F/No-27/1357(HL)/2013/Tpt/BSF/MHA-Prov-I 1591
Bharat Sarkar/Government of India
Griha Mantralaya/Ministry of Home Affairs
PM Division/Prov.I Desk

26, Man Singh Road, Jaisalmer House
New Delhi, Dated 14th August, 2015

To,

DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

**Subject: QRs and Trial Directive for Hydraulic Ladder.**

Sir,

The QRs and Trial Directives in respect of Hydraulic Ladder as per Annexure have been accepted by the Competent Authority in MHA.

2. The CAPFs concerned will be accountable for correctness of the QRs/Trial Directives.

3. Henceforth, all the CAPFs should procure the above item required by them strictly as per the laid down Technical Specifications/QRs.

Yours faithfully,

Issued 17/8/2015

Encl: as above

(Manohar N. Sukole)
Under Secretary to the Govt. of India
Tel: 23381278

Copy forwarded for necessary action to :-

SO (IT), MHA : It is requested to host the QRs and Trial Directives (soft copy attached) on the MHA website (under the page of Organizational Set up- Police Modernization Division- Qualitative Requirement under Vehicle Equipments.

(R. K. Soni)
Section Officer (Prov-I)

Copy to: DDG (Procurement), MHA.

O/C

Appendix-'C'

## TECHNICAL SPECIFICATIONS/ QR'S FOR HYDRAULIC LADDER

| S/No | Specification | Recommended QRs |
|---|---|---|
| A | **PERFORMANCE SPECIFICATIONS OF HYDRAULIC LADDER** | |
| | **PERFORMANCE/ APPLICATION** | The **hydraulic ladder** will consist of hydraulically operated elevating platform (Cabin) mounted on diesel driven Engine truck chassis with heavy duty steel structure and construction. Working height of the hydraulically operated elevating platform shall be 11 meter. The elevating platform will be articulation/telescopic type and can be stopped at a desired height. The action of the beam shall be controlled with operation by hydraulic device. The complete unit shall be fully equipped with hydraulic outriggers 4 points to stabilize the unit during operation The hydraulic platform should be able to stop at any height between 2 meters to minimum 11 meters. The unit shall also include all necessary accessories & control devices to ensure maximum manoeuvrability and safety of operation. |
| B | **TECHNICAL SPECIFICATION OF VEHICLE UNIT** | |
| 1 | **ENGINE** | Water cooled, turbo charged diesel engine of any reputed make conforming to ARAI / BIS / BS / SAE standards.<br>(i) Power :- Not less than 115 HP |
| 2 | **TRANSMISSION.** | Manually operated, minimum 4 Forward 1 reverse, with 4WD, (Synchromesh on forward and constant mesh on reverse gear). |
| 3 | **SUSPENSION.** | Semi elliptic leaf spring with double acting shock absorbers on front and leaf spring on rear. |
| 4 | **CLUTCH** | Single dry plate hydraulically operated and pneumatically assisted. |
| 5 | **BRAKES** | Service - Dual circuit hydraulic /pneumatic/ vacuum assisted. Parking brake should be Compatible with service brake. |
| 6 | **TYRES.** | Vehicle should be fitted with modern sand cum highway tyres of 16 PR of reputed make. Spare wheel/ tyre be provided with the vehicle. |
| 7 | **MINIMUM GROUND CLEARANCE** | 230 mm |

PO : 19/4/16 M-1 AR M-2 _____ M-3: 19/4/16 M-4: _____ M-5 : _____ M-6 : _____

Accepted M-1 19/4/16 Craft/M-2 19/4/16

| | | |
|---|---|---|
| 8 | ELECTRICAL SYSTEM | 12/24 Volts. |
| 9 | BATTERY | The battery should be maintenance free, of reputed make of 12/ 24 Volts with 125-135 Amph. |
| 10 | GRADIENT | Not less than 20 degree |
| 11 | SIDE SLOPE CAPABILITY | Not Less than 15° |
| 12 | STEERING SYSTEM | Right hand Power steering. |
| 13 | CABIN | Full forward, Tilted for better access. Provision of cabin light should be available. |
| 14 | LIGHTS | The vehicle should be fitted with necessary lights as per CMVR norms. |
| 15 | INSTRUMENT PANEL | Vehicle should be provided with all gauges for various lights, oils, temperature etc. |

PO : M-1 M-2 M-3: M-4: M-5 : M-6 :

Co-opted-M-1 Co-opted M-2

| C | TECHNICAL SPECIFICATION OF HYDRAULIC LADDER | |
|---|---|---|
| 16 | **WORKING HEIGHT** | The minimum working height of the hydraulic platform should be 11m. The working height shall be calculated as the vertical distance from ground level to bottom of cage plus 1.5m |
| 17 | **OPERATION OF HYDRAULIC PLATFORM** | Power for the hydraulic platform shall be provided by a hydraulic pump driven from engine power take off unit only. The pump shall be of ample and sufficient output for normal smooth operation of the platform with *not less than 1500 rpm*. Hydraulic reservoir shall be provided and hydraulic circuit shall be fully protected by efficient filters. Pump and motor shall be of reputed make such as Dowty, Boss, Vickers, Danfoss, Eaton or better make. |
| 18 | **HYDRAULIC HOSES** | The hydraulic hoses shall be located in such a way that they do not interfere with the movement of the platform, booms etc. Make of hoses offered shall be Dunlop/Swastik/Superseal/Rattan Hose/Hyflex or better. The hoses should withstand temp of 0 degree Celsius to 70 degree Celsius. |
| 19 | **STRUCTURE** | The booms shall be made from high strength low alloy steel. Telescopic boom sections shall be rigid, reinforced box section. All fabricated sections shall be rust inhibited from the inside while the exterior surfaces shall be pre-treated and finished to give a glossy look. |
| 20 | **STABILIZERS/ OUTRIGGERS** | Four H-type stabilizers (horizontal in/out and vertical up/down), hydraulically powered, shall be provided. Each of the stabilizers shall be operated independently, to allow levelling on uneven ground. Suitable level indicators shall be provided to check the level, both along the length as well as along the width of the chassis/vehicle.<br><br>When stowed, no part of the stabilizers shall protrude beyond the chassis<br><br>Suitable interlocks shall be provided to ensure that the stabilizers cannot be retracted until platform booms are stowed and also to ensure that booms cannot be operated until stabilizers are deployed.<br><br>A single push button electronic vehicle auto-levelling system shall be provided to level vehicle accurately before the booms are operated. |
| 21 | **HYDRAULIC** | All platform motions are to be performed either by double acting hydraulic cylinders or hydraulic motors with automatic brake. |

PO : M-1 M-2 M-3: M-4 M-5 : M-6 :

| | | |
|---|---|---|
| | CYLINDERS | The cylinder tubes shall be of ST52, cold drawn seamless tubes conforming to DIN 2391, having H8 tolerance and surface roughness Ra0.2 microns<br>The piston rods shall be of CK45, hard chrome plated and ground steel rods having minimum 20 microns hard chrome plating and surface roughness Ra0.2 microns and corrosion resistance NSS ISO 3768 & ASS/ISO3769<br>Piston glands shall be from EN8<br>All Seals shall be of high quality / reputed make.<br>Hoses shall be tested to twice rated pressure and the bursting pressure shall be at least four times the rated pressure. Test certificate shall be provided by the manufacturer. |
| 22 | **SLEWING** | The platform shall be designed for continuous and unlimited slewing by a high torque, low speed motor, through reduction gear box endlessly in either direction – continuous, unlimited. Slewing speed shall be precisely controlled by using fine restrictors in the circuit.<br>The slewing range should be totally restricted by default and thereafter permitted only on the side where the stabilizer/s has been extended fully horizontally, to ensure stability. |
| 23 | **PERSONNEL CAGE** | A special designed Cabin made of stainless steel of size 1.1x0.7x1.1M approx. shall be provided. All attachment points shall be bonded to withstand most arduous use. The non-slip floor with drain holes shall be provided to give the operator safe working condition. ***The cage shall be insulated to 440 volts as a security measure against electric shock. Hoses/ links etc. need not to be insulated mandatorily***. The basket shall be designed to carry a safe working load of 250 kgs. The hydraulic platform design shall be such that entry and exit into/from cage should be easy. Test certificate for cage insulation shall be provided.<br>The cage shall be provided with high quality/ laminated viewing glass and a fan.<br>***The bullet proofing of cage/ personnel cabin with suitable light weight composite material shall be catered for by the manufacturer on the request of the indenting sectors.*** Provision of hatch shall be made on the roof of the cage.<br>The protection of cage is as given under :-<br>For steel and glass 7.62 x 51mm ball/NATO FMJ, Bullet Weight 9.4 to 9.6 gm, Reference velocity 838 ± 15 m/s. Nos of shots for Steel/Composite Material-6 and Glass-3.<br>Normal cage may be built with any material either FRP or aluminium guardrails etc. |
| 24 | **CAGE** | The cage shall be level in all positions, achieved through a hydraulic cum mechanical levelling system. In addition to the cage |

| | | |
|---|---|---|
| | VELLING | levelling mechanism, independent controls shall be provided in the cage, to enable operator to adjust the cage level, if so required. |
| 25 | BUCKET VAN/ PLATFORM CONTROLS | The hydraulic controls for all functions (except outriggers) shall be in cage. All control levers shall be self-centring and hooded for protection against accidental operations. A hand pump permitting lowering of the boom shall be provided at the base in case of vehicle engine/electrical system failure. The stabilizer controls shall be provided only at base, at rear of vehicle. |
| 26 | SAFETY DEVICES | The hydraulic platform shall be incorporated with special over centre valves in the hydraulic circuit to ensure that all boom movements are accurate and precise. In addition, these valves shall safeguard the operator in the event of hydraulic hose failure or engine/electrical system failure or leakage, by preventing creeping or collapsing of boom.<br>Pilot operated lock valves shall be incorporated in the stabilizer hydraulics, to prevent sinking of stabilizers while in operation. |
| 27 | SAFETY FEATURES | (a) Automatic stops to prevent platform from reaching unstable areas of operation (if applicable) |
| | | (b) Interlocks to ensure that stabilizers are not retractable as long as boom is in elevated position. |
| | | (c) Another interlock to ensure that boom cannot be operated unless stabilizers are deployed |
| | | (d) Lock valves provided on all load bearing cylinders (over-centre valves on main lift and telescopic cylinder) to ensure that there is no mishap/boom/outrigger collapse in the event of hose failure. |
| | | (e) Automatic oil pressure overload protection through pressure relief valve. |
| | | (f) Cage insulated to 440 V against electric shocks. |
| | | (g) Relief valve/ oil bye-pass system to bring down main boom, in event of hose failure during operation. |
| | | (h) Hand operated pump to stow the platform in case of main pump/engine failure. |
| | | (j) Safety harness anchorage points for 2-persons at cage with the safety harnesses. |
| | | (k) Slew restriction: Slew movement is automatically prohibited on side where outriggers have not been fully extended fully horizontally to ensure stability. |
| | | (l) Cage overload protection – Digital cage load indicator with alarm in case of bucket overload |
| | | (m) Hydraulic system overload protection through pressure relief valve |
| | | (n) Independent cage slew of $\pm 45^0$ to align cage as required. |
| | | (o) Electronic vehicle auto-levelling system (with 4 nos. outriggers) |
| | | (p) Emergency stop control |

PO : M-1 M-2 M-3: M-4: M-5 : M-6 :

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|---|---|---|
| 28 | **PUBLICATION** | The following publications need to be provided both as hard copies and e-copies:- |
| | | (a) User Hand Book (Bilingual Hindi and English) |
| | | (b) Technical service manual. |
| | | (c) Spare Parts List. |
| | | (d) List of spares tools and accessories |
| | | (e) Repair and Maintenance manual of hydraulic platform. |
| 29 | **GUARANTEE/ WARRANTY** | 02 year guarantee / warranty shall be provided on complete unit, including hydraulic platform. |

Approved / Not Approved

K. L. SUMAN
(D. K. PATHAK, IPS)
DG, BSF

PO : 17/4/19 M-1 M-2 M-3: 17/4/19 M-4: M-5 : M-6 :

6

**Appendix 'D'**

# TRIAL DIRECTIVE FOR HYDRAULIC LADDER

Date of Trial .....
Time of Trial .....
Place of Trial.....
GR of Trial Area..... (Clear/cloudy/Partially cloudy/Hot and Humid/rainy/Foggy and Humid/Soft Snow or Hard Ice)

Temperature.....
Altitude.....
Weather Condition.....

| A. | PERFORMANCE SPECIFICATIONS OF HYDRAULIC LADDER | | | |
|---|---|---|---|---|
| Srl | **Specification** | **Parameter** | **Procedure Suggested for Trial** | **Result expected/desired** |
| 1. | PERFORMANCE/ APPLICATION | The **hydraulic ladder** will consist of hydraulically operated elevating platform (Cabin) mounted on diesel driven Engine truck chassis with heavy duty steel structure and construction. Working height of the hydraulically operated elevating platform shall be 11 meter. The elevating platform will be articulation/telescopic type and can be stopped at a desired height. The action of the beam shall be controlled with operation by hydraulic device. The complete unit shall be fully equipped with hydraulic outriggers 4 points to stabilize the unit during operation The hydraulic platform should be able to stop at any height between 2 meters to minimum 11 meters. The unit shall also include all necessary accessories & control devices to ensure maximum manoeuvrability and safety of operation | To be checked physically. | As per parameter. |

M-1 M-2 M-3 M-4 M-5 M-6

Co-opted M-1 Co-opted M-2

| B. | TECHNICAL SPECIFICATION OF VEHICLE UNIT | | | |
|---|---|---|---|---|
| 2. | ENGINE | Water cooled, turbo charged diesel engine of any reputed make conforming to ARAI / BIS / BS / SAE standards.<br>(i) Power :- Not less than 115 HP | Certificates provided by the manufacturer. | It should be as per specification mentioned in the QRs |
| 3 | TRANSMISSION. | Manually operated, minimum 4 Forward 1 reverse, with 4WD, (Synchromesh on forward and constant mesh on reverse gear). | The vehicle will be physically driven in all the rears including reverse gear. | The vehicle should be able to move in all the gears including the reverse gear. The 4WD should engage properly. |
| 4 | SUSPENSION. | Semi elliptic leaf spring with double acting shock absorbers on front & rear | As per the certificates provided by the manufacturer. | It should be as per specification mentioned in the QRs |
| 5 | CLUTCH | Single dry plate hydraulically operated and pneumatically assisted. | As per the certificates provided by the manufacturer | It should be as per specification mentioned in the QRs |
| 6 | BRAKES | Service - Dual circuit hydraulic /pneumatic/ vacuum assisted. Parking brake should be compatible to the service break. | The service brakes shall be applied on moving vehicle. The parking brake shall be applied on the vehicle parked on a slope. | The vehicle should stop properly and smoothly. The parking brake shall be able to stop the vehicle on the slope. |
| 7 | TYRES. | Vehicle should be fitted with modern tyres of 16 PR of reputed make. Spare wheel/ tyre be provided with the vehicle. | The PR of tyres will be physically checked by the BOO and the manufacturer shall provide certificates in this regard. | It should be as per specification mentioned in the QRs |
| 8 | MINIMUM GROUND | 230 mm | The ground clearance | It should not be less than |

| | | | | |
|---|---|---|---|---|
| | CLEARANCE | | will be measured physically | 250 mm |
| 9 | ELECTRICAL SYSTEM | 12/24 Volts. | As per the Certificates to be provided by the firm | It should be as per specification mentioned in the QRs |
| 10 .. | BATTERY | The battery should be maintenance free, of reputed make of 12/ 24 Volts with required Ah. | As per the Certificates to be provided by the firm | It should be as per specification mentioned in the QRs |
| 11 | GRADIENT | Not less than 20 degree | The vehicle shall be physically operated on a slope having required gradient. ( With ladder stowed) | The vehicle shall be able to negotiate the gradient smoothly. |
| 12 | SIDE SLOPE CAPABILITY | Not Less than 15° | The vehicle shall be physically operated on a side slope ( With ladder stowed) | The vehicle shall be able to negotiate the slope smoothly. |
| 13 | STEERING SYSTEM | Right hand Power steering. | The vehicle will be driven and turned right and left. | The driver should be able to turn the vehicle right and left easily |
| 14 | LIGHTS | The vehicle should be fitted with necessary lights as per traffic norms. | To be checked physically | It should be as per specification mentioned in the QRs |
| 15 | INSTRUMENT PANEL | Vehicle should be provided with all gauges for various lights, oils, temperature etc. | To be checked physically | All the gauges/ instruments/ devices should be in excellent working condition. |
| 16 .. | CABIN | Full forward, Tilted. Provision of cabin light should be available. | As per the certificate provided by the firm and to be checked physically by the BOO | It should be as per specification mentioned in the QRs |

M-1 AR M-2 M-4 M-5 M-6

Corrected M-1 M-2

| C. | TECHNICAL SPECIFICATION OF HYDRAULIC LADDER | | | |
|---|---|---|---|---|
| 1. | WORKING HEIGHT | The minimum working height of the hydraulic platform should be 11m. The working height shall be calculated as the vertical distance from ground level to bottom of cage plus 1.5m | The Hydraulic ladder shall be operated on field. The height will be calculated from the top of hydraulic platform | It should attain the height of minimum 11 meters from the ground. |
| 2. | POWER SUPPLY | Power for the hydraulic platform shall be provided by a hydraulic pump driven from chassis power take off unit only. The pump shall be of ample and sufficient output for normal smooth operation of the platform with not less than 1500 rpm. | The pump shall be driven physically. The firm should furnish certificates | It should be as per specification mentioned in the QRs |
| 3. | HYDRAULIC HOSES | The hydraulic hoses shall be located in such a way that they do not interfere with the movement of the platform, booms etc. Make of hoses offered shall be Dunlop/Swastik/ Superseal/Rattan Hose/Hyflex or better. The hoses should withstand temp of 0 degree Celsius to 70 degree Celsius. | The boom of the ladder platform shall be operated vertically/ horizontally physically | It should meet the desired parameter. |
| 4. | STRUCTURE | The booms shall be made from MS structural steel of good quality. Telescopic boom (as offered) sections shall be rigid, reinforced box section. All fabricated sections shall be rust inhibited from the inside while the exterior surfaces shall be pre-treated and finished to give a glossy look. | Certificates to be provided by the firm | It should be as per specification mentioned in the QRs |

PO 12/12/17 M-1 AR M-2 M-3 12/12/17 M-4 M-5 M-6

Co-opted M-1 12/12/17 Cmdt M-2

| | | | | |
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| 5. | STABILIZERS/OUTRIGGERS | Four H-type stabilizers (horizontal in/out and vertical up/down), hydraulically powered, shall be provided. Each of the stabilizers shall be operated independently, to allow levelling on uneven ground. Suitable level indicators shall be provided to check the level, both along the length as well as along the width of the chassis/vehicle.<br><br>When stowed, no part of the stabilizers shall protrude beyond the chassis<br><br>Suitable interlocks shall be provided to ensure that the stabilizers cannot be retracted until platform booms are stowed and also to ensure that booms cannot be operated until stabilizers are deployed.<br><br>A single push button electronic vehicle auto-levelling system shall be provided to level vehicle accurately before the booms are operated. | Stabilizers/ triggers shall be checked physically. | It should be as per specification mentioned in the QRs |
| 6. | HYDRAULIC CYLINDERS | Certificates to be provided by the manufacturer | | |
| 7. | SLEWING | The platform shall be designed for continuous and unlimited slewing by a high torque, low speed motor, through reduction gear box endlessly in either direction – continuous, unlimited. Slewing speed shall be precisely controlled by using fine restrictors in the circuit. | The boom of the ladder shall be rotated continuously beyond 360 degree. | The boom should be able to rotate beyond 360 degree continuously. |

M-1 M-2 M-3 M-4 M-5 M-6

Accepted M-1 Complied M-2

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|---|---|---|---|---|
| 8. | PERSONNEL CAGE | A special designed Cabin made of stainless steel of size 1.1x0.7x1.1M approx. shall be provided. All attachment points shall be bonded to withstand most arduous use. The non-slip floor with drain holes shall be provided to give the operator safe working condition. ***The cage shall be insulated to 440 volts as a security measure against electric shock. Hoses/ links etc. need not to be insulated mandatorily***. The basket shall be designed to carry a safe working load of 250 kgs. The hydraulic platform design shall be such that entry and exit into/from cage should be easy. Test certificate for cage insulation shall be provided.<br>The cage shall be provided with high quality/ laminated viewing glass and a fan.<br>***The bullet proofing of cage/ personnel cabin with suitable light weight composite material shall be catered for by the manufacturer on the request of the indenting sectors***. Provision of hatch shall be made on the roof of the cage.<br>The protection of cage is as given under :-<br>For steel and glass 7.62 x 51mm ball/NATO FMJ, Bullet Weight 9.4 to 9.6 gm, Reference velocity 838 ± 15 m/s. Nos of shots for Steel/Composite Material-6 and Glass-3. | The dimensions of the cabin shall be measured physically and certificates shall be provided by the firm. It should be as per specification mentioned in the QRs | It should be as per specification mentioned in the QRs.<br>Certificate to be produced by the OEM wherever physical checking is not possible. (Electric shock and ballistic protection). |

PC 19/11/24 M-1 NR M-2 M-3 19/11/24 M-4 M-5 M-6

Accepted — M-1 19/11/24 Accepted M-2 19/11/24

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| | | Normal cage may be built with any material either FRP or aluminium guardrails etc. | | |
| 9. | CAGE LEVELLING | The cage shall be level in all positions, achieved through a hydraulic cum mechanical levelling system. | The levelling of the cage will be checked at the maximum height in all the positions. | The cage shall be able to attain horizontal/ vertical levelling |
| 10. | SAFETY DEVICES AND FEATURES | As per the details specified in the QRs | All the safety devices and features mentioned in the QRs shall be checked physically | It should be as per specification mentioned in the QRs |

M-1 NR M-2 M-3 M-4 M-5 M-6

Co opted M-1 Co opted M-2

Approved / Not Approved

K.K. SHARMA

(D.K. PATHAK, IPS)

DG BSF