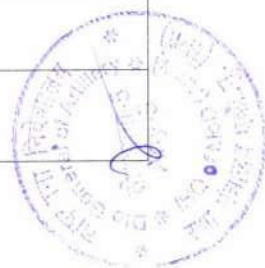


Appendix 'A'
(Refer Para 7 of RFI)

RFI QUESTIONNAIRE : 155 MM / 52 CAL TOWED GUN SYSTEM

<u>S No</u>	<u>Operational Parameters</u>	<u>Specification Required</u>	<u>Response</u>
1.	<p><u>(a) Gun</u></p> <p>(i) What is the length, width and height of the gun in Meters in travel position ?</p> <p>(ii) What is the weight of the gun in Kilograms ?</p> <p>(iii) What is the length of barrel in meters?</p> <p>(iv) What is the life of the barrel in terms of Equivalent Full Charge (EFC)?</p> <p>(v) What is the chamber capacity of the barrel?</p> <p>(vi) How many personnel are required as crew (including the commander and driver) to operate the gun?</p> <p>(vii) What are the traverse limits at all angles of elevation? (Mention as ____ degrees Right and ____ degrees Left for ____ to ____ angle of elevation)</p> <p>(viii) What is the maximum and minimum elevation for the gun system?</p> <p>(ix) What is the maximum altitude above MSL that the gun can be employed with and without special preparation/ modification?</p> <p>(x) Is the gun system compatible with current types of 155 mm ammunition used by the Indian Army?</p> <p>(xi) <u>Time Into / Out of Action.</u> What are the time limits for the gun to come into and out of action during Day and during Night?</p> <p>(xi) <u>Safety Arrangements.</u> What are the safety arrangements on the equipment to ensure the following:-</p> <p>(aa) The gun does not fire till breech block is closed.</p> <p>(ab) The gun does not fire till fully run out.</p> <p>(ac) The gun should have facility to set firing mechanism to safe.</p> <p>(ad) Once breech is closed, it should not open unless the gun has fired or without physical action by operator.</p> <p>(ae) Prevent firing when gun is beyond safe traverse/ elevation limits.</p>		



<u>S No</u>	<u>Specification Required</u>	<u>Response</u>
	<p>(af) Safety lights during move, should be provided in front and at the rear of the gun system.</p> <p>(ag) Over voltage and overload protection including surge protection.</p> <p>(ah) Prevention of double loading of Shell & Charges.</p> <p>(aj) A system should be provided on the TGS for indication of the following:-</p> <p>(i) Readiness to fire.</p> <p>(ii) Level of oil and air pressure in the recoil system.</p> <p>(iii) Chamber loaded.</p> <p>(iv) High barrel temperature conditions to prevent cook off.</p> <p>(ak) Suitable locking arrangements for locking azimuth and elevation axes should be provided.</p>	
(xii)	<u>Ammunition Auto Loading.</u> Does the gun have automatic loading as well as manual loading facilities ?	
(b)	<u>Sighting System.</u>	
(i)	<p>Is the sighting system based on GPS/IRNSS and Inertial Navigation System?</p> <p>(aa) What is INS alignment timings without GPS?</p> <p>(ab) What is accuracy of fixation with and without GPS on moving 10 kms from point of fixation?</p> <p>(ac) INS is based on RLG technology or Analog Technology?</p> <p>(ad) Is the electronic sight system compatible with DSM?</p>	



<u>S No</u>	<u>Specification Required</u>	<u>Response</u>
(ii)	What is the accuracy of aiming INS/GPS based sight for the following:- (aa) Azimuth (in mills). (ab) Elevation (in mills).	
(iii)	<u>Optical Sight for Indirect Fire.</u> (aa) Does the equipment have an optical sight with collimator as a back-up for indirect fire during Day and Night ? (ab) What is the Magnification and Field of View of the optical sight?	
(iv)	<u>Day Night Thermal Direct Firing Sight.</u> (aa) Does it have Day and Night Thermal Direct Firing Sight with an integrated Laser Range Finder? (ab) At what ranges can the Night Sight identify a tank sized target at Night ? (ac) What is the maximum and minimum range of Laser Range Finder (LRF)?	
(v)	<u>Direct Firing Sight.</u> What is the Magnification and Field of View of Day sight for direct firing?	
(c)	<u>Fire Control System (FCS)</u>	
(i)	Is the FCS capable of receiving the gun data from the Command Post in digital as well as manual feed by the gun crew?	
(ii)	Is the FCS capable of laying the gun automatically, after input of command from the crew, at the desired bearing and elevation?	
(iii)	Can the FCS be integrated with Project SHAKTI?	
(iv)	Can the gun system fire in autonomous mode (on orders of OP without command post)?	
(v)	Is Artificial Intelligence (AI) incorporated. If yes, for what purpose?	



S No	Specification Required	Response
(d)	Muzzle Velocity Radar (MVR)	
(i)	Is the equipment equipped with an integrated MVR ?	
(ii)	Does the FCS of the Gun automatically compute the MV from the integrated MVR ?	
(e)	Accuracy and Consistency in Low Angle at 80 Per Cent of Maximum Range for Standard HE Ammunition and HE Base Bleed Ammunition in Low Angle.	
(i)	What is the consistency of the gun in terms of the following:- (i) Range. (ii) Line.	
(ii)	What is the accuracy of the gun in terms of the following:- (i) Range. (ii) Line.	
(f)	Direct Firing. What is the maximum distance at which the gun can hit at 3m x 3m target within three rounds?	
(g)	Recoil System. What is the type of recoil system in the Gun ?	
(h)	Obturation System. What type of obturation system is in use with the Gun?	
2.	Mobility Parameters	
(a)	Does the Gun has Auxiliary Power Unit for gun firing and limited mobility without GTV?	
(b)	What is backup means for power supply incase of APU failure?	
(c)	What is the maximum speed and distance the gun can travel without GTVs in beaten desert tracks?	
(d)	What is the maximum side slope stability provided by the gun without GTV ?	
(e)	What is the ground clearance of the Gun in Meters ?	
(f)	Can the gun be carried in the service aircraft like IL 76, C17 & C130 ?	
(g)	What is the maximum gradient negotiable by the gun with APU?	
(h)	What is the maximum gradient negotiable by the gun with GTV and with APU switched off?	
(j)	What is the depth of water body which can be crossed / negotiated by the gun without any additional preparation or equipment?	
(k)	What is the depth of trench which can be crossed by the gun on APU?	
(l)	What is the depth of trench which can be crossed by the gun with GTV?	
(m)	What is the Turning Circle Diameter while towed with GTV as measured from the central axis of the gun?	
(n)	Can the gun negotiate without additional preparation on the assault bridges in service in Indian Army ?	
(o)	Can the gun be carried on existing Railway wagon on the Broad Gauge Railway line?	
(p)	What is the maximum power, torque and RPM of APU?	



<u>S No</u>	<u>Specification Required</u>	<u>Response</u>
	<p>(q) <u>Brakes.</u></p> <p>(i) Does the gun have Anti Lock Brake System ?</p> <p>(ii) What is the maximum gradient at which the gun can be held by the brakes without GTV?</p> <p>(r) What is the average life of APU in hours run? What are the parameters for overhaul of the APU?</p>	
3.	<p><u>Firing Parameters</u></p> <p>(a) What is the maximum range of the gun with standard High Explosive (HE) ammunition?</p> <p>(b) What is the maximum range of the gun with assisted (Base Bleed) ammunition?</p> <p>(c) What is the minimum range achievable by the gun in high angle with standard HE ammunition?</p> <p>(d) What is the maximum range of the gun for direct fire / anti tank fire?</p> <p>(e) What is the intense rate of fire of the gun with highest charge? What is the maximum duration for which it can fire at intense rate?</p> <p>(f) What is the burst rate of fire of the gun with highest charge?</p> <p>(g) What is its sustained rate of fire for 60 minutes with highest charge?</p>	
4.	<p><u>Miscellaneous Details</u></p> <p>(a) What are the towing arrangements and compatibility with in-service GTVs?</p> <p>(b) Can the Gun's APU function in tandem with GTV engine while being towed?</p> <p>(c) What are the means of ejecting a stuck projectile?</p> <p>(d) Is security lights on barrel/ rear of the gun being provided while being towed with GTV?</p> <p>(e) What is the primer magazine capacity in the firing mechanism?</p> <p>(f) Parameters recommended to be evaluated by certification/ simulation?</p> <p>(g) <u>Power Backup Arrangements.</u> Does the gun have alternate back-up arrangements for enabling automatic functions including laying as well as to bring the Towed Gun System into and out of action?</p> <p>(h) <u>Cold startup.</u> What are the cold starting arrangements provided for ignition of APU upto -20°C and altitude upto 5000 meters?</p> <p>(i) <u>Communication System.</u></p> <p>(i) What are the arrangements for inter-communication within the gun crew?</p> <p>(ii) What are the arrangements for Detachment Commander to communicate with the Command Post within range of minimum one kilometre?</p> <p>(k) <u>Maintenance Philosophy.</u> What would be the Maintenance philosophy for repair and maintenance of the gun? Can it be aligned with the system of unit and Field level repairs prevalent in the Defence Services?</p>	



<u>S No</u>	<u>Specification Required</u>	<u>Response</u>
(l)	<p><u>Product Support.</u></p> <p>(i) What kind of 'Product Support' will be ensured including warranty & AMC proposed? What will be 'Time Period'?</p> <p>(ii) What is the anticipated time line for base overhaul and is the firm willing to provide the facility?</p> <p>(iii) Is the company have major repair and overhaul facility for major assemblies and component level repair? Is the firm ready to share MTOT with Indian Army?</p> <p>(iv) Does the company ready to sign Life Cycle Support Contract (LCSC) with the gun contract as per DAP 2020? Does the company ready to provide LCSC for entire life of the equipment?</p> <p>(v) Can ESP (Engineering Support Package) comprising of MRLS (Manufacture Recommended List of Spares), SMT (Special Maintenance Tools) / STE (Special Test Equipment), Technical Manual / Documents, Training Material including Sectionised Models, Training Charts and CBT (Computer Based Test) packages be provided?</p>	
(m)	<p><u>Warning Arrangements.</u> What warning arrangements are incorporated to ensure safe operation and maintenance of the gun?</p>	
(n)	<p><u>On Board Test Equipment.</u> Give out the details of following:-</p> <p>(i) Off line test facilities for FCS and APU.</p> <p>(ii) Hardware test facilities.</p>	
(o)	<p><u>Environmental Performance.</u></p> <p>(i) What is the temperature range in which the gun system will function efficiently?</p> <p>(ii) Does the gun comply with JSS 55555 standards ?</p>	
(p)	<p><u>Standardisation.</u> Please confirm that the assemblies, sub-assemblies, components, parts and materials used in the equipment conforms to relevant MILSTD(S) and in the absence of MILSTD(S), other internationally accepted standards.</p>	
(q)	<p><u>Status of Development / Production</u></p> <p>(i) What is the present status of development of the gun system?</p> <p>(ii) Please specify timelines for fielding the product for evaluation from date of issue of RFP.</p>	



<u>S No</u>	<u>Specification Required</u>	<u>Response</u>
	<p>(iii) What is the infrastructure available to produce the Towed Gun System in India?</p> <p>(iv) What is / will be the annual production capability of your firm?</p> <p>(v) Please intimate number of Equipment Under Trials (EUT) that can be provided for trials.</p> <p>(vi) Please clarify whether EUT being provided will be of JV Foreign OEM or of the Indian Vendor?</p> <p>Indicative Cost. Likely cost of production of one Towed Gun System in broad percentage wise breakdown to facilitate formulation of PVC formula as given below:-</p> <p>(i) Fixed Percentage.</p> <p>(ii) Material Percentage. Only two to three major materials to be mentioned.</p> <p>(iii) Labour Percentage.</p>	
(r)		
(s)	What is the minimum quantity which OEM would be willing to offer keeping in mind the financial viability of the project?	
(t)	Details of Joint Venture (JV) Partners.	
	(i) Please specify details of foreign firm(s) as JV partner(s) (if any). If Yes, what are the essential critical technology which are required to be obtained? How much time will the startup/JV take to start production?	
	(ii) What are the critical system for which IPR will be with JV Foreign OEM?	
(u)	Whether it is indigenous design and development? If No, whether the vendor has IPR for the eqpt? Maximum IC Content (excluding labour) that can be confirmed by the vendor?	
(v)	Please specify if your firm will be able to field their equipment under Buy Indian (IDDM) category?	
(w)	Is this eqpt in service with any other country? If yes, furnish details of quantity supplied to the country and year of supply? In which country and Def/ Para Mil forces has the eqpt in service and since when?	
(x)	What are the enhanced parameters / specification that can be provided?	
(y)	Will you be able to offer sectionised /cut models, 3D models, CDs for training whether simulators for the equipment are available and will be provided?	
(z)	Any other relevant info in terms of specifications/ terms of reference, the OEM/ vendor would like to share.	
(aa)	What fire safety arrangements are provided with the system?	
(ab)	Max feasible preservation period, if required? Effect of preservation on warranty?	
(ac)	Is the firm holding Design IPR of the gun system? Also specify specific IPRs with respect to components and subcomponents of the gun system held with the firm?	

