

MATERIAL AND EQUIPMENT STANDARD
FOR
BATTERIES

| CONTENTS : | PAGE No. |
|--|-----------------|
| 1. SCOPE | 3 |
| 2. REFERENCES | 3 |
| 3. UNITS | 3 |
| 4. SERVICE CONDITION | 3 |
| 5. REQUIREMENTS | 3 |
| 5.1 Endurance | 4 |
| 5.2 Short Circuit Current and Internal Resistance..... | 4 |
| 6. INSPECTION, QUALITY CONTROL AND TEST | 4 |
| 7. TEST AND CERTIFICATION..... | 4 |
| 7.1 General requirements for test | 4 |
| 7.2 Type Tests and Certificate | 4 |
| 8. MARKING..... | 4 |
| 9. INFORMATION FOR MANUFACTURER / SUPPLIER | 4 |
| 10. DOCUMENTATION LITERATURE TO BE SUPPLIED BY MANUFACTURER OR SUPPLIER | 4 |
| APPENDICES : | |
| APPENDIX A DATA SHEET FOR BATTERIES | 6 |

***ATTACHMENTS (GENERAL):**

| | | |
|------------------|--|----|
| ATTACHMENT 1 | ENVIRONMENTAL CONDITIONS..... | 8 |
| ATTACHMENT 2 | INSPECTION, QUALITY CONTROL AND QUALITY RECORDS..... | 9 |
| ATTACHMENT 3 | TESTS AND CERTIFICATION (GENERAL REQUIREMENTS)..... | 10 |
| ATTACHMENT 4 | PACKING..... | 11 |
| ATTACHMENT 5 | SHIPMENT..... | 12 |
| ATTACHMENT 6 | GUARANTEE..... | 13 |
| 6.1 | Clearance of Defects | 13 |
| 6.2 | Replacement of Defective Parts | 13 |
| 6.3 | Supply of Spare Parts | 13 |
| 6.4 | After Sale Technical Services | 13 |
| ATTACHMENT 7 | SPARE PARTS..... | 14 |
| ATTACHMENT 8 | LANGUAGE..... | 15 |
| ATTACHMENT 9 | COORDINATION RESPONSIBILITIES WITH OTHERS..... | 16 |
| ATTACHMENT 10 | GENERAL CONDITIONS OF PURCHASE..... | 17 |
| ATTACHMENT 11 | SAMPLE OF PURCHASER'S DRAWING TITLE BLOCK:..... | 18 |
| ATTACHMENT 12 | INSTRUCTIONS OF PURCHASER ABOUT PERTINENT DRAWING.. | 19 |
| ** ATTACHMENT 13 | MATERIAL, LAYOUT AND LETTERING OF LABELS..... | 20 |
| ATTACHMENT 14 | FULL ADDRESS OF PURCHASER..... | 22 |

* See Attachments at the end of standard.

** Attachment No. 13 is not applicable.

1. SCOPE

This Standard is applicable to cells and batteries which are designed for service in a fixed location i.e. they are stationary and which are permanently connected to the load and to the a.c. power supply.

Typical application of such batteries is given below:

- Power station and sub station closing, tripping, indication and alarm supply.
- General emergency supply.
- Uninterrupted power supply.
- Telecommunication supply.
- Solar power storage.

In this Standard the main characteristics, test requirements and data sheet is given in general for stationary types of batteries.

2. REFERENCES

In preparation of this Standards the following Standards and Codes have been considered or referred to. Batteries shall, to the extent specified herein, be designed, constructed, wired and tested in accordance with all applicable sections of these standards that are in effect at the time of publication of this Standard. The applicability or changes in standards and codes that occur after the date of this Standard shall be mutually agreed upon by the Company and the vendor /consultant.

IEC (INTERNATIONAL ELECTROTECHNICAL COMMISSION)

- IEC 68 "Environment Tests".
- IEC 622 "Sealed Nickel Cadmium Prismatic Rechargeable Single Cells"
- IEC 623 "Vented Nickel Cadmium Prismatic Rechargeable Single Cells".
- IEC 896.1 "Stationary Lead Acid Batteries".
- IEC 993 "Electrolyte for Vented Nickel Cadmium Cell".

BSI (BRITISH STANDARD INSTITUTION)

- BS 3031 "Sulfuric Acid for use in Lead Acid Batteries".
- BS 4974 "Water for Lead Acid Batteries".
- BS 6290 "Lead Acid Stationary Cells and Batteries Parts 1,2 and 3".

3. UNITS

International system of units (SI) shall be used.

4. SERVICE CONDITION

See Attachment 1.

5. REQUIREMENTS

The essential characteristics of cells and batteries are:

5.1 Endurance

Cells and batteries shall be capable of withstanding operation under specified condition for a minimum period of time, in accordance with data sheets requirements.

5.2 Short Circuit Current and Internal Resistance

The value of short circuit current I_{sc} (A) and the internal resistance R_i (Ω) shall be indicated by the manufacturer.

6. INSPECTION, QUALITY CONTROL AND TEST

See Attachment 2.

7. TEST AND CERTIFICATION

7.1 General requirements for test

See Attachment 3.

7.2 Type Tests and Certificate

7.2.1 Type tests and certification shall comply with the requirements of IEC 623, IEC 623 A, IEC 896.1 and BS 6290 Part 1 as applicable.

7.2.2 In addition to requirement under sub-sub clause 7.2.1 the following check shall also be made:

- a) Measurement of insulation to mass of battery.
- b) Checking of dielectric properties of mats where applicable. (by voltage test).
- c) Checking of vibration and shock resistance in accordance to IEC 68.
- d) Checking the adequacy of accessories.
- e) Checking the adequacy of tools and instruments (where applicable)

Note:

For shipment, the batteries shall be packed dry. (see Attachment 5)

8. MARKING

Batteries shall be marked in compliance with IEC 623.

9. INFORMATION FOR MANUFACTURER / SUPPLIER

See data sheet for batteries: Appendix A.

10. DOCUMENTATION LITERATURE TO BE SUPPLIED BY MANUFACTURER OR SUPPLIER

10.1 Weights and dimensions of individual cells.

10.2 Data required for the design of the battery changer.

10.3 Data and performance recorded during type tests and routine test.

10.4 Test certificates.

10.5 Instructions for installation and inspection.

10.6 Instructions for operation and maintenance.

11. PACKING

See Attachment 4.

12. SHIPMENT

See Attachment 5.

13. GUARANTEE

See Attachment 6.

14. SPARE PARTS

See Attachment 7.

15. LANGUAGE

See Attachment 8.

16. COORDINATION RESPONSIBILITY WITH OTHERS

See Attachment 9.

APPENDICES

**APPENDIX A
DATA SHEET FOR BATTERIES**

- LOCATION
- APPLICATION
- TYPE OF BATTERY:
 - Lead acid open closed
 - Nickle cadmium open closed
- COMPOSITION OF. ELECTROLYTE
- VOLTAGE PER CELL
- NUMBER OF CELLS
- TERMINAL VOLTAGE REQUIRED:
- CAPACITY IN AMPERE HOURS AT DISCHARGE RATE AMPS.
- MODE OF OPERATION
 - Charge/discharge
 - Floating/trickle
- CHARGE DISCHARGE CYCLE:
 - Ampere hours taken from battery during power failure
- EXTERNAL LOAD ON BATTERY:
 - Amp min..... Amp max
 - (When battery is fully charged.)
- OUTPUT VOLTAGE RANGE:
 - Floating volt min. to volt max.
- CONTAINER
 - Steel
 - Plastic
 - Others
- DIMENSION (In case where available space is limited)
 - Length mm, width mm, depth mm.
- FLAME ARRESTER:
 - Required not required
- SPECIAL MEASURING DEVICE:
 - Thermometer
 - Hydrometer

Voltmeter

- STANDS

Required not required

- MATS

Required not required

SCHEDULE OF TECHNICAL AND TEST DATA REQUIRED

.....
.....
.....
.....

**ATTACHMENTS
GENERAL**

**ATTACHMENT 1
ENVIRONMENTAL CONDITIONS**

1.1 Site elevation : ----- meters above sea level.

1.2 Maximum ambient air temperature : ----- degrees centigrade.

(Bare metal directly exposed to the sun can at times reach a surface temperature of ----- degrees centigrade.

1.3 Minimum air temperature : ----- degrees centigrade.

1.4 Relative humidity : ----- percent.

1.5 Atmosphere : saliferous, dusty corrosive and subject to dust storms with concentration of 70-1412 mg/cubic meter, H₂S may be present unless otherwise specified in data sheet.

1.6 Lightning storm isoceraunic level : ----- storm days/year.

1.7 Maximum intensity of earthquake ----- richters.

Note:

Blanks to be filled by client.

**ATTACHMENT 2
INSPECTION, QUALITY CONTROL AND QUALITY RECORDS**

2.1 Inspection, Quality Control

2.1.1 The purchaser's inspector, or his authorized representative shall have free access to the manufacturing plant engaged in the manufacture of the equipment, to carry out necessary inspection at any stage of work.

2.1.2 Inspection may include the visit to quality control laboratories, work shops, testing bay etc.

2.1.3 The supplier shall make available technical data, test pieces and samples that the purchaser's representative may require for verification in conjunction with pertinent equipment.

If required the supplier shall forward the same to any person or location that the purchaser's representative may direct.

2.2 Quality Records

2.2.1 The supplier shall maintain appropriate inspection and test records to substantiate conformance with specified requirements.

2.2.2 Quality record shall be legible and relevant to the product involved.

2.2.3 Quality records that substantiate conformance with the specified requirements, shall be retained by manufacturer and made available on request by purchaser.

2.2.4 The supplier shall establish and maintain procedure for identification collection, indexing, filing, storage, maintenance and disposition of quality records.

2.2.5 Supplier shall submit to purchaser: reports, test schedules, and test certificates (in _____ copies) on completion of tests.

Note:

Blanks to be filled by client

**ATTACHMENT 3
TESTS AND CERTIFICATION**

3.1 General Requirements

3.1.1 Test procedure as proposed by the supplier shall be agreed upon, and approved by the purchaser before any test is carried out.

3.1.2 Purchaser may require witnessed tests to be carried out in the presence of his nominated representative who should be informed at least ----- weeks in advance of the date of the tests and confirmed ----- weeks before the tests.

3.1.3 Test certificates and test reports shall refer to the serial No. of the equipment tested and must bear the purchaser's name, order No. and manufacturer's name and seal.

The certificates shall be approved by the purchaser before shipment instruction are given.

3.1.4 Approval by the purchaser's inspector or representative shall not relieve the vendor of his commitments under the terms of this Specification or any associated order.

3.1.5 The batteries may be rejected if measurement and inspection reveal any discrepancies between quoted figures resulting in purchase order and those measured actually.

3.1.6 Any charges incurred by the tests quoted under heading of specific requirements for tests to be quoted as a separate item and are not to be included in the cost of the equipment.

Note:

Blanks to be filled by client.

**ATTACHMENT 4
PACKING**

The packing must be adequate to avoid mechanical damage during transport handling and stacking. The material and pack design must be chosen so as to prevent the development of unintentional electrical conduction corrosion of the terminals and ingress of moisture.

**ATTACHMENT 5
SHIPMENT**

5.1 Preparation for shipment shall be in accordance with manufacturer's standard unless otherwise noted on the request for quotation and or purchase order. Under no circumstances the batteries or cells shall be shipped filled with electrolyte. (Sealed types are exceptional).

5.2 The manufacturer shall be solely responsible for the adequacy of the preparation for shipment employed with respect to materials and shall provide materials to their destination in ex-work condition when handled by commercial carrier systems.

5.3 Shock and vibration must be kept to a minimum. For instance boxes should not be thrown off, slammed into the position or piled so high as to overload battery container below.

Protection shall be provided for inclement weather.

5.4 The greatest care must be taken to ensure that shipping and associated documents with exact description for custom release are accompanied with the shipment.

ATTACHMENT 6 GUARANTEE

6.1 Clearance of Defects

The supplier shall guarantee his equipment during commissioning and for one year operation starting from the completion of seven days continuous service test in site at full load against the following defects:

- All operational defects.
- All material defects.
- All constructional and design defects.

6.2 Replacement of Defective Parts

All defective parts shall be replaced by the supplier in the shortest possible time free of charge including dismantling reassembling at site and all transportation cost. The above mentioned period shall not however be longer than 18 months from the date of dispatch from the manufacturer's works.

6.3 Supply of Spare Parts

Furthermore the supplier shall guarantee the provision of spare parts to the purchaser for a minimum period of ----- years from the date of despatch.

6.4 After Sale Technical Services

6.4.1 Commissioning

6.4.1.1 The supplier shall quote if required for the services of competent engineer(s) and or technician(s) to assist in installation commissioning and testing of the equipment at site on a per diem basis.

6.4.1.2 The quoted rates shall be irrespective of duration and frequency and the supplier shall guarantee the services of the engineer(s) and technician(s) on the specified date within a minimum of ----- weeks advance notice by the purchaser.

6.4.2 Training

6.4.2.1 The purchaser may require the supplier to arrange for training of his personnel in the manufacturing plant and or in site for the operation and maintenance of the equipment offered.

6.4.2.2 The supplier shall quote (if required) for the cost of any of above mentioned services on a per person per diem basis. The program for the training shall be prepared by mutual agreement. An advance notice of ----- weeks minimum, is required by purchaser for the commencement of training program.

Note:

Blanks to be filled by client.

**ATTACHMENT 7
SPARE PARTS**

- 7.1** All spare parts shall comply with the same standards, specification and tests of the original equipment and shall be fully interchangeable with the original parts without any modification at site.
- 7.2** They shall be correctly marked in accordance with client reference and manufacturer part numbers, giving also the purchaser's order number.
- 7.3** Spare parts shall be preserved to prevent deterioration during shipment and storage in humid tropical climate.
- 7.4** List of recommended spare parts and interchangeability with spare parts of similar equipment shall be submitted by supplier.

**ATTACHMENT 8
LANGUAGE**

8.1 All correspondence drawings, documents, certificates, including testing operation and maintenance manuals and spare part lists etc. shall be in English.

8.2 Offers in other languages will not be considered.

**ATTACHMENT 9
COORDINATION RESPONSIBILITIES WITH OTHERS**

- 9.1** In case the equipment ordered should be mounted on, aligned, connected, adjusted, or tested with the equipment of other manufacturer(s) the supplier shall contact directly the said manufacturer(s) and supply and obtain all dimensional and technical informations and arrange for any interconnecting equipment and combined test that may be required.
- 9.2** The supplier shall be responsible for correct and timely communication with the said manufacturer(s) and for any delay and/or cost claims arising from such communications.
- 9.3** Copies of all correspondence should be sent to purchaser.
- 9.4** The name and address of the manufacturer(s) will be given as soon as their orders have been confirmed.

**ATTACHMENT 10
GENERAL CONDITIONS OF PURCHASE**

This document will be submitted by purchaser at the time of ordering.

**ATTACHMENT 11
SAMPLE OF PURCHASER'S DRAWING TITLE BLOCK:**

| | | | | | |
|--|--------------------|----------------------------|--------------------|----------------|-----------------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| DRAWING NO. | DESCRIPTION | | | | |
| REFERENCE DRAWINGS | | | | | |
| D | | | | | |
| C | | | | | |
| B | | | | | |
| A | | | | | |
| REV | DATE | DESCRIPTION | | REF | CHK APP |
| <p>THE NAME OF RELEVANT COMPANY</p>  | | | | | |
| DRAWING TITLE : | | | | | |
| | | | | | |
| DRN. BY | SCALE | MICRO FILM CODE | PROJECT NO. | CHK. BY | APP. BY |
| JOB NO. | AREA CODE | | DWG. NO. | SHEET | REV. |

Note:

Appropriate Nomenclature and Registered mark shall be used for quotation and order.

**ATTACHMENT 12
INSTRUCTIONS OF PURCHASER ABOUT PERTINENT DRAWINGS**

12.1 Purchaser's drawing title block, "the sample of which is given in Attachment 11 shall be shown in the right lower corner of the drawings.

12.2 Drawings are to be protected and packed. Negatives must be dispatched in a strong card board cylinder.

12.3 Drawings must be rolled and not folded.

12.4 All drawings, documents and literatures shall be forwarded under cover of a fully detailed letter to purchaser whose addresses are given in Attachment 14.

Note:

Blank to be filled by client.

**ATTACHMENT 13
MATERIAL, LAYOUT AND LETTERING OF LABELS
(NOT APPLICABLE)**

Label material to be "Traffolite" 5 mm. Thick having two outer layers letter to be engraved into the white layer to give black lettering on a white background.

| TYPE | HEIGHT | WIDTH mm | STROKE | CASE | | LETTERS / 25 mm | SAMPLE |
|-------------|---------------|---------------------|---------------|-------------|------|------------------------|---------------|
| A | 5 | WIDE | LIGHT | UPPER | CASE | 7½ ± 1.2mm. TOL | ABCDEFGHIJKLM |
| B | 5 | WIDE | HEAVY | " | " | 7½ ± 1.2mm. TOL | |
| C | 5 | NARROW | LIGHT | " | " | 11 ± 1.2mm. TOL | |
| D | 5 | NARROW | HEAVY | " | " | 11 ± 1.2mm. TOL | |
| E | 3 | WIDE | LIGHT | " | " | 10 ± 1.2mm. TOL | |
| F | 3 | WIDE | HEAVY | " | " | 10 ± 1.2mm. TOL | |
| G | 3 | NARROW | LIGHT | " | " | 15 ± 1.2mm. TOL | |
| H | 10 | WIDE | HEAVY | " | " | 3½ | |
| J | 12 | WIDE | HEAVY | " | " | 2½ | |

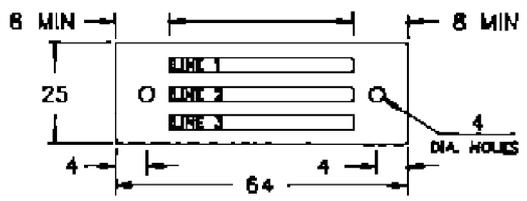
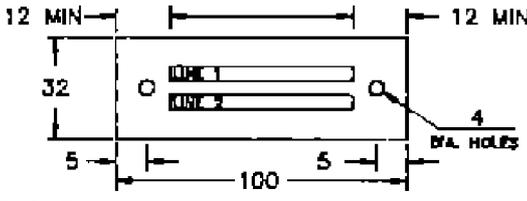
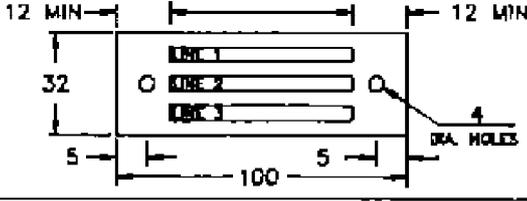
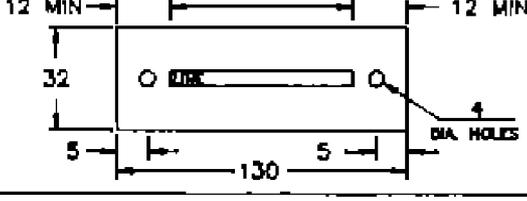
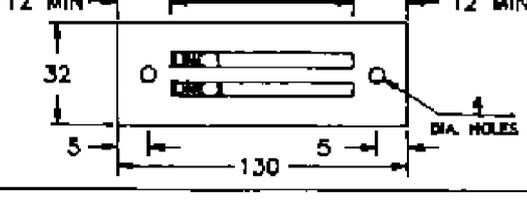
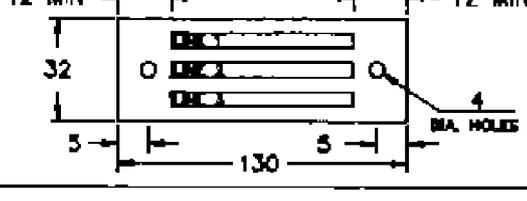
Note:

Height is in millimeters

(to be continued)

ATTACHMENT 13 (continued)

LAYOUTS

| | | | | | |
|-----------------|-------|----|-----------------------|--------|--|
| LAYOUT 1 | | | LETTERS MAX / LINE | 8 MIN |  |
| LETTER TYPE | G | 28 | | | |
| | E & F | 19 | | | |
| LAYOUT 2 | | | LETTERS MAX / LINE | 8 MIN |  |
| LETTER TYPE | G | 28 | | | |
| | E & F | 19 | | | |
| LAYOUT 3 | | | LETTERS MAX / LINE | 12 MIN |  |
| LETTER TYPE | A & B | 22 | | | |
| | C & D | 23 | | | |
| | E & F | 30 | | | |
| | G | 45 | | | |
| LAYOUT 4 | | | LETTERS MAX / LINE | 12 MIN |  |
| LETTER TYPE | A & B | 22 | | | |
| | C & D | 23 | | | |
| | E & F | 30 | | | |
| | G | 45 | | | |
| LAYOUT 5 | | | LETTERS MAX / LINE | 12 MIN |  |
| LETTER TYPE | H | 15 | | | |
| | J | 10 | | | |
| LAYOUT 6 | | | LETTERS MAX / LINE | 12 MIN |  |
| LETTER TYPE | A & B | 28 | | | |
| | C & D | 40 | | | |
| | E & F | 40 | | | |
| | G | 58 | | | |
| LAYOUT 7 | | | LETTERS MAX / LINE | 12 MIN |  |
| LETTER TYPE | A & B | 28 | | | |
| | C & D | 40 | | | |
| | E & F | 40 | | | |
| | G | 58 | | | |

ATTACHMENT 14**FULL ADDRESS OF PURCHASER:**

.....
.....
.....
.....

| | | |
|------------------|-----------------|----------------------|
| P. O. BOX | No. | CODE No. |
| TELEPHONE | No. | |
| TELEX | No. | |
| FACSIMILE | No. | |

Note:**Blank to be filled by client.**