEM/vendor will provide certificate for commercial availability of battery.		
	(iii) Battery Life : Minimum two years (iv) Charging Time : 6 hrs or less and should last upto minimum 500 cycles of recharging.	Targets system with fully charged battery will be provided by the firm/OEM. Target will be programmed on popup mode. The same will be activated and left in location for 4hrs. Actions will be checked by the BOOs. Fully discharged battery will be provided and the same will be checked using multimeter. It will be checked whether the battery is fully charged after 6 hrs.		
	(v) Ingress Protection : Battery should be separate in a detachable box (weather proof IP 67 encasement) attached to the target with robust connectors.	To be physically checked by BOOs.		
	(vi) Operating Temperature : -10 degrees C to +60 degrees C	A certificate to the effect to be submitted by the vendor from national/ international/ NABL accredited laboratory. The same will be checked by the BOOs.		

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7.	<p>Accessories</p> <p>Sensors (as per user requirement)</p> <p>(i) Motion sensors- targets should automatically pop-up or rotate when a person crosses the sensors. Targets should stay exposed for a programmable time after activation by sensors.</p> <p>(ii) Sensors should be separate from the target.</p> <p>(iii) Sensors should have its own power supply & should have wired/ wireless connectivity with the target system.</p>	To be physically checked by the BOOs.	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
8.	<p>Interactive Virtual Target System</p> <p>General : System that allows live fire training with 5.56mm, 7.62mm, and 9mm and laser based weapon firing to include the following integrated devices. The System shall provide tactical training video scenarios as follows:</p> <p>(i) The dimensions of the screen should be wide enough to cover the maximum area of the range provided in a 270-degree arc for an immersive training environment.</p> <p>(ii) The shooting screen should be capable of taking a minimum of 200,000 live bullet hits before being changed.</p> <p>(iii) It should be a self-sealing screen/auto refreshing or any similar technology which does not require repair of target surface.</p>	<p>To be physically checked by the BOOs. The OEM/Vendor will show one functional sample of shooting screen which is at least 2x2 feet wide.</p> <p>50 rounds shall be fired 9mm MP5, 5.56 INSAS and 7.62mm AK47 to check the functionality of the system.</p> <p>A certificate from the OEM/Vendor that the screen is capable of subjected to 2,00,000 rounds without repair will be checked.</p> <p>The complete system in 270° degree will be checked as per OSAT procedure Appendix B when the FITT has been finally executed.</p>		

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			Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	(a) Video Scenarios (i) Video scenarios with audio included, shall be displayed with an accurate point of view of the scene on a life-size video projection screen.	To be physically checked by the BOOs.		
	(ii) Video scenarios shall have been filmed in High Definition video with 1920x1080 or higher native pixel resolution, and shall not be stretched/warped/resized to meet the required resolution.	The OEM/Vendor will give a certificate from National/ International accredited lab test report for High Definition video with 1920x1080 or higher native pixel resolution as per QRs.		
	(iii) Video scenarios shall be capable of reaction and branching based upon location of shot on the video projection screen. (iv) The system shall allow branching based upon instructor-selected branch options wherever desired, to include: (v) Queued (next to play) branching which occurs after the current scene or display item.	BOOs will check branching option as per QRs.		
	(vi) The System shall allow inclusion of new interactive video scenarios in a variety of training topics.	BOOs will be shown addition of a new sample interactive scenario by OEM/Vender.		
	(vii) Minimum video frame rate per screen: 30 fps (or 25 fps for PAL)	The OEM/Vendor will give a certificate from National/ International accredited lab test report for video frame rate as per QRs.		

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	(viii) The system shall provide a instructor selectable list of scenario sessions for review. (ix) Dynamic Shooting Exercises. The system shall provide computer generated graphics applications. Typical plate rack targets, targets that appear at random on the screen, a grid of shoot/no-shoot targets, a moving target. (x) Lane Based Targets. The system shall provide real-time computer generated graphics for lane-based shooting as follows	To be physically checked by the BOOs.	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	(b) Hit & Miss System (i) Software shall record and display all hits and misses accurately with a minimum speed of at least 60 hits per second of live ammunition with 90% (+/- 10%) accurate detection. (ii) Hit Detection should work consistently throughout the screen. (iii) The system shall permit a replay of all shots fired. (iv) Software shall provide a printable report for the shooter's performance.	To be physically checked by the BOOs. 100 rounds shall be fired 9mm MP5, 5.56mm INSAS and 7.62mm AK47 to check the functionality of the system.		
	(c) Low Light Training & Sound effects (i) System shall provide lowlight training with flashlights. The flashlight feature shall be available all over the screen surface whenever enabled for the session. The opacity (darkness) of the areas on the screen unlit by flashlight shall be adjustable by the instructor. Use of the flashlight feature must not reduce the number of possible laser-based weapons	To be physically checked by the BOOs. OEM/Vendor will show one sample of flashlight to check the functionality of the system.		
	(ii) Must provide instructor selected real-time sound effects in instructor user interface. Real-time sound effects should support user-selected speaker(s) for playback.	To be physically checked by the BOOs.		

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	<p>(d) Control Unit.</p> <p>(i) Multimedia Computer System, latest generation, Intel Core i7. 8GB RAM, 2 TB HD or higher.</p> <p>(ii) Wireless mouse and keyboard.</p> <p>(iii) Color laser printer</p> <p>(iv) Minimum 46+LED Monitor, Full HD, Integrated Speakers.</p> <p>(v) Additional remote wireless instructor interface via handheld, Touch screen tablet device. User interface of the wireless control device must be the same as primary instructor control interface.</p>	To be physically checked by BOOs during OSAT as per Appendix B .	Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
9.	<p>Firing Bays/ Stalls</p> <p>The inter firer partition panels should be ruggedized, , see through panels with provisions for the following:-</p> <p>Provide for firing from standing, kneeling, lying and CQB mode.(move downrange)</p> <p>Provision for mounting individual firer display monitors for hit and score indication.</p> <p>Suitable assembly/fitment for communication system for each lane as voice interface between the firer and the instructor</p> <p>The partition panels material should be of Acrylic or Prospex or toughened glass and should be permanently fixed to the ground.</p>	<p>A copy of certificate from an accredited lab regarding material and bullet proof nature of panel will be provided by OEM and will be checked by the BOOs.</p> <p>The inter firer partition panels should conform to NIJ level 3 Ballistic protection for the glass/transparent portion. The side walls (frame) should be made from non transparent AR 500 hardened steel copy of certification from an accredited laboratory that the ballistic glass conforms to NIJ level 111 protection and steel used for the frame is AR 500 compliant will be checked. (class R2 for BS 5051 1988, NIJ level 111 OR FB6 for EN 1522 or equivalent class shall be the acceptable standard). The OSAT procedure is att at Appendix 'C'.</p> <p>The OSAT procedure is att at Appendix 'C'.</p> <p>The OSAT procedure is att at Appendix 'C'.</p> <p>The OSAT procedure is att at Appendix 'C'.</p>		

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10.	Bullet Proofing		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	(a) A suitable system of granulated rubber based firing Butt+to trap the bullets at the far inside end of the range. The firing Butt+ should enable recovery of the bullets rather than the bullet getting embedded to minimize the risk of lead contamination within the range. The Firing Butt should cover the area behind the targets in a manner that it absorbs all hits fired on the target configuration given in the Target Specification+.	Test procedure will be as per OSATs att at Appendix 'D' . The lab certificates for qualities specified in the OSAT will be checked by the BOOs.		
	(b) The firing Butt+should be able to sustain extensive/daily firing of upto average 2000 rounds daily.	Apart from the ammunition used for firing, a total of 2000 rounds will be fired. 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 985 m/Sec.	A certificate, from lab/test report from anNational/ International accredited lab that the firing butt has the capacity to Stop/absorb bullets of muzzle velocity upto 985m/sec will also be provided by the firm.		

QUALITATIVE REQUIREMENTS & TRAIL DIRECTIVES OF FACILITY FOR INTERACTIVE FIREARMS TRAINING FACILITY...

S.No	QRs	Trial Directive	Response from the firm	
11.	<p>Side Walls/ Roof/ Floor</p> <p>Suitable non ricochet proofing of side walls, roof and floor to prevent accidental fire hit/ricochet.</p> <p>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.</p> <p>(a) The tiles/ arrangement used should be of a tensile strength 01 N/mm² at least. A copy of the laboratory test report in terms of ASTM 412 or DIN53571 or DIN EN ISO 1798 2008-4 should be attached. Certifications should be provided for :-</p> <p>(i) The tiles must conform to at least Flame Spread rating 3 and Smoke Spread rating 84 as per ASTM94 (class 1) or Class BZ of DIN 4102.</p> <p>(ii) Confirmation to UL 1715.</p> <p>(b) Baffle plates where used and installed should utilize 3/8 inch thick AR 500 steel plate with attached furring and sacrificial plywood or rubber facing with an air gap. The BHN of the steel should be 460-544 tested as per ENISO 6506. The plywood/rubber face should be either 3/4 inch plywood or 43mm thick rubber tiles. One such panel will be displayed to the BOO for OSAT.</p>	<p>OSAT for Side Walls/roof/floor are att at Appendix 'E'. BOOs to also check all the certificates provided by the firm</p>	<p>Compliant (Mention Yes or No)</p>	<p>Comments/ suggestion (in case non compliant)</p>
12.	<p>Protection of the Target System Equipment and Rails.</p> <p>Exposed equipment of the target system and the rails including roof mounted rails should have suitable bullet protection to prevent damage by direct bullet hit or ricochet.</p>	<p>To be physically checked by BOOs.</p>		

QUALITATIVE REQUIREMENTS & TRAIL DIRECTIVES OF FACILITY FOR INTERACTIVE FIREARMS TRAINING FACILITY...

S.No	QRs	Trial Directive	Response from the firm	
13.	Ventilation System.		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	<p>a. A suitable NON AC ventilation system to pump infresh air and flush out indoor air to minimize the lead fouling and maintain cool/fresh atmosphere within the indoor range.</p> <p>Lead. The Lead-in-Air Assessment should be less than the Permissible Exposure Limit i.e. 50 microgram (Mg) of Lead per metre cube of air (50 Mg/M³) based on an eight-hour Time Weighted Average (TWA)- in accordance with NIOSH (US National Institute of Occupational Health and Safety , April 2009) Guidelines</p>	<p>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 BOO (BOOs) is given at Appendix 'F'. BOOs to also check all the certificates provided by the firm</p>		
	<p>b. The system preferably should be roof Mounted with provision of iron ladder on either side of the range to access the said system on the roof.</p> <p>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 metres 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 vendor will also provide a copy of certificate about the capability of the ventilation system from an nationally/ internationally certified and accredited laboratory. The certificate should show the capability of system to provide Lead in air levels, air flow levels and negative pressure as given above.</p>	<p>BOOs to check all the national/ International accredited certificates provided by the firm</p>		
	<p>c. The system should have dual controls, one in the control room and other at a point of the system's immediate location. 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 conducts, air locks and vault ventilators will be provided as required. All cutting/patching of existing building will be carried out by the vendor. All doors to the negative pressure area should have air- locks.</p>	<p>BOOs to check all the national/ International accredited certificates provided by the firm</p>		

**QUALITATIVE REQUIREMENTS & TRAIL DIRECTIVES
OF FACILITY FOR INTERACTIVE FIREARMS TRAINING FACILITY...**

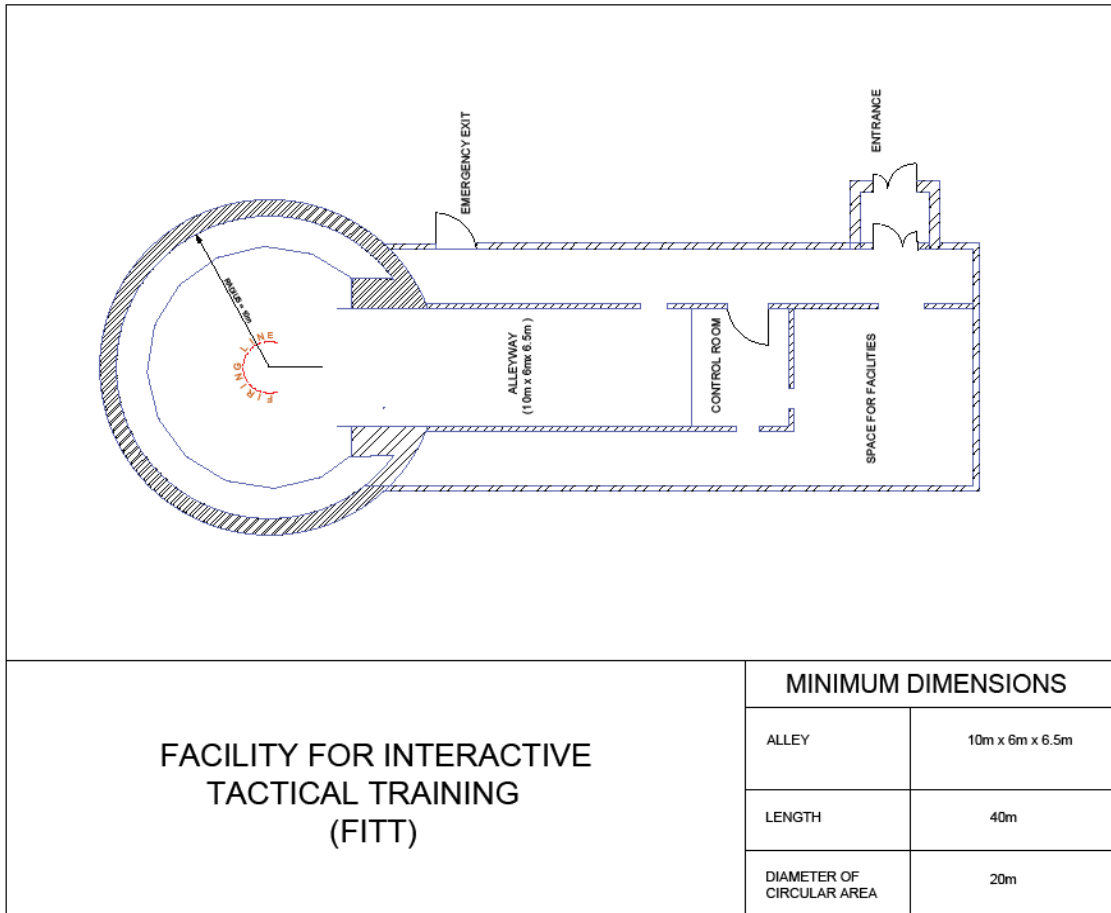
S. No	QRs	Trial Directive	Response from the firm	
14.	<u>Acoustic Reduction System.</u>		Compliant (Mention Yes or No)	Comments/ suggestion (in case non compliant)
	<p>A suitable sound absorbing panelling of the range interiors to minimize the sound of gun fire.</p> <p><u>Acoustic Reduction System.</u> 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 unburnt propellant. The peak impulse sound should not be greater than 170 Decibels (d3). Further, on an eight hour Time Weighted Average (TWA) noise level in the range should not be greater than 85 db (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, reverberation will be carried out as per On Site Acceptance Test (OSAT) attached at Appendix 'G'.</p>	BOOs to check all the national/international accredited certificates provided by the firm		
15.	Control Room			
	The control room should have all facilities for:-			
	a. Controlling all targets being installed in the range in the manner indicated in the QRs	To be physically checked by BOOs		
	b. Master control for the ventilation system.	OSAT for ventilation system attached at Appendix 'F'		
	c. Communication system for interface with individual firer and with the group which should also functions as central announcement system	To be physically checked by BOOs		
	d. One master computer along with a heavy duty printer.	To be physically checked by BOOs		
	e. The software being supplied should be Window based	To be physically checked by BOOs		

ON SITE ACCEPTANCE TEST (OSAT)

Appendix 'A'
(Ref Para 2 of Trial Directives)

ON SITE ACCEPTANCE TEST (OSAT) FOR STRUCTURE, DESIGN AND SETUP OF FACILITY FOR INTERACTIVE TACTICAL TRAINING (FITT)

1. **On Site Acceptance Test Procedure** Objective is to test and verify the structure and Setup of the Facility for Interactive Tactical Training (FITT) as per QRs.
2. OEM/ Vendor will provide a certificate from National/ International/ NABL accredited laboratory for compliance with structural specifications as per the QRs.



ON SITE ACCEPTANCE TEST (OSAT) FOR Interactive Virtual Target System

1. **On Site Acceptance Test Procedure.** Objective is to test and verify the functioning of Interactive Virtual Target System. Steps will be as under:

QR Para 7 (a) All System devices to be installed with live fire shooting screen setup in a 270 degree arc.

QR Para 7 (a) Test the Lifting system to raise and lower the Shooting Screen. The screen should be protected from the hits when retracted.

QR Para 7 (b)(c)(d) The control, hit indication and functionality of the system, as specified in QRs will be checked.

QR Para (c) 100 rounds shall be fired uniformly across the 270 degree shooting screen with 9mm SMG MP-5, 9mm Pistol Glock5.56mm Assault Rifle and 7.62mm AK 47 Rifle each to test self-sealing and hit detection on the shooting screen.

QR Para (d) (i) Test the flashlight feature as specified in the QR.

QR Para (e) Run CCS (Central Control Software).

2. Testing will form part of Contract period and no extension of the time will be granted to permit rectification, modification, adjustment or retesting except where testing has been delayed or retesting has been necessitated by circumstances beyond the control of the Contractor.

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

QR Para 8 (a)(b)(c)(d). The partition panel along with various accessories / fitments as given in 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 (SMG MP-5, Pistol Glock, Rifle INSAS, SIG Assault Rifle and AK-47 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.

QR Para 6 (a). One firer with weapon (SMG MP-5, Pistol Glock, Rifle INSAS, SIG Assault Rifle and AK-47 Rifle in turn) will check the presence of supports for various positions as specified.

QR Para 6 (b). Displays will be checked physically.

QR Para 8 (c). 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.

ON SITE ACCEPTANCE TEST (OSAT) FOR BULLET PROOFING

Acceptable bullet traps acceptable are as under:-

- (a) **Steel Total Containment Traps.** 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 SP 6 paint specifications. The vendor should provide a copy of certificate from an 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:-
 - i **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.
 - ii 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 vacuum based, screw conveyor system (where bullets fall from deceleration chamber to a semi circular trough on the bottom of the trap) or canister based (where bullets fall from 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.

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

1. **Anti Ricochet Tiles.** Ricochet proofing will include providing protective baffles to eliminate backslash. 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 MP-5, 9mm Pistol Glock, 5.56mm INSAS Rifle, 5.56mm SIG 551 Assault Rifle, 7.62mm AK 47 Rifle by firing one round on a marked anti ricochet panel each on all the side walls, one on the floor and one on the roof as specified. The shot will be made at an angle of 30 degrees or more (which will be measured by the Board of Officers). Damaged tiles/floor portion will be replaced by the vendor :-

<u>Weapons</u>	<u>Distance of Anti Ricochet Panel to be Fired at</u>
9mm Pistol Glock	5 meters.
9mm SMG MP-5	10 meters.
5.56mm Rifle INSAS	20 meters.
SIG 551 Assault Rifle	25 meters.
7.62mm AK-47 Rifle	30 meters

Note: Burst firing with two / three rounds each will also be carried out on marked anti- ricochet panels by weapons specified in the table above less 9mm Glock.

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/backslash of ammunition. Firing will be carried out from a secure location on the panel to prevent chances of injury to firers.

ON SITE ACCEPTANCE TEST (OSAT) FOR VENTILATION SYSTEM

Lead Control

1. 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 analysed by Inductively Coupled Plasma Spectroscopy (ICP) at vendors cost.
3. For checking lead, air filters will placed by the 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) will be identified by the OEM/firm and chosen by the NSG for trials. 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 patterns 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, a coffee can with some type of a handle fabricated (pliers) should be used to handle the candle. At the firing line, smoke test 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 shooter's position. Eddies or swirls near the floor, or other obstructions are 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.
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 measurements 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. Again note that many ranges were designed to have multiple exhaust points down range.

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 a 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.,

ON SITE ACCEPTANCE TEST (OSAT) FOR ACOUSTIC REDUCTION SYSTEM

1. **Noise Characteristics.** Tests will be carried out by a 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 fifty 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 comfortable levels for the firer for both individual firers as well as for entire detachments. Orders will be given by an instructor to individual firers as well as 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 its is durable to withstand repeated washing and cleaning.