

# TRIAL DIRECTIVE OF HIGH ALTITUDE SHELTER

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**INTRODUCTION:-** The structure of HAS (**High Altitude Shelter**) shall be a pre-engineered unit requiring no onsite fabrication or welding to install, strike, or relocate. This applies to structural frame components, fabric and accessories. The structure shall be fully re-locatable, allowing for disassembly and reuse of all components without any additional fabrication, welding of structural components or replacement of fabric. The shelter shall allow for all fabric shell panels and optional inner liner fabric panels to be replaced or removed individually with the structure erected without the need to deconstruct the shelter or completely un-restrain. The fabric panels for the main bays of the structure shall be designed so the installation and removal can be accomplished with all personnel on the ground.

**GENERAL INSTRUCTIONS-**This trial directive is issued to assist and guide the evaluation committee. Nothing in this trial directive absolves the Board of Officers from their responsibility to ensure that the evaluation is carried out strictly as per the specifications in every respect.

- A. The Evaluation committee may carry out additional test which they consider necessary after seeking approval of competent authority, to verify the quality of the tender sample with the specifications.
- B. The Evaluation committee should ensure proper safety of man and equipment during evaluation to avoid any damage.
- C. Trial / evaluation will be conducted in presence of firm representative only.

**GENERAL REQUIREMENT:** Following test instruments should be available during the trial:

1. Variable AC source ranging from 90-270 Volt single phase 50 Hz
2. Weighing Machine 3.Measuring Tape 4.Multi meter 5.Hygro -Meter.

Following Parameters must be **complied** prior to trial of product by **O E M** :-

SL NO	PARAMETERS	DEATIL REQUIREMENT
1	Physical Characteristics:	<p>A. The shelter arch structural links to be fabricated from lightweight corrosion resistant materials for easy transportation as well as for mobility in HAA.</p> <p>B. The shelter shall be modular in design, allowing for extended lengths via addition or matching arch structures.</p> <p>C. Shelter to include external engineered system designed to resist water intrusion at the arch assembly joints and the arch/fabric interface.</p> <p>D. All shelter support cabling shall be designed, fitted and provided with preassembled or easily assembled terminal fittings.</p>
2	DIMENSION	Must comply as per QRs.
3.	SHELTER ERECTION	<p>The HAS shall be capable of being set up by a maximum of <b>eight (08) soldiers in 6 working hours</b> exclusive of site preparation under ideal conditions. The shelter shall be capable of being erected, operated or taken down from within the specified range as per QRs. Operators shall be able to erect, strike, pack, adjust the shelter, enter, exit, open and close shelter doors and flaps while wearing cold weather garments issued to <b>ITBP personnel (ECC&amp;E)</b></p>
4	SHELTER ERECTION KIT	<p>The shelter shall include all tools, manuals and technical drawings required for assembly. The erection kit must be of such size and configuration to fit into supplied packing.</p>

SL NO	PARAMETERS	DEATIL REQUIREMENT
5	SHELTER ASSEMBLY	<p>A. The shelter shall have individual fabric panels which are installed between the structural arches.</p> <p>B. The shelter's fabric shall be tensioned without the need to completely un-restrain the base plates from an anchoring point. For safety purposes, all fabric panels shall become integral with the frame during installation so that unexpected winds during installation cannot lift the fabric away from the frame.</p> <p>C. The shelter's Main Bay and End Wall or End Door System exterior fabric panels shall be capable of being installed or removed with the arches erected and anchored to the ground without removing or loosening.</p>
6	ANCHORING SYSTEM	<p>A. The structure shall be designed and provide for installation on loose soil ,concrete, dirt, grass with an anchoring system suitable for all the required loads.</p> <p>B. The number, size and strength of the anchors shall be adequate to meet the wind and roof load requirements as per QRs.</p> <p>C. All anchors shall be self-locking with no glue or adhesives necessary to develop full load capacity. The anchoring system shall include a powered anchor driving machine with all accessories necessary for driving anchors included.</p>
7	BLACKOUT PROTECTION	<p>The shelter shall prevent detectable light leakage through the shelter outer fabric cover, vents, door openings and shall provide blackout protection on level and varying terrain to the naked eye when using the general illumination lighting system supplied with the shelter.</p>
8	SHELTER WEATHER BARRIER	<p>The shelter must comply, conform and sustain all norms as specified in QRs under environmental and temperature specification.</p>

9	<b>FLAMMABILITY</b>	The shelter shall be flame resistant, self-extinguishing and shall not have flaming melt pieces when exposed to flame or high heat. The <b>HAS</b> shall not generate toxic gases when exposed to fire and high heat.
10	<b>ODORS, SAFETY &amp; TOXICITY</b>	<p>A. The shelter shall not harbor or emit noxious or toxic odors under all environmental Conditions. The shelter shall not irritate skin or cause other human reactions.</p> <p>B. The shelter shall minimize flammability and personnel hazards. The shelter system shall be physically safe to operate, store, transport and maintain throughout the life cycle of the system.</p> <p>C. The HAS shall not be constructed of materials that shall expose installation team or operators to any chemicals or chemical compounds deemed hazardous.</p>
11	<b>ELECTRICAL SYSTEM</b>	<p>A :-The HAS shall be equipped with an electrical system consisting of a main power panel, junction boxes, lighting, power cables, duplex receptacles, switches, wiring and other items necessary to supply electrical power and lighting.</p> <p>B. All components shall conform to the Min BIS(Bureau of Indian Std) or International Std. The electrical system shall be designed to accommodate all required circuits and vendor supplied ancillary equipment .All connectors shall be weatherproof and able to withstand temperature condition as specified in QRs.</p>
12	<b>WIND ,RAIN,WATER RESISTANCE &amp; SNOW AND SLEET:</b>	<p>A. The HAS shall withstand sustained winds as specified in QRs from any direction, in all soil/surface conditions &amp; including the fabric, framing, all access doors and support cabling.</p> <p>B. The HAS shall resist intrusion of water during rainstorms though the shelter structural.</p>

		<p>C. Members, fabric, flaps, seams, tabs, material interfaces or vents. Dripping water will not be allowed.</p> <p>D. The HAS shall incorporate water management features designed to mitigate rain water intrusion along the length of the shelter. The shelter is to include an external system engineered to resist water intrusion at the arch assembly joints and the arch/fabric interface.</p> <p>E. The design of the HAS shall be such that no water collects or pools on the exterior surface. Methods used to join shelter fabric sections together shall not compromise the structural integrity of the shelter system or result in leakage of liquids.</p> <p>F. The shelter shall support a minimum threshold of snow load as specified in the QRs. The shelter will support the designated load for a minimum of 36 hours without sustaining damage that would render the shelter unusable or unserviceable.</p>
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**TRIAL DIRECTIVE FOR HIGH ALTITUDE SHELTER**

1.

S.N	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1.	<b>ENVIRONMEN-TAL CONDITIONS</b>	Shelter should be deployable at an altitude of above 15000 ft. (4600 Mtrs)	<p>The trial for erection and deploy ability of High Altitude shelter shall be carried out at post situated above 15000 Ft Ht under command of SHQ (Ldk) or SHQ (SNR)</p> <p>The activity must be hassle free, co-ordinated and without any damage to equipment.</p>	The HAS shall be capable of being set up by a maximum of eight (08) soldiers in 6 working hours ( <b>Wearing ECC &amp;E clothing</b> ) in complete formation including commencing & functioning of all equipments.	
2.	<b>WIND LOAD</b>	Shelter should be able to withstand a wind load of =>150 km/h	<p>The HAS shall remain deployed for 03 days at site as mentioned above.</p> <p>With the test shelter in the fully functional condition and all doors/openings secured, the possibility of damage to equipment because of vibration, It is important to keep equipment securely tied down.</p> <p>Wind Driven Rain resistance test to be Performed by <u>NITRA(Northern India Textile research Association)</u> or any other <u>LAB accredited by NABL</u> .</p>	<p>Inspect for damage to fabric, findings, framing or operational deficiencies.</p> <p>Degradation of material or material interface or operational capability shall constitute failure of this test.</p> <p>Any interference of alien material like ingress of water etc after wind driven rain resistance test shall constitute failure of this test.</p> <p>Visually inspect erected shelter to determine if any water collects or pools on the exterior of the erected test shelter.</p>	

3.	<b>TEMPERATURE</b>	Shelter should be able to operate in temperatures ranging from -50°C to + 40°C.	<p>All the accessories including <b>HAS</b> shall exposed at functional area for 03 days for Temp Test.</p> <p>Temp shall be measured with the help of <b>Hygrometer</b> after 08 Hrs on each day.</p> <p>Data for temp variation shall be recorded by BOO.</p> <p>Water shall be sprayed on HAS for inspection and freezing of Water on HAS/Accessories.</p> <p>Cold Chamber test of Fabric, instrument, electrical appliances shall be executed by <b><u>NITRA(Northern India Textile research Association ) or any other LAB accredited by NABL</u></b></p>	<p>No effects of low temperature conditions on materiel safety, integrity, and performance during storage, operation, and manipulation.</p> <p>Test in accordance with laid down procedure. Following results are expected:-</p> <p>A. No cracking.</p> <p>B. No Hardening and embrittlement of materials.</p> <p>C. No Binding of parts from differential contraction of dissimilar materials and the different rates of expansion of different parts in response to temperature transients.</p> <p>D. No Loss of lubrication and lubricant flow due to increased viscosity.</p> <p>E. No Changes in electronic components (resistors, capacitors, etc.).</p> <p>F. No Changes in performance of transformers and electromechanical components.</p> <p>G. No Stiffening of shock mounts.</p> <p>H. No Cracking and crazing, embrittlement, change in impact strength, and reduced strength.</p> <p>I. No Effects due to condensation and freezing of water in or on the materiel.</p>	
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4.	<b>RAIN</b>	Equal to or more than 1 cm per hour	Test to be conducted by <b>NITRA(Northern India Textile research Association ) or any other LAB accredited by NABL</b>		
5.	<b>SNOW LOAD</b>	Minimum 100 kg/sq. mtr. Load	Test to be conducted by <b>NITRA(Northern India Textile research Association ) or any other LAB accredited by NABL</b>		

## 2. CONSTRUCTION

S.NO.	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1.	<b>DIMENSIONS</b>	Minimum dimensions of the shelter should be 6 m width 9m length and 3 m height. <b>(10 % tolerance may be considered)</b> Shelter should also extendable.	Measure dimension with W & M department certified tapes. Record parameters for W x Hx L from 04 sides of HAS. <b><u>Note: Max Tolerance as prescribed in QRs.</u></b>	The dimension must be as per QRs and under Tolerance .	
2.	<b>BASIC STRUCTURE</b>	Shelter should have a corrosion resistant metal frame free-span type tent with no poles in the centre of the tent.	OEM shall be directed to provide additional HAS for trial of Advance Sample.  Additional sample shall be adjoined with main sample.	1.Capable of being connected by a maximum of four (04) soldiers in 01 working hours in complete formation <b>wearing ECC &amp;E clothing issued to troops.</b>  2. Visually inspect for any gap, de-formation, and alignment. Any violation shall be considered Test Failure.	

	<p>Shelter should have a corrosion resistant metal frame, free-span type tent with no poles in the centre of the tent.</p>	<p>OEM to submit certificate for corrosion resistant metal frame.</p> <p>Visual inspection for free-span type tent with no poles in the centre of the tent.</p> <p>Inspect for alignment and de-formation if any.</p> <p><b>Final inspection by NITRA(Northern India Textile research Association ) or any other LAB accredited by NABL</b></p>	<p>HAS should have a corrosion resistant metal frame (OEM Certification ), free-span type tent with no poles in the centre of the tent.</p> <p>Certificate of corrosion resistant metal frame shall be verified by NITRA after inspection.</p>	
	<p>Each piece of metal frame should be less than 5 Kgs. Wt. for easy transportation and handling.</p>	<p>Measure weight with W &amp; M department certified Weighing machines.</p> <p><b>2.</b> Record weight parameters.</p> <p><b>3.</b> 10 Sample for weight measurement shall be selected with following criteria:-</p> <p>A. 03 sample of metal frame from</p>	<p>Every metal frame sample must not exceed weight limit.</p>	

		<p>central arch.</p> <p>B. 01 sample of metal frame each from front and back door</p> <p>C. 04 metal frame side and adjoining arch/frames.</p> <p><b>Note:</b> Max Tolerance of <math>\pm 10</math> Gm in all weight is accepted.</p>		
	<p>The wall and roof structure of the High altitude shelter should be multi-layered heat insulating material</p>	<p>Visual inspection by BOO .</p> <p>NITRA shall validate OEM claim for multi-layered heat insulating material.</p> <p>OEM must comply Ambient temp as specified in the QRs.</p>	<p>Ambient temp as specified in the QRs must be complied.</p> <p>Failure to comply test shall be considered Test Failure.</p>	
	<p>Shelter anchorage mechanism should be sturdy enough to withstand high velocity winds.</p>	<p>Explained above.</p>	<p>Explained above.</p>	
	<p>Colour of the shelter should match the surroundings to provide adequate camouflage</p>	<p>Visual inspection by BOO. With the help of Binocular 103 A,BOO shall observe</p>	<p>Colour of the shelter should match the surroundings.</p>	

			from a distance of 800 Mtrs the HAS colour match with surrounding or not. Note:-As the area is without vegetation ,user department must intimate colour coding to the OEM		
3.	<b>FOUNDATION</b>	Shelter should have a stable anchorage system, sturdy enough to withstand high wind velocities.	Explained above.	Explained above.	
		Anchorage system should be sufficient to be deployed in loose sandy base as well as rocky bases	Explained above.	Explained above.	
<b>SL.NO.</b>	<b>FEATURES</b>	<b>SPECIFICATIONS</b>	<b>PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS</b>	<b>RESULT EXPECTED / DESIRED</b>	<b>COMPLIED / NOT COMPLIED</b>
4.	<b>WALL STRUCTURE</b>	Shelter must include two zipper entrances, 1 per each of the shelter of appropriate size. Minimum 1x2 m.	Zippers str as claimed by OEM shall be inspected as following :- A. Test of Zippers at CRT Machine at NITRA as per the claim value of OEM. B. The B.O.O shall examine the holding str of STOPS as below:-  A. Check that slider moves beyond stop or not .	Zipper must function well as qualify test. Entries as per QRs.	

			<p>B. To check that zipper to resist failure applied longitudinally to the bottom.</p> <p>C. To check and hold two string of zipper of chain together at the bottom.</p> <p>D. To check for separation resistance.</p> <p>E. To check that remain at place where it left to move further.</p>		
		Shelter walls must include 10 windows. Eight (8) on the main cover and two (2) on the end panel. Size of the windows to be minimum 70 cm to 100 cm.	<p>Visual inspection.</p> <p>Measure dimension with W &amp; M department certified tapes.</p> <p>Record parameters for size of HAS window.</p> <p><b>Note:</b> Max Tolerance of <math>\pm 2</math>mm in all measurement is accepted.</p>	Shelter walls must include 10 windows. 08 on the main cover and 02 on the end panel. Size of the windows to be minimum 70 cm to 100 cm.	
		Walls must have a triple layer construction. outer vinyl material, insulation panel and inner liner material, with a minimum thickness of 12mm.	<p>The thickness of a specimen of triple layer shall be provided by OEM.</p> <p>1.The thickness of a sample is measured as the distance between the ref plate on which the sample rests and a parallel circular pressure foot that exerts</p>		

			<p>a specified pressure on the area under test.</p> <p>2. Determine the thickness by thickness tester under <b><u>IS 7702 Std Test procedure.</u></b></p> <p>3. The thickness shall be measured at 10 points of sample and calculate thickness of sample.</p>		
		Material used in high altitude shelter should be fireproof.	<p>OEM to provide sample of material used for wall fabrication.</p> <p>Provided sample shall be tested on <b><u>Inclined Flammability Tester</u></b>, <b><u>LOI Chamber</u></b> and <b><u>Vertical Flammability Tester</u></b> as per procedure at <b><u>NITRA</u></b>.</p> <p>±</p>	Walls should be fire proof	

Sl. No.	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
5.	ROOF DESIGN	Shelter must include one piece cover design system.	Visual and Physical inspection.	Shelter must include one piece cover system.	
		Roof should be arched and able to withstand snow load, wind load and rain load as mentioned in the specific requirement of the ITBP.	<ol style="list-style-type: none"> <li>1) BOO shall adopt following procedure :-</li> <li>2) Erect a shelter with all doors, flaps and other openings configured for coldweather blackout conditions.</li> <li>3) Perform the test on frozen soil, hard pan dry soil or loose soil conditions.</li> <li>4) Evenly load the entire top surface of the shelter at a minimum of 100 kg/sq m</li> <li>5) Apply the weight gradually and leave in place for an additional 12 hours. Typical user adjustments, such as line tensioning, may be performed as necessary.</li> </ol>	Verify structural integrity and no damage to the shelter as well as any other material used for fabrication of HAS.	

Sl.No.	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
6.	FLOOR STRUCTURE	Shelter should have a light weight, non-ship floor system, which should also be fire retardant.	The weight of structure must Light weight. The procedure for fire retardant explained above.	Shelter should have a light weight, non-slip floor system, which should also be fire retardant	

### 3. HEATING

S.NO	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1.	SPACE HEATING	An ambient temperature of around 25°C should be maintained within the Shelter.	By applying all means ambient temp. of around 25°C must be maintained within the Shelter. Temp recording shall be measured by BOO with the help of Hygrometer.	Temp. of around 25°C should be maintained.  As Explained at procedure.	
		CO <sup>2</sup> build should be maintained at a safe limit.	OEM to provide certificate for CO <sub>2</sub> build-up which should be maintained at a safe limit.		
		Adequate ECU/HVAC/Heater ports and ducts should be included.	Visual and physical inspection.OEM to provide certificate.		
		Heater will be provided to maintain ambient temperature of 25°C	Visual and physical inspection .OEM to provide certificate.		
		Adequate insulation should be provided.	Certificate in this regard shall be submitted by		



## 4. ELECTRICAL SYSTEM

S.N	<u>FEATURES</u>	<u>SPECIFICATIONS</u>	<u>PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS</u>	<u>RESULT EXPECTED / DESIRED</u>	<u>COMPLIED / NOT COMPLIED</u>
1.	<b>ELECTIRICAL CIRCUITING</b>	All electrical circuiting and wiring should be made of material that should not crack when exposed to extreme cold conditions up to -60 <sup>0</sup> Temp.	BOO shall inspect visually and physically for electrical circuiting and wiring.	The electrical circuiting and wiring must sustain under -50 <sup>0</sup>	
		Adequate circuit breakers should be provided to avoid failure of the electrical system.	BOO shall inspect visually and physically about the adequate provision of circuits.	As explained in procedure.	
		Adequate lighting should be provided through shatter proof lamps or LED lights.	BOO shall inspect visually and physically about the adequate provision of LED Lamps.  All lamps must be in working condition.	As explained in procedure.	
		Adequate plugs should be provided for using various electric gadgets like laptops, chargers etc.	BOO shall inspect visually and physically about the provision of 15/5 Amp plugs.	As explained in procedure.	
		Certified power distribution box should be provided.	BOO shall inspect visually and physically about the availability of Certified power distribution box.	As explained in procedure.	
		Alternative power source may be considered.	B O O shall inspect facility for 2 Kv solar powered panel.	Min Generation of solar energy through solar	

				panels must not be less than 1800 Watts.	
		Additionally adequate power cables should be provided to connect to external power system.	Power cable other than attachment must be inspect, counted and recorded by BOO.	As per procedure	
		All electrical systems should be energy efficient.	B O O shall inspect facility for kerosene oil fuelled generator.	Min Generation of kerosene oil fuelled generator must not be less than 1800 Watts.	
			BOO must check that all energy system must conform MIN Bureau of Indian Standards.	All electrical systems should be energy efficient & BIS marked.	

## 5. OTHER FEATURES

S.N	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1.	ADDITIONAL FEATURES	Shelter should include proper ventilation and exhaust for fumes, whenever cooking is done using kerosene.	BOO shall confirm that OEM provided facility for cooking area with sinks, proper ventilation and exhaust for fumes,	The HAS must have following facilities.  A cooking area with sinks Proper ventilation and exhaust for fumes.	
		Adequate fire extinguishers should be provided	BOO shall physically examine ABC type of fire extinguishers, expiry date etc.	Fire extinguishers must be made available in adequate numbers.	

## 6. PRODUCT AVAILABILITY AND SUPPORT

S.NO.	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1.	PRODUCT SUPPORT	Firm must provide after sales services, warrant availability of spares and parts.	Recommended that Tender inviting authority must incorporate 5 Years warranty, Spares ,product support etc .	N/A	
2.	TRAINING	The manufacturer must provide onsite installation training to the designated personnel. The training should include complete knowledge of all operation. Detailed instruction booklet must also be provided in Hindi & English.	Recommended that Tender inviting authority must incorporate that OEM must provide training for safety, maintenance , packing, Ops use of product in 5 Years warranty, Spares ,product support etc .	N/A	
		All tools for the installation of the shelter should be provided to the end user	BOO shall inspect that all tools are provided by OEM as per brochure of product .	Tools must be as per brochure of product .	
3.	WARRANTY	Shelter should have a 5 years warranty.	Explained above	Explained above	

## 7. DOCUMENTATION AND STANDARDIZATION

Sl.No.	Features	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED / NOT COMPLIED
1	GENERAL	The product with all its fitments and accessories should conform to various industry, certification and regulatory norms for a product meant of operation in high altitude > 450m and temperatures form 50°C to +40°C	The BOO shall verify various certificates provided by OEM.	Every certificate must comply as per instructions and functional requirement of force.	

## 8. PACKAGING & MARKING

SL.NO.	FEATURES	SPECIFICATIONS	PROCEDURE SUGGESTED FOR TRIAL FOR BOARD OF OFFICERS	RESULT EXPECTED / DESIRED	COMPLIED/NOT COMPLIED
1.	GENERAL	HAS must be packed in such a way that is its easy to carry men pack, mules & vehicles.	N/A	N/A	
		Packaging material must be ruggedizing and capable to sustain extreme winter and tough transportation.	Product should be packed in such a way that it should be easy to carry on Men Back without hassle as per authorisation load in HAA.	N/A	
		Marking of each and every material should be done in such a way so the erecting and dismantling should be hassle-free.	Explained above	Explained above	