

times. After the test, no traces of loosening of the hinge from the walls of the housing, no cracking of the walls, no bending of the hinges or breaking away of the handle shall be observed.

(ii) **Method for Moulded type fixed handles:-** Allow the battery to hang on both the handles with vertical load of 3 times of its filled weight for 2 hours (minimum) No cracks or breaking of the of the handles should be observed after completion of Test.

15.8 Charge Acceptance

The charge acceptance is tested on a new battery not subjected to any test under the following conditions, and the current value measured after an interval of 10 min from commencement of charging.

(a)	State of battery before test	The battery is charged in accordance with charging procedure (Para 3.3 & 3.5). It is then discharged at the 5-h discharge rate for 2.5 h at an electrolyte temperature of 20 to 35 ° C. It is then allowed to stand at an ambient temperature of 0 ± 2 ° C for not less than 12 h.
(b)	Temperature of electrolyte at commencement of charging	0 ± 2 °C
(c)	Charging voltage at battery terminals	14.4 ± 0.1 V

Requirement:

The battery shall meet the minimum requirement in Table IX.

15.9. Air Pressure test: The seal of each cell of the battery shall be checked by compressed air as a pressure equal to 70cm of water. The volume of the tubes and auxiliary parts in connection with the cell under pressure shall not exceed 0.5 liter. Air pressure in the cell shall be noted 15 seconds after the supply has been disconnected. At the end of 15 seconds the level of water in the manometer connected to the cell shall not fall below 67 cm. The air pressure test shall be carried out in dry uncharged condition.

OR

On line Air Pressure Test can be carried out at a pressure of 250 cm water column for 3- 4 second. Drop allowed is Maximum 5 -10 cm.

15.10 Life Cycle Test

15.10.1 The life cycle test is carried out on a battery, which has passed the test of 15.5&15.6.

(a) Throughout the test and during the checking discharges, the battery shall be

- kept at an ambient temperature (in a water bath or environmental test chamber) of 40 – 45 ° C.
- (b) The battery shall be subjected to a series of discharges and charges as in Table VIII.
- (c) During the test, at the 25th, 50th, 75th and every 25th cycle thereafter, a continuous discharge shall be made at the current mentioned in Table VIII. Srl No. (i) Until the terminal voltage drops down to 10.20 V and 5.1V for 6V and the duration measured.
- (d) The test is terminated when the capacity obtained as the product of discharge time (at 40 to 45 °C ambient) and the discharge current falls to 50 percent or less of the 5-h capacity in **Table XII** and does not increase again.
- (e) After every checking discharge (c) the battery shall be recharged at the appropriate current in **Table VIII**, Srl No. (ii) Until the specific gravity (corrected to 27 ° C) and terminal voltage is constant for 3 consecutive 30 min readings.
- (f) Throughout the test, the level of electrolyte shall be maintained at the specified level by topping up with pure water/distilled water. Topping up should be done during the charging portion of cycles. The battery shall not be topped up immediately before the checking discharges (c).

Requirement: The battery shall meet the minimum requirements as given in Table IX.

Table VIII
Life Cycle Test (Clause 15.10)

Srl No.	Requirement	Battery Type		
		High Current	Medium Current	Low Current
		12 V 88 AH 12 V 100 AH 12 V 120 AH 12 V 130 AH 12 V 135 AH 12 V 150 AH 12 V 180 AH 12 V 200 AH 6 V 120 AH 6V 150 AH 6 V 150 AH 2A	12 V 35 AH 12 V 45 AH 12 V 55 AH 12 V 60 AH 12 V 70 AH 12 V 92AH 6V 90 AH	12 V 32 AH 12 V 20 AH 6 V 12 AH
(1)	(2)	(3)	(4)	(5)
(i)	Discharge at 1 h at current	40A	20A	10A
(ii)	Charge for 5 h at current	10A	5A	2.5A

Note: Each discharge and charge make one cycle.

Table IX
Electrical Performances
(Clauses 15.6.1, 15.6.3, 15.8, 15.10 and 15.12)

Bty Type	Discharge Current A	5 to 7 Sec Voltage V	30 sec voltage V	Duration Min	No of endurance cycles	Overcharge endurance units	Charge acceptance
12 V 20 AH	60	8.4	--	2.0	165	4	3
12 V 32 AH	150	8.9	--	2.5	275	3	3
12 V 35 AH	150	9.5	--	3.5	250	4	3.5
12 V 45 AH	300	8.6	--	2.0	300	6	4.5
12 V 55 AH	300	7.8	--	1.9	315	7	4.5
12 V 60 AH@C ₂₀	300	7.8	--	1.9	315	7	6
12 V 60 AH@C ₅	300	--	8.7	3.3	375	10	7.5
12 V 70 AH	300	--	8.2	2.8	315	9	7
12 V 88 AH	500	--	8.2	2.6	485	7	11
12 V 92 AH	300	--	8.8	4.0	415	5	10
12 V 100 AH	300	--	8.8	4.0	415	5	10
12 V 120 AH	500	--	8.6	3.6	600	9	15
12 V 130 AH	500	--	8.8	2.6	525	8	12
12 V 135 AH	500	--	9.0	3.3	525	9	13.5
12 V 150 AH	500	--	8.6	3.6	600	9	15
12 V 180 AH	500	--	8.9	4.8	700	11	18
12 V 200 AH	500	--	9.0	5.6	785	13	20
6 V 12 AH	36	4.5	--	3.5	165	4	2.5
6V 90AH	270	4.5	--	3.5	165	4	2.5
6 V 120 AH	360	4.5	--	3.5	165	4	2.5
6 V 150 AH	450	4.5	--	3.5	165	4	2.5
6 V 150 AH 2A	450	4.5	--	3.5	165	4	2.5

15.11 Vibration Resistance

15.11.1 The resistance to vibration is conducted on a fully charged battery after it has passed a capacity test (15.5). The battery is tested under the following conditions:-

- (a) Discharge current during vibration = 0.2 C₅ amperes.
- (b) Direction of vibration = vertical simple harmonic motion.
- (c) Peak to peak amplitude = 2.3 to 2.5mm.
- (d) Acceleration = 3g (29.4 m/s²)
- (e) Duration of vibration = 2h.

OR

15.11.2. The test shall be performed in accordance with IS 9000(Part 8): 1981. The Samples shall be first tested for capacity test at 20-h rate before putting into vibration test. The test consists of vibrating the batteries at a frequency of 16 Hz with a total displacement of 5 mm for a period of 2 h. During vibration the batteries shall be discharged at the 20-h rate.

15.11.3 Requirement

There shall be no abnormality or sudden drop in voltage or spillage of electrolyte exhibited by the battery during the test.

15.12 Overcharge Endurance

15.12.1 The overcharge endurance test is conducted on a battery, which has passed the test of 15.5 and 15.6.1 and has been fully charged:

- (a) Throughout the test the battery shall be kept at an ambient temperature (in a water bath or environmental test chamber of 40 to 45 ° C).
- (b) The battery shall be charged at the appropriate current given in Table X for a period of 110 h.
- (c) The battery is then allowed to stand for 48hrs on open circuit after (b).
- (d) At the end of the 48 hrs open circuit stand as per (c), the battery is discharged at the appropriate current in Table X Srl No. (ii) for 30 seconds.
- (e) The procedure (b), (c) and (d) constitute one overcharge endurance cycle. Immediately after (d), the battery shall be subjected to the next cycle of overcharge without recharging.
- (f) When the terminal voltage of the battery reaches down to 7.20 V before 30 S in the test (d), the overcharge endurance test is terminated and the battery is deemed to have reached the end of its overcharge endurance.
- (g) During the test the battery shall be periodically topped up with pure water to maintain the correct electrolyte level.

Table X**Overcharge Endurance Test
(Clause 15.12)**

S. No.	Requirement	Battery Type		
		High Current	Medium Current	Low Current
		12 V 88 AH 12 V 100 AH 12 V 120 AH 12 V 130 AH 12 V 135 AH 12 V 150 AH 12 V 180 AH 12 V 200 AH 6 V 120 AH 6 V 150 AH 6 V 150 AH 2A	12 V 35 AH 12 V 45 AH 12 V 55 AH 12 V 60 AH 12 V 70 AH 12 V 92AH 6 V 90 AH	12 V 32 AH 12 V 20 AH 6 V 12 AH
(1)	(2)	(3)	(4)	(5)
(i)	Charging current (110 h)	9A	4.5A	2.25A
(ii)	Discharge test current to 7.20 V	250A	150A	75A

15.12.2 Requirement

The battery shall meet the number of overcharge endurance cycles specified in Table IX, the number excluding the last cycle in which the discharge duration was less than 30 seconds.

15.13 Strength of Terminal(Applicable above 20 Ah).

15.13.1 Fitting suitable adapters to the positive and negative terminals and applying a torque to the adopter by means of a torque wrench in the direction of rotation test the strength of terminal.

The torque applied shall be as follows:-

- (a) 11.8 Nm for small terminals
- (b) 14.7 Nm for standard terminals.

15.13.2 Requirement

The battery terminals shall withstand the torque applied without breaking off or exhibiting any abnormality.

15.14 Robustness to Fastening (Applicable above 20 Ah).

15.14.1 The robustness to fastening is tested under the following conditions:

- (a) Fastening is made at ambient temperature,
- (b) During the test the temperature shall be kept between 60 to 65 ° C, and
- (c) The duration of test is 5 h after fastening. During this period and after test the state of the battery is examined.

The battery is fastened vertically, diagonally or horizontally in accordance with the method given in Table XI.

Table XI
Fastening Condition
(Clause 15.14)

Battery Type	Fastening Method	Fastening Load per One Bolt
12 V 32 AH, 12 V 35AH 12 V 45 AH, 12 V 55 AH 12 V 60 AH, 12 V 70 AH	Vertical or Horizontal	980 N
12 V 88 AH, 12 V 92 AH 12 V 100AH, 12 V 120 AH 12 V 130 AH, 12 V135 AH 12 V 150 AH, 12 V 180 AH, 12V 200 AH	Diagonal or Horizontal	1960 N

15.14.2 Requirement

There shall be no visual deformation in the battery during the test.

15.15 Retention of charge test:

The battery shall be fully charged at normal rate specified by the Supplier, and the level and specific gravity of the electrolyte in each cell shall then be adjusted, if necessary. The battery shall then be subjected to two consecutive capacity tests, the initial capacity C being calculated as the mean of the two results obtained. After a complete recharge and cleaning of electrolyte from its surface, the batteries are stored for a period of 28 days without disturbance at a temperature of 20 ° C to 30 ° C. The terminal voltage, specific gravity and the temperature of electrolyte in the cells will be checked once a day during this period and recorded.

15.15.1 After 28 days storage the batteries must be subjected to capacity test. The value of the capacity measured after storage is denoted by C1. The loss of capacity 'S' expressed as percentage is calculated from the following formula

$$S = \frac{C-C1}{C} \times 100 \text{ percent}$$

The loss of capacity shall not exceed 20 %

15.16 Electrolyte Retention Test:

Test for electrolyte retention will be made under the following condition:

The electrolyte will be adjusted to the level stated in the instruction card attached to the battery at the end of a discharge at 5h rate as relevant. The vent plugs will be firmly placed on the vent holes. The battery will then be charged at the normal rate recommended by the Manufacture/Supplier.

15.16.1 The escape of electrolyte shall not occur during the following tests:

When the battery is tilted through 45° in a plane normal to its major length and so held for 20 seconds

When the battery is tilted through 45° in a plane normal to its minor length and so held for 30 seconds

15.17 High Voltage Test(Applicable above 20 Ah): An AC Voltage of 8KV applied for a period of 1 minute between one terminal of the battery and the outer container of the battery. There shall be no breakdown.

16.1 Reserve Capacity

The reserve capacity is the period of time obtained in minutes for which a fully charged battery can maintain a discharge current of 25A to a cut-off voltage of 10.5 V at a temperature of 25 ± 2 °C.

Reserve capacity test may be conducted on a battery, which has passed the tests under 15.5 and 15.6. The test conditions to be maintained are those given under the clause 15.5 (a), (d) and (e).

16.2 Cranking Performance Test at -18°C

The cold cranking performance is the discharge current in amperes, to be declared by the Supplier/manufacturer, which a battery can deliver at -18°C depending upon any one of the criteria define below:

- (i) For 60 s to a cut-off voltage of 8.4 V.
- (ii) For 30 s to a cut-off voltage of 9.0 V.

The Supplier declares cold cranking amperes conforming to any one of the above criteria.

The cold cranking at -18°C may be conducted on a battery which has passed the requirements under 15.5 and 15.6. The battery under test shall comply with the following conditions.

- (a) The fully charged battery shall stand for stabilization for a minimum period of 20h
- (b) Temperature of electrolyte at start of discharge shall be $-18 \pm 1^{\circ}\text{C}$.

- (c) The battery shall be discharged at the current specified by the Supplier/manufacturer against its type either within or outside the cooling chamber within two minutes after the end of cooling period. During discharge the terminal voltage shall be recorded after every 15 s.

Cranking Performance Test at $-29\pm 1^{\circ}\text{C}$ (Optional Test)

The cold cranking performance is the discharge current in amperes, **to be declared by the Supplier/manufacturer**, which a battery can deliver at $-29\pm 1^{\circ}\text{C}$ depending upon both of the criteria defined below:

- (i) After 10 S cut-off Voltage ≥ 7.5 V.
(ii) After 30 S cut-off Voltage ≥ 7.2 V.

The cold cranking at $-29\pm 1^{\circ}\text{C}$ may be conducted on a battery which has passed the requirements under 15.5 and 15.6. The battery under test shall comply with the following conditions.

- (a) The fully charged battery shall stand for stabilization for a minimum period of 24h
(b) Temperature of electrolyte at start of discharge shall be $-29\pm 1^{\circ}\text{C}$.
(c) The battery shall then be discharged either within or outside the cooling chamber within two minutes after the end of cooling period with a current declared by the Supplier/manufacturer. This current shall be kept constant to within $\pm 0.5\%$ during the discharge.

16.3 Water Consumption Test.

- (a) The battery after being charged shall be cleaned dried and weighed the mass of battery (**W1**) to an accuracy of $\pm 0.05\%$ or better.
- (b) The battery shall be placed in a water-bath maintained at a temperature of $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$. The water surface shall be 15 mm to 25 mm below the upper surface of the battery. If several batteries are in the same water bath then the distance between them and also the distance to the walls of the bath shall be at least 25 mm.
- (c) Charge the 12 V battery with constant voltage of $14.4\text{V} \pm 0.05$ V and 6 V battery with constant voltage of 7.2 ± 0.05 V (measured across the battery terminals) for a period of 500 h.
- (d) Immediately after this overcharging, clean and dry the surface of the battery, and weigh the battery mass (**W2**) using the balance the same in para (a) above.

(e) Water consumption shall be not more than 4 g/Ah and calculated as follows:-

$$\frac{(W_1 - W_2)}{1.2429 C_{r,e}^{0.8455}} \quad \text{g/Ah}$$

$$C_{r,e} = t [1 - 0.009(T - 25)] \quad (\text{min})$$

Where,

$C_{r,e}$: effective reserve capacity (min)

t : duration of discharging (min)

T : electrolyte temperature ($^{\circ}\text{C}$)

16.4 SPECIAL TESTS FOR KOLOS TATRA (12 V 200 AH @ 20 hr rate)

16.4.1 HRD TEST AT ROOM TEMPERATURE

The fully charged batteries will be subjected to HRD test as per sequence below at room temperature as specified below and the battery should meet the requirement.

Discharge current	Time	Terminal voltage
1350 A	10 Secs	8 V (min)
1000 A	10 Secs	9 V (min)
500 A	10 Secs	10 V (min)

Note: No intermediate charging is allowed between the various discharging currents as per above sequence.

16.4.2 HRD CYCLIC TEST AT ROOM TEMPERATURE

The fully charged batteries will be subjected to HRD cyclic tests as per details given below and the battery should meet the requirement as specified.

Discharge Current	Discharge time	Rest time	No of cycles	Terminal voltage At the end of 6 th Cycle
1350 A	10 Secs	30 Secs	6	6V (min)

Note: No intermediate charging is allowed between the cycles.

16.4.3 HRD at $-10 \pm 3^{\circ}\text{C}$

The fully charged batteries will be subjected to HRD tests at $-10 \pm 3^{\circ}\text{C}$ per details given below and the battery should meet the requirement as specified. The batteries shall be conditioned at $-10 \pm 3^{\circ}\text{C}$ for 16 hrs before the HRD test.

Discharge current	Voltage at 5 – 7 Secs	Voltage at 3 min 30 Sec
600 A	9V (min)	6 V (min)

17.0 ENVIRONMENTAL TESTS (FOR SPECIAL BATTERY i.e. 12 V 20 AH)**17.1 Contamination Test.**

17.1.1 The battery shall be charged as per laid down procedure.

17.1.2 The battery shall then be subjected to contamination test. After the test, the battery shall be examined for any physical damage. The battery shall be allowed to remain under normal atmospheric conditions for a period of 2 hours and then discharged and Ah value shall be recorded. The Ah value shall comply with the requirements.

17.2 Dust Test.

The battery shall be charged as per laid down procedure. The vent plugs shall be in closed condition. The battery shall then be subjected to dust test as per test No. 14 of JSS 55555:2000. After completion of test, the battery shall be wiped off to remove external dust and shall be allowed to remain under normal atmospheric conditions for one hour and then shall be subjected to discharge test. The battery shall comply with the specified requirements.

17.3 Dry Heat Test.

The battery shall be charged as per laid down procedure. The battery shall then be kept in a dry heat chamber the inside temp of which is maintained at $70^{\circ}\text{C} + 2^{\circ}\text{C}$ for 6 hours. While still in the chamber at 70°C , the battery shall be discharged. The battery shall comply with the specified requirements. The battery shall be taken out of Dry Heat Chamber and be physically examined. There shall be no signs of any physical damage to the battery.

17.4 Impact Strength.

This test is conducted on the battery, which has passed the tests at Para 13.1. The battery is charged as per the specified procedure. The checking of impact strength is carried out with an acceleration of 117.7 m/sec^2 (12 g) for impulse duration of 10 to 15 m sec with frequency of impact upto 100 per minute for a total number of 2000 impacts. At the end of the test the surface of the battery is examined. There shall be no damage to the parts. Presence of isolated drops of electrolyte on the surface of the battery is permitted. The battery shall be allowed to remain for a period of 1 hour under the normal atmospheric conditions. The battery shall then be subjected to starting discharge operation test. The battery shall conform to the requirement mentioned at para 15.5.

17.5 Damp Heat Test.

17.5.1 Damp Heat Test shall be carried out on the battery in dry state. Damp heat test shall be conducted in accordance with test number 10 of JSS 55555: 2000 as follows:
Exposure for 16 hours at $+40 \pm 2^{\circ}\text{C}$ and Relative Humidity not less than 95% exposure for 3 hours at Lab temp. Saturation of the chamber atmosphere with water vapor shall

occur during this period. The battery shall be taken out from the damp heat chamber and shall be allowed to remain under standard recovery conditions for a period of 2 to 4 hours. The battery shall then be visually examined. There shall be no damage or corrosion to the exposed parts of the battery.

17.6 Corrosion (Salt) Test.

This test shall be conducted on the battery in dry state. The test shall be conducted in accordance with procedure No. 3 of Test No. 9 of JSS 55555: 2000 the duration of salt spray shall be for 1 hour. The battery shall then be taken out of salt spray chamber and wiped clean taking care not to cause short circuit of the terminals. The battery shall then be stored at standard ambient temperature for 2 to 4 hours. At the end of recovery period, the battery shall be visually examined. There shall be no damage or corrosion to the exposed parts of the battery.

17.9 Drop Test.

17.9.1 Drop test shall be carried out as per Test Number 13, Clause 3.2.3, and test condition 'C' of JSS 55555. The batteries shall be dropped on its base from a height of 100 mm and the number of drops shall be six.

17.9.2 The battery shall be examined for any physical damage and there shall be no leakage/spillage of electrolyte.

17.10 Tropical exposure Test

17.10.1 The battery shall be exposed to tropical conditions as laid down in clause 9.0 of JSS 55555. The duration of the test shall be 14 days. After recovery the battery shall pass the air pressure test as per clause 15.9 of this specification.

18.0 TRANSIT AND STORAGE.

18.1 The battery shall always be in a state of full charge before being packed for shipment.

18.2 The battery shall be placed with adequate packing on all sides and transported in upright position only.

18.3 The Supplier shall be responsible for the safe delivery of stores at the consignee's end and transit damage if any shall be promptly attended to by him.

18.4 The battery shall be protected against rain, mist, dust, snow and direct sun while in transit and storage as far as possible. It shall be stored in a cold dry atmosphere away from source of heat and fumes.

18.5 While in storage the voltage of the battery shall be checked once in 6 months. If the voltage falls below the specified voltage, the battery shall be charged. Necessary charging instructions shall be provided by the Supplier along with the battery.

19.0 **Receipt Inspection by the Consignee.**

19.1 The receipt inspection shall be carried out through visual examination to ensure the correctness and completeness of the items received against each inspection.

Note: Discrepancies and transit damage if any will be taken up with the under intimation to all concerned.

20.0 **Stocking and Issue.**

20.1 The stores shall be stocked for the barest minimum period (not more than 6 months) in the depots.

The battery shall always be stored in fully charged condition. The voltage of the battery should be checked periodically. Maintenance charging of the batteries will be carried out as per Manufacturer's instructions to prevent the deep discharge/sulphation of batteries, which leads to the pre-mature death of the batteries.

20.2 The battery shall be issued to the units as soon as possible on first-in first-out basis and it shall be ensured that full benefits accruing from the warranty clause are made available to the user.

20.3 Batteries shall be issued to the user along with all associated items as originally supplied by the Contractor.

20.4 Under no circumstances the batteries shall be stocked beyond the warranted shelf life period of 6 months from the date of manufacturing.

21.0 **Warranty**

The Manufacture/Supplier will render the following warranty in respect of batteries:-

- (a) That the batteries supplied will be free from manufacturing defects and this will be repaired / replaced in-situ, free of cost, if found defective within a period of 24 months from date of acceptance.
- (b) Satisfactory functioning with the main equipment in the temperature range from -30°C to $+55^{\circ}\text{C}$.

21.2 Control Sample

21.2.1 To ensure that batteries give specified/guaranteed number of life cycle, control samples are randomly to be drawn by the concerned SQAE(L) on the following scale:-

S.No.	Lot Size	No. of Control Sample
(i)	Upto 3000	03
(ii)	3001-6000	04
(iii)	6001-9000	05
(iv)	9001 & above	06

21.2.2 The selected samples shall be sent to CQAL Bangalore by the supplier/manufacturer on their own cost **within 10 (Ten) days from the date of issue of the I-Note alongwith product drawing in which charging instruction, reserve capacity and CCA for both temperatures shall be clearly mentioned for testing purposes.**

21.2.3 The supplier/manufacturer shall indicate in advance the schedule of production for the entire quantity on order and will ensure that the same is continuous and consistent.

21.2.4 For orders for qtys up to 3000 nos, the entire qty on order will be tendered in one lot.

21.2.5 For orders for qtys running into several thousands, the production will be done in lots of minimum of 3000 nos. and lot tendered shall consist of minimum of 3000 Nos. each time. However maximum number of lot will be up to supplier/manufacturer limited to maximum production (MPC) capacity of the firm.

21.2.6 The month and year of manufacturing to be marked on the individual batteries will be that conforming to the month and year of tendering the lot. Warranty period will be counted from the date of acceptance of stores.

21.2.7 The control samples drawn from the lot will be treated as a true representative of the particular lot and the results of the life cycle test on these samples will be applicable to the entire quantity comprising the lot.

21.2.8 The selection of control samples mentioned at clause 21.2 above will be at the discretion of the AHSP and it is dependent on the performance of the quality of the supplies observed by the AHSP.

22. Suggestions for improvement

22.1 Any clarifications or suggestions for improvement may be forwarded to

<p>Joint Controller (P) CONTROLLERATE OF QUALITY ASSURANCE (L) MINISTRY OF DEFENCE (DGQA) GOVERNMENT OF INDIA J.C. NAGARPO, BANGALORE - 560 006</p>

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TABLE – XII
LIST OF BATTERIES AND THEIR CAPACITIES, OVERALL DIMENSIONS, MASS, DS CAT/PART NO, DRG NO.& APPLICABILITY

Battery Rating and Capacity	Maximum over all Dimensions (mm) of Container			Battery Height (mm) Max	Mass with Electrolyte (Kg)	DS Cat No. LV6/MT4/6140-	Drg No.	Applicability/Remarks
	Length	Width	Height					
12 V 2.5 Ah @ C ₁₀	81	71	106	106	1.15	004649	CQAL 4420(A)	Hero Honda CD100
12 V 5 Ah @ C ₁₀	121	61	131	131	2.10	005116	CQAL 4431(A)	Motor Cycle 350CC Royal Enfield Bullet
12 V 20 AH @ C ₁₀	548	120	232	232	18.0	000094	CQAL SK 667(E)	General purpose/B Vehicle
12 V 32 AH @ C ₂₀	197	129	203	227	11	000439	CQAL 4431(B)	Maruti Gypsy
12 V 35 Ah @ C ₂₀	197	129	203	227	11.5	Misc-CQAL-4467	CQAL-4467	Maruti SX4
12V 45Ah @ C ₂₀	260	177	200	225	14.5	000490	CQAL 4460	Car Premier & Padmini118NE Black
12 V 55 AH @C ₂₀	242	175	190	190	17.8	Misc-CQAL-4460	CQAL 4460	Gen Set for CSV of Smerch
12 V 60 AH @C ₂₀	260	173	204	225	18	000012	CIL SK 983(D)	Lorry 5 Ton, Smerch, Ashok Leyland
12 V 60 AH@ C ₅ (IN70Z)	306	173	204	225	24.0	005087	CQAL4425(C)	VehEicher, SwarajMajda, DCM Toyota, Mahindra Nissan Allwyn
12 V 70 AH@ C ₂₀	306	173	204	225	22.5	000424	CQAP-0121(A)	Howitzer 155MM FH 77B-02, JEEP M&M-550XD/4WD
12 V 88 AH@ C ₅	410	176	213	233	32.5	000489	CQAL 4373	Ly5/Leyland Stallion Mk-III SwarajMajda, DCM Toyota, Ashok Leyland
12 V 92 AH@ C ₂₀	410	176	213	233	31	000013	CIL SK 887(D)	Tractor 8x8 Maz 537 G, Lorry 3 Ton 4x4 Shaktiman /TMB LAA 312/42 Chassis, Motor Towing Lunch BMK – 150 M
12 V 100 AH@ C ₂₀	363.4	173	213	234	25.5	Misc-CQAL-4455	CQAL 4455	Carrier Mortar Tracked Vehicle
12 V 100 AH@ C ₂₀	285	267	230	244	31	000128	CILSK1075(C)	Veh tracked Comd Post FV-432 MK2/1

RESTRICTED

Battery Rating and Capacity	Maximum over all Dimensions (mm) of Container			Battery Height (mm) Max	Mass with Electrolyte (Kg)	DS Cat No. LV6/MT4/ 6140-	Drg No.	Applicability/Remarks
	Length	Width	Height					
12 V 120 AH@ C ₅	505	220	240	240	45	005117	CQAL 4429 (B)	With side terminal protector and top cover used in ICV BMPs, T-72 & T-90
12 V 130 AH@ C ₂₀	503	182	255	257	36.4	Misc- CQAL-4465	CQAL-4465	Lorry 5/7.5 Ton 4X4 Ashok Leyland Stallion MK-IV (BS-III)
12 V 135 AH@ C ₂₀	505	182	213	257	38	000200	CQAL-4419 (A)	Viking Bus over snow Veh Ashok Leyland ALP SV 1/3
12V 150AH @C ₂₀	508	222	257	257	45	Misc- CQAL-- 4458	CQAL-4458	Tata Pre-Fabricated Bus LPO 1512 TC/55
12 V 180 AH@ C ₂₀	505	222	257	257	47	Misc-CQAL 4466	CQAL-4466	Truck 2.5 Ton 4X4 LPTA 715/32 TC (BS-III)
12 V 180 AH@ C ₂₀	521	278	220	270	61.8	005189	CQAL-4447	Lorry 3 Ton 4X4 Telecom repair fitted Shaktiman, Tata 4X2 Model LP, Lorry 3 Ton 4X2 TMB
12 V 200 AH@ C ₂₀	521	278	220	270	64	Misc-CQAL 4454	CQAL 4454	Smerch Weapon System, KOLOS TATRA-815
6V 12 AH@ C ₂₀	122	92	155	162	3.5	000004	CIL SK 980(C)	Motor Cycle Solo 350CC Bullet Standard On Off
6 V 90 AH@ C ₂₀	232	178	224	224	19	000005	CIL SK 997(A)	Obsolete vide L/P/CIL/AGD-329 dated 10 May 1983.
6V 120 AH@ C ₂₀	280	185	250	250	23	000016	CIL SK 991(B)	Tank Centurion ME VIII, Tank Centurion ARV II, Crawler Tractor D-405, Tractor T-100M
6 V 150 AH@ C ₂₀	317	178	230	230	28	000007	CIL SK 981(D)	Lorry 10 Tonne 6x6 Ashok Leyland Tractor
6 V 150 AH 2A@C ₂₀	338	181	190	242	28	000163	CIL 3965	Vijayanta ARV Mk-I

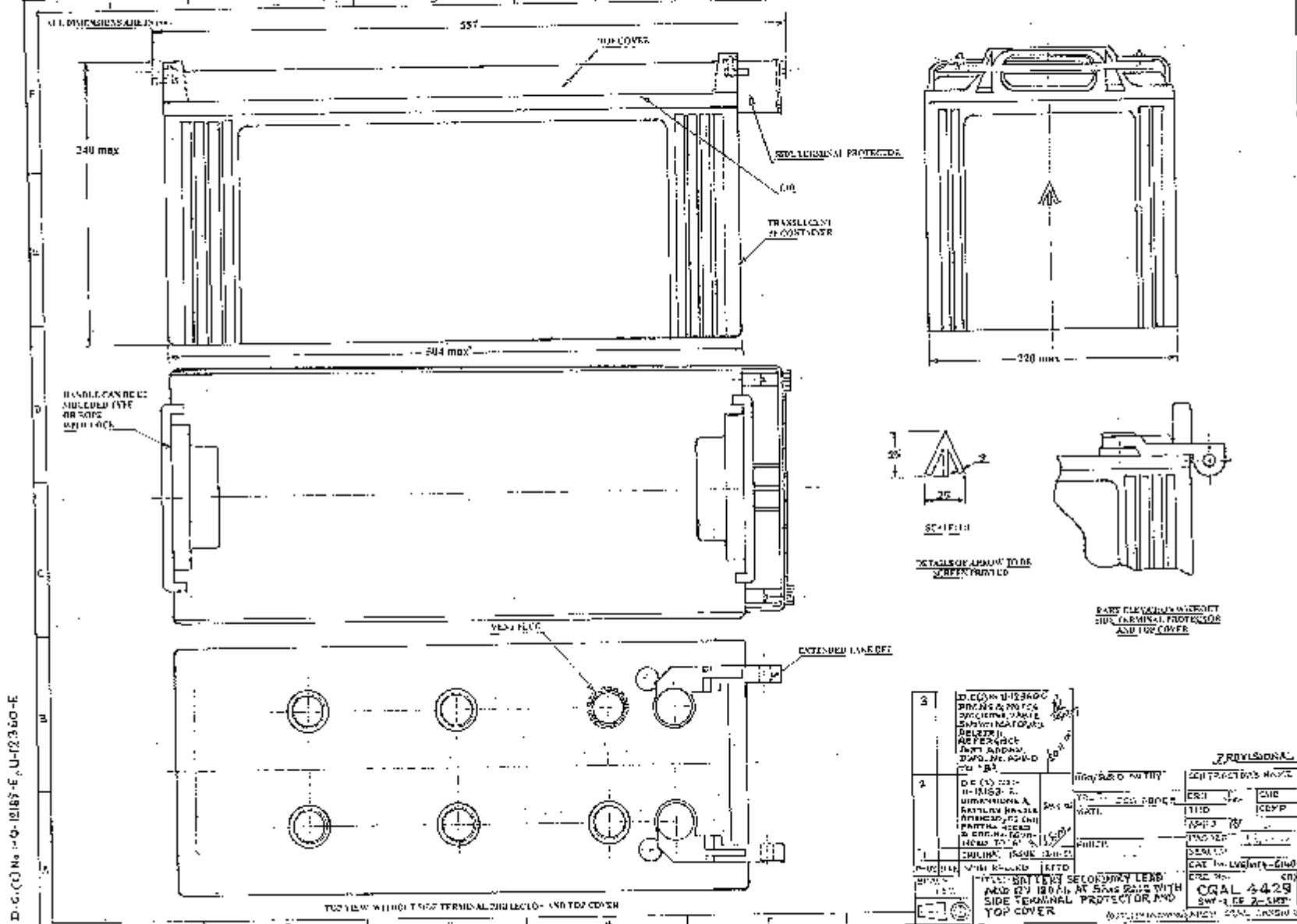
NOTES:

1. All acceptance tests shall be carried out on the basis of discharge at the 5-h rate only. The 20-h capacity is indicated only to establish equivalence with other test specification.

Conversion Formula

Capacity at 20 Hr Rate in AH C_{20}	Capacity at 10 Hr Rate in AH $C_{10}=0.88C_{20}$	Capacity at 5 Hr Rate in AH $C_5=0.8C_{20}$
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2. While the Supplier/Manufacturer can have their own nomenclature, the specific designation should conform to one of the types as listed above.
3. Mass with electrolyte has been indicated for the purpose of reference only.
4. Drags mentioned here are only for ref & for dimensional purposes only and testing to be done as CQAL 637(C).
5. Batteries Physical/Electrical/functional parameters which are not covered in Tables VI, VIII, IX, X or XI may be checked for compliance to relevant IS-Specification / approved drawing of supplier in case Defence requirement exists.



D.C. CO No. 9-12187-E, U-12350-E

3	D.C. CO No. 9-12360-0 PRINTS & WORKS SPECIFICATIONS SERIALS & DRAWINGS RELEASE REFERENCE FORM APPROV. STAMP NO. 4010 C-187	PROV. & O. AUTH.	CONTRACTORS NAME
2	D.C. CO No. 9-12187-E DIMENSIONS A APPLYING INSTRUCTIONS APPROVED TO (S) PARTIAL ISSUE D.C. CO No. 9-12187-E HEAD TO (S) DURING ISSUE (S)	PROV. & O. AUTH.	CONTRACTORS NAME
1. 100% BATTERY SECURITY LEAD AND BY 120.0 AT 5000 GALS WITH SIDE TERMINAL PROTECTOR AND TOP COVER		ERG TTD TMS DENT CAT ERG SW	ERG TTD TMS DENT CAT ERG SW

PROVISIONAL

CGAL 4429

SPECIFICATIONS

ITEM	CONDITION	STANDARD
NOMINAL VOLTAGE		12V
CAPACITY	5 HOUR RATE	120 AH
HIGH RATE DISCHARGE	AT 500A -15° C	30 SEC. VOLTAGE ≥ 8.6V DURATION TO 6V ≥ 8 minutes 36 seconds
CHARGE ACCEPTANCE	14.4 V ₀ °C	≥ 15A
CYCLIC ENDURANCE	40° - 45° C	≥ 500 CYCLES
OVERCHARGE ENDURANCE	40° - 45° C	≥ 3 UNITS
FILLED WEIGHT		45kg
TEST SPECIFIC GRAVITY		1.28 ± 0.01 AT 27° C

NOTE:

1. TESTING TO BE CARRIED OUT AS PER SPECIFICATION COAL 637(A)-2006.
2. NOMENCLATURE, MANUFACTURERS NAME, D.S.CAT No., SRL No., MONTH & YEAR OF MFR, POLARITY OF TERMINALS AND WARRANTY CLAUSE SHOULD BE MARKED AS PER THE SPECIFICATION IN SUITABLE SIZE CHARACTERS.
3. BATTERY TO BE SUPPLIED AS FACTORY FILLED, CHARGED AND READY TO USE CONDITION.

ONLY FOR REFERENCE:

THIS BATTERY WILL BE USED WITH TRAY (DWG. No. COAL 4450^(A) CAT No. LV6(MT4-6140-005) IS) WHILE FITTED ON TANKS.

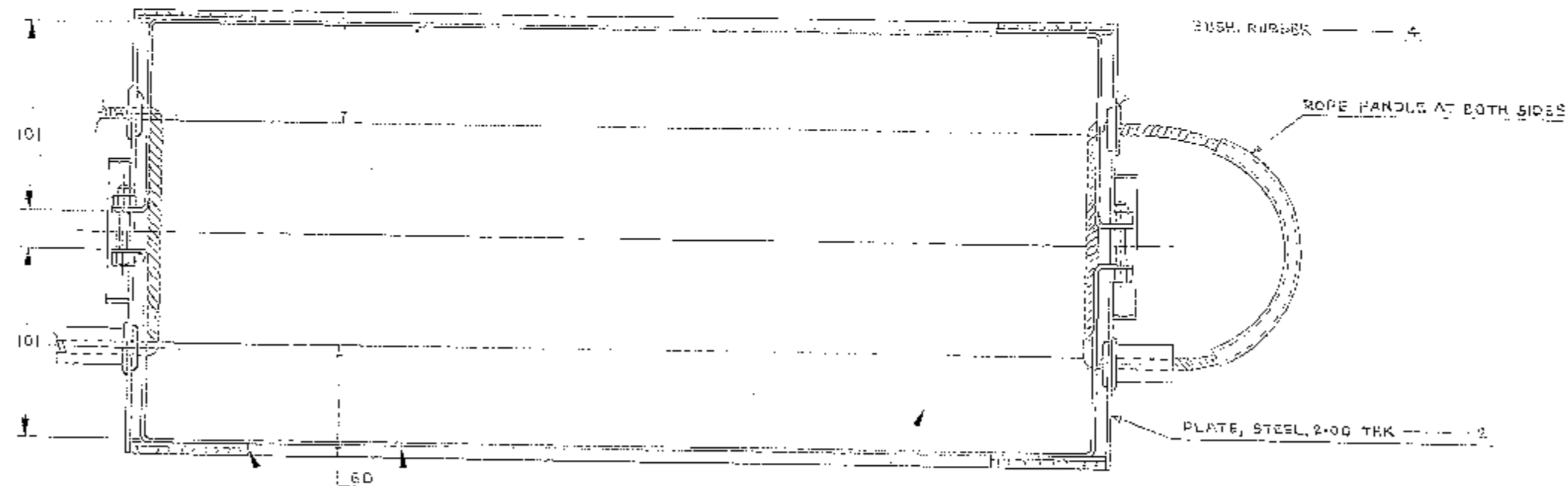
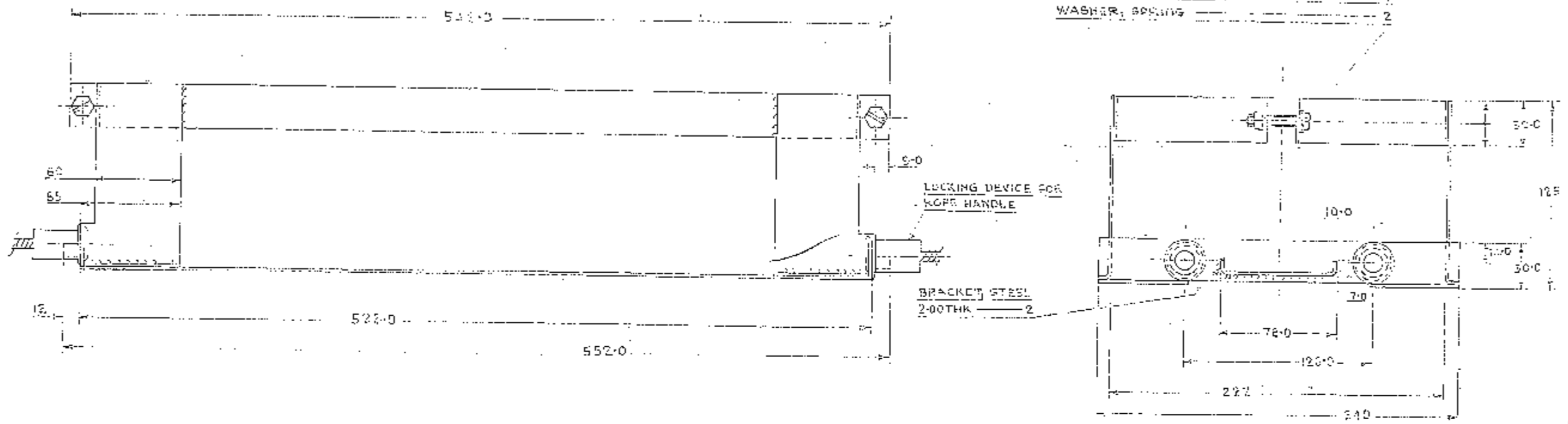
D.C. CO No: D-18187-5, JF-12360-E.

PROVISIONAL

2	D.C. CO No: U-18187-5	ISSUE No. & D. DATE	CONTRACTOR'S NAME
	DE DET/PRINT No. APPROV. & DR. No. APPROVED "BY" & DATE	ISSUED TO ISS. SOURCE	DRN No. / CHG No.
1	ORIGINAL ISSUE	12-11-01	TRD No. / APPD No.
ISSUE ZONE	BRIEF RECORD	APPD	PASSED / SEALED
SCALE	TITLE: BATTERY SECONDARY LEAD ACID 12V 120AH AT 5HRS RATE WITH SIDE TERMINAL PROTECTOR AND TOP COVER (OUTLINE DRAWING)		CAT No. LV6(MT4-6140-005) IS
	D.C. CO No. U-18187-5	ISSUE No. & D. DATE	DWG. No. / CB No.
	TABLE SHOWS MATERIALS OBTAINED, REFERENCE TEXT ABOVE DWG. ON APP. AND CLIP TO IT	30/11/06	COAL 4429 / SHT-2 OF 2-SHYS
			NIIP COAL FABRIKORE-6

SIMENSIONS ARE IN MM

- BOLT, HEX. HD. STEEL MS. & COLD 2
- HEX. NUT, STEEL, M6 2
- WASHER, PLAIN 4
- WASHER, SPRING 2



FINISH:-
 TRAY TO BE CLEANED AND DE-GREASED PRIOR TO THE COAT OF PRIMING RED-OXIDE PAINT AND TWO FINISHING COATS OF ACID RESISTANT BLACK PAINT.

- NOTES:-**
1. NOMENCLATURE AND CAT NUMBER ARE TO BE MARKED ON TRAY WITH INDELIBLE ACID RESISTANT YELLOW PAINT.
 2. ALL WELDED CONSTRUCTION UNLESS OTHERWISE STATED.
 3. ALL WELDED JOINTS TO BE FINISHED BRIGHT.

LV6/MT 4 - 6140-00518

PLATE, STEEL, 2.00 THK 4

BRACKET, STEEL, 2.00 THK 2

D.C.(S) No:- U-12150-E

2	D.C.(S) No:- U-12150-E DS GRAY/PART NO. ADDED & DRG NO. ADVANCED TO R	2.5.05	GEN/REGISTRY	CONTRACTOR NAME	
			TOL TO 250 50000	DRR	CRD
1	ORIGINAL 1983E	NO-11-01	DATE	TRD	DATE
SCALE	TITLE	FINISH	AS CD DRAWING		
1:2	TRAY FOR BSLA 12V 120AH AT 5 hrs RATE (IN '50)	AS CD DRAWING	FILED		
			CAT No. 1839E		
			LRS No. CA) 1839E		
			CQAL 4430		
			AND SEAL BANGAL RE-6		

Handwritten signature and initials