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SOUTHERN CALIFORNIA EDISON COMPANY
Rosemead, California

DOE/SF/10501-015
(STMP0-492)

SPECIFICATION NO. A11-1978
(Revision of A11-1976)

LEAD ACID BATTERY CELLS FOR SUBSTATION, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

A11-1978

LEAD ACID BATTERY CELLS FOR SUBSTATION, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

September 15, 1978

SOUTHERN CALIFORNIA EDISON COMPANY
Rosemead, California

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LEAD ACID BATTERY CELLS FOR SUBSTATION, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

APPROVED MANUFACTURERS OF LEAD ANTIMONY CELLS

Types (1)

Exide Power Systems Division, ESB Inc.
Gould Inc., Electrical Systems Group

Plante, Ironclad (Tubular)
Plante

APPROVED MANUFACTURERS OF LEAD CALCIUM CELLS

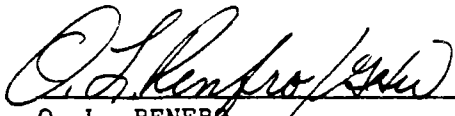
Types (1)


Exide Power Systems Division, ESB Inc.
C&D Battery Division, Eltra Corp.
Gould Inc., Electrical Systems Group

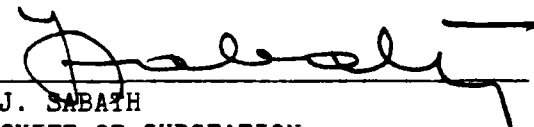
Faure (Pasted Plate)
Faure (Pasted Plate)
Faure (Pasted Plate)

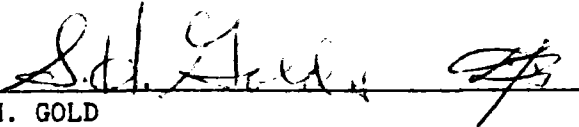
(1) Refer to Table 3-2 for approved type and manufacturer.

APPROVAL OF SPECIFICATION



O. L. RENFRO
MANAGER OF SUBSTATIONS

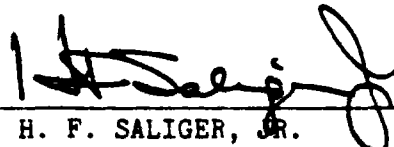

R. M. KING
MANAGER OF TELECOMMUNICATION


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DESIGN ENGINEERING


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CHIEF APPARATUS ENGINEER


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MANAGER OF STEAM GENERATION


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ELECTRICAL ENGINEERING DESIGN


H. F. SALIGER, JR.
MANAGER OF MATERIAL
SERVICES

SOUTHERN CALIFORNIA EDISON COMPANY
Rosemead, California

SPECIFICATION No. A11-1978
(Revision of A11-1976)

<u>Section No.</u>	<u>Title</u>	<u>Page</u>
<u>SECTION 1</u>		
<u>GENERAL TERMS AND CONDITIONS</u>		
1.1	Definitions	1-1
1.2	Delivery	1-2
1.3	Title and Risk of Loss	1-2
1.4	Packaging	1-2
1.5	Payment	1-2
1.6	Acceptance	1-3
1.7	Warranty	1-3
1.8	Statutes and Codes	1-3
1.9	Changes	1-3
1.10	Termination	1-3
1.11	Consequential Damages	1-4
1.12	Patents	1-4
1.13	Uncontrollable Forces	1-4
1.14	Non-waiver	1-4
1.15	Governing Law	1-5
1.16	Assignment	1-5
1.17	Notices	1-5
1.18	Publications	1-5
1.19	Employment Practices	1-5

SECTION 2

SUPPLEMENTAL REQUIREMENTS

2.1	Scope	2-1
2.2	Supplemental Definitions	2-1
2.3	Warranty	2-1
2.4	Changes	2-1
2A.1	Documentation Requirements	2A-1
2A.2	Documentation Quality Requirements	2A-2

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

TABLE OF CONTENTS

<u>Section No.</u>	<u>Title</u>	<u>Page</u>
<u>SECTION 3</u>		
<u>TECHNICAL REQUIREMENTS</u>		
3.1	Scope	3-1
3.2	Service Conditions	3-1
3.3	Conformance to National Standards	3-1
3.4	Definition of Technical Terms	3-2
3.5	Battery Cell Plates	3-2
3.6	Plate Separators	3-2
3.7	Battery Cell Containers	3-2
3.8	Electrolyte	3-3
3.9	Cell Covers	3-3
3.10	Cell Post and Interconnectors	3-4
3.11	Terminal Lugs	3-4
3.12	Tests	3-4
3.13	Nameplate	3-6
3.14	Preparation for Shipping	3-6
3.15	Technical Assistance	3-7
3.16	Seismic Withstand Requirements	3-7
Table 3-1	Documentation Submittal List	3-8
Table 3-2	Lead Calcium Batteries	3-9
Table 3-3	Lead Antimony Batteries	3-14

SECTION 4

PROPOSAL REQUIREMENTS

4.1	Drawings	4-1
4.2	Information	4-1
Table 4-1	Proposal Document Submittal List	4-3

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

1 SOUTHERN CALIFORNIA EDISON COMPANY

2 SECTION 1 - GENERAL TERMS AND CONDITIONS

3 Category I - Fixed Price Material

4 The parties agree to enter into a contract for Supplier to sell
5 and for Company to purchase the Material specified in the Purchase
Order of which these General Terms and Conditions are a part.

6 1.1 DEFINITIONS:

7 1.1.1 Bidder: The entity submitting a proposal pursuant to
this Specification.

8 1.1.2 Change Order: Document issued by Company to Supplier to
9 change the Purchase Order.

10 1.1.3 Company: Southern California Edison Company, or where other
11 participants are set forth in Section 2, Southern California
Edison Company acting as principal in its own behalf and as
12 agent for such other participants.

13 1.1.4 Delivery Date: The date the Material is to be received
at the "Ship To" address specified in the Purchase Order.

14 1.1.5 Material: All apparatus, materials, products, supplies and
15 documentation to be provided by Supplier pursuant to the
Purchase Order. Supplier's standard product is acceptable if
16 it meets all of the requirements of the Purchase Order.

17 1.1.6 Proposal Requirements: Commercial and technical requirements
to be submitted in Bidder's proposal.

18 1.1.7 Purchase Order: Document issued by Company to Supplier in-
19 corporating by reference this set of General Terms and Con-
ditions and other applicable documents, with the following
20 priority in the event of conflicting provisions: Purchase
Order, Sections 2, 1, and 3 of the Specification.

21 1.1.8 Specification: Document issued by Company containing these
22 "General Terms and Conditions" as Section 1, the "Supplemen-
tal Requirements" as Section 2, the "Technical Requirements"
23 as Section 3, and supplements, drawings, and data sheets
attached thereto or incorporated by reference.

24 1.1.9 Supplier: The entity to which the Purchase Order is
25 addressed.

26 1.1.10 Work: All obligations of Supplier to be performed as speci-
27 fied in the Purchase Order, including the Material, and its
design, fabrication, inspection, testing, documentation, and
28 technical assistance.

1 1.2 DELIVERY: Delivery shall be "FOB Point of Shipment" unless
2 otherwise specified in the Purchase Order. Delivery of the
3 Material and specified documentation by the Delivery Date is
4 essential to maintain the operating schedule of Company facilities.
5 Deliveries may be expedited by Company. Supplier shall notify
6 the Buyer promptly of any condition affecting the Delivery Date.
7 Company may, at its sole option, accept or return deliveries
which vary from the specified Delivery Date or quantities.
When the value of a shipment exceeds \$100,000 and except
when Supplier retains risk of loss, Supplier shall notify
Company's Manager of Traffic and Transportation of such shipment
and of the carrier billing reference data at the time such
Material is accepted by the carrier for shipment.

8 1.3 TITLE AND RISK OF LOSS: Title and risk of loss or damage to
9 the Material shall pass from Supplier to Company at point of ship-
10 ment or at shipment destination as determined by the shipping
11 terms set forth in the Purchase Order. Title shall be free and
12 clear of any and all liens and encumbrances whatsoever.

13 When "FOB Point of Shipment," if Material is received at
14 destination in a damaged condition and a claim for such damage is
15 denied by the carrier on the basis that such damage was attribut-
16 able to the Supplier, the Supplier shall repair or replace such
17 damaged Material at no cost to the Company.

18 In any event, Supplier shall assist Company in establishing
19 carrier liability for Material damage by supplying evidence that
20 the Material was properly manufactured, packaged, and secured to
21 withstand normal transportation conditions.

22 Supplier shall be liable for any uninsured loss or damage in
23 transit, not chargeable to the carrier, resulting from Supplier's
24 failure to provide timely notice of shipment as required in
25 Section 1.2.

26 1.4 PACKAGING: Material shall be packaged and shipped in accord-
27 ance with good shipping practices. All items or their containers
28 shall be piece marked with material code or description, Purchase
Order Number and Release Number if available. Items disassembled
for shipment shall be match-marked. Unpainted surfaces and open-
ings shall be protected from impact and weather damage.

1 1.5 PAYMENT: Invoices shall be paid within 30 days after receipt
2 of the Material at the destination set forth in the Purchase Order.
3 For any portion of the Material which does not conform to the
4 requirements of the Purchase Order, a corresponding portion of the
5 price may be withheld until such nonconformance is corrected.
6 Payment shall not forfeit Company's right to inspect and accept
7 the Material and its documentation, nor shall the withholding of
8 any payment, or portion thereof, preclude Company from pursuing
9 any other rights or remedies it may have under the Purchase Order.

10 Invoices shall separately identify sales or use taxes, and
11 any freight charges for shipments other than "FOB Destination."
12 All freight charges shall be supported by a copy of the applic-
13 able freight bill. Sales and use taxes are not applicable to
14 freight charges.

1 Except for sales and use tax, the Purchase Order price for
2 the Material is inclusive of all other taxes, fees, excises and
3 charges which are now or hereafter imposed by federal, state,
4 municipal, or other local public authority.

5 1.6 ACCEPTANCE: Company shall accept the Material after suffi-
6 cient tests and inspections have been made by Company, within a
7 reasonable time after receipt of the Material, to determine that
8 the Material meets all the requirements of the Purchase Order.
9 If such inspection and tests show the Material, or any part
10 thereof, not to be as specified in the Purchase Order, Company
11 may reject such Material and Supplier shall be so advised and
12 shall promptly correct or replace such rejected Material at
13 Supplier's sole expense or, at Company's option, shall issue
14 credit for monies paid.

15 Company shall be allowed access to Supplier's facilities to
16 inspect workmanship, observe tests and inspections, expedite manu-
17 facture, and obtain required information for the Material.

18 1.7 WARRANTY: Supplier warrants that, for the period stated in
19 Section 2 after acceptance by Company, the Material shall be free
20 from defects in workmanship, materials, and design if by Supplier,
21 and shall conform to the requirements of the Purchase Order. Sup-
22 plier shall, at its sole expense and promptly after notification
23 by Company, correct or replace such defective Material, FOB Desti-
24 nation. Company shall have the right to use such defective Mater-
25 ial until it can be removed from operation for correction or
26 replacement, however, any additional damage due to such continued
27 use shall be at Company's expense. Supplier shall comply with all
28 existing jobsite labor agreements in performance of corrective
Work at the jobsite. The warranty period for such corrected or re-
placed Material shall be of an equal duration as the original
warranty period and shall start upon acceptance of such corrected
or replaced Material.

1.8 STATUTES AND CODES: The Work shall comply with the applicable
requirements of all statutes, acts, ordinances, regulations, codes
and standards of legally constituted authorities having jurisdic-
tion as of the date of the Purchase Order.

1.9 CHANGES: Company may make changes in any of the provisions of
the Purchase Order by issuance of a Change Order. If such changes
affect the Delivery Date or price, Supplier shall promptly notify
the buyer and an equitable adjustment shall be negotiated.

1.10 TERMINATION: Company may terminate the Purchase Order at any
time by the issuance of a Change Order. Any charges resulting from
such termination shall be equitably negotiated by the parties or
shall be per a schedule of termination charges if set forth in the
Purchase Order. Company, at its option, may take possession of
any Material fabricated or procured to date of termination with a
corresponding adjustment in such termination charges. The provi-
sions of this Section 1.10 shall be Supplier's sole remedy result-
ing from such termination.

1 1.11 CONSEQUENTIAL DAMAGES: Supplier shall not be liable to
2 Company for loss of or use of Company's facilities, loss of rev-
3 enue, cost of replacement power, and claims of any customer of
4 Company arising out of Company providing electric service to such
5 customer, resulting from Supplier's performance or nonperformance
6 of its obligations under the Purchase Order.

7 Company shall not be liable to Supplier for loss of antici-
8 pated profits, and loss of use of or under-utilization of Sup-
9 plier's labor or facilities, resulting from Company's performance
10 or nonperformance of its obligations under the Purchase Order, or
11 in the event of termination of the Purchase Order.

12 1.12 PATENTS: If any action or proceeding brought against Company
13 is based on a claim of patent infringement arising out of Sup-
14 plier's performance of the Work or Company's use of the Material
15 and, if Company promptly notifies Supplier in writing of any such
16 action or proceeding, Supplier shall, at its own expense, do the
17 following to assure continuation of the Work or of the use of the
18 Material: (i) defend such action or proceeding and pay all
19 damages, costs, losses, claims, awards, settlements, attorney's
20 fees and expenses, or any of them, arising out of such action or
21 proceeding; (ii) procure for Company the right to continue to use
22 any part of the Material affected by such action or proceeding,
23 or replace or modify, with Company's approval, any infringing
24 Material such that the infringement is removed; (iii) if in any
25 such action or proceeding a temporary restraining order or pre-
26 liminary injunction be granted, Supplier shall, by giving a
27 satisfactory bond, or otherwise, endeavor to secure the suspension
28 of such restraining order or preliminary injunction.

Company shall cooperate reasonably with Supplier at no cost
to Supplier in any defense of the actions and proceedings. Sup-
plier shall give Company prompt written notice of any potential
patent infringement problems of which it becomes aware.

18 1.13 UNCONTROLLABLE FORCES: Supplier shall not be liable for
19 delay in the Delivery Date or failure to perform the Work due to
20 any cause beyond its reasonable control, such as strike, flood,
21 fire, lightning, epidemic, quarantine restriction, war, sabotage,
22 act of a public enemy, earthquake, or material availability;
23 provided that Supplier promptly notifies Company in writing of
24 the nature, cause, date of commencement and expected impact of
25 the event and has exercised due diligence in proceeding to meet
26 the Delivery Date, then Company shall extend the Delivery Date
27 for an equitable period due to such causes.

24 1.14 NON-WAIVER: The failure of Company to enforce any of the
25 terms and conditions, or to exercise any right or privilege in the
26 Purchase Order, shall not be construed as thereafter waiving any
27 such terms and conditions or right or privilege and the same shall
28 continue and remain in force and effect as if no such failure to
enforce or exercise had occurred. No waiver by Company shall be
valid unless waived by a Change Order.

- 1 1.15 GOVERNING LAW: The Purchase Order shall be interpreted,
2 governed and construed under the laws of the State of California
3 as if executed and to be performed wholly within the State of
4 California.
- 5 1.16 ASSIGNMENT: Neither the Purchase Order nor any interest
6 under it shall be assigned to any entity without the prior written
7 consent of Company. The Purchase Order shall not be deemed an
8 asset of Supplier. If Supplier enters into any voluntary or
9 involuntary receivership, bankruptcy, or insolvency proceedings,
10 the Purchase Order may be cancelled at Company's option upon five
11 days written notice to Supplier.
- 12 1.17 NOTICES: Any notice pertaining to the Purchase Order shall
13 be in writing and sent registered or certified mail, postage pre-
14 paid, to Company or to Supplier, as appropriate, at their respec-
15 tive addresses appearing in the Purchase Order.
- 16 1.18 PUBLICATIONS: No publication concerning the Work shall be
17 made by Supplier without prior written authorization by Company.
- 18 1.19 EMPLOYMENT PRACTICES: The employment practices preprinted
19 on the back of the Purchase Order form shall apply.

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SPECIFICATAION A11-1978
(Revision of A11-1976)

LEAD ACID BATTERY CELLS FOR SUBSTATIONS, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

SECTION 2

SUPPLEMENTAL REQUIREMENTS

2.1 SCOPE

This Specification is a revision of Specification A11-1976. Due to extensive changes, Manufacturers are requested to read A11-1978 in its entirety.

2.2 SUPPLEMENTAL DEFINITIONS

- A. The terms "Apparatus" and "Material" are used synonymously herein.
- B. The terms "Manufacturer" and "Supplier" are used synonymously herein.
- C. Circles in the margin of the pages are for Company's use in preparing a proposal request.

2.3 WARRANTY (REF. SECTION 1.7)

The warranty period shall be one year from Acceptance. Acceptance will occur when the Apparatus is placed in commercial operation or six months after delivery, whichever is first.

2.4 CHANGES

Certain batteries have been qualified for Company's use; any changes in the design, materials, or manufacturing process for previously qualified batteries shall be described in writing and submitted for approval. The changes will be approved or disapproved in writing by Company's Manager of Material Services, with the concurrence of the Chief Apparatus Engineer and the user departments.

SUBSECTION 2A

DOCUMENTATION

2A.1 DOCUMENTATION REQUIREMENTS

All Documentation specified in Table 3-1, Section 3, shall be provided by Supplier in the form and quantity specified.

A. All Documentation submitted shall be accompanied by a letter of transmittal which shall provide the following:

1. Company Project Name(s)
2. Company Purchase Order Number
3. This Specification Number
4. The Item Number as Referenced on the Documentation Submittal Schedule, Table 3-1
5. The Document Identification Number, Title, Revision and Date
6. Supplier's Description and Quantities of Items Sent
7. Supplier's Correspondence Identification
8. Updated Drawing List

B. Submittals shall be addressed as follows:

Southern California Edison Company
Engineering Data Management (EDM)
Administrative Services Department
P. O. Box 800
Rosemead, California 91770

- C. Drawings shall be submitted in sets and each set shall be accompanied by a drawing list which shall list each drawing in the set with its number, title, revision identification and release date.
- D. A Master Drawing List shall identify, in numerical order, all the drawings used in the design and manufacture of the Work defined by this Specification. All drawings shall be listed by drawing number, title, revision identification and date, and status.
- E. Unless otherwise specified in writing by Company, all documents submitted to Company for approval shall be returned to Supplier not later than 30 days after receipt by Company. Company shall indicate approval status and action required.
- F. Company-approved documents shall not be changed without prior written approval from Company. Approved changes shall be incorporated into the applicable documents and transmitted in the final form to Company.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

DOCUMENTATION

- G. Supplier's drawings shall be reviewed and approved by Company only as to arrangement and conformance to Specification. Such approval shall not be construed to relieve or mitigate Supplier's responsibility for accuracy or adequacy of design, materials and/or equipment represented thereon.
- H. Catalogs, bulletins and other published documents shall not be microfilmed. They shall be prepared in the best commercial practice and be suitable for microfilming to the quality requirements specified herein. In general, these documents shall conform to the quality requirements for hard copy specified in Section 2A.2.A.

2A.2 DOCUMENTATION QUALITY REQUIREMENTS

All submittals of Documentation shall be in one or the other of the following forms. The preferred form is shown in Table 3-1.

2A.2.1 Hard Copy Documents

- A. Legibility and contrast of the documents shall be such that every line, number, letter and character shall be clearly legible.
- B. Reproductive quality shall be of such clarity as to produce a third generation copy which will meet the legibility requirements of Item 1.
- C. Documentation shall be right reading from the image side and shall have dark lines on a light background (positive).
- D. Documentation may be reproducible (translucent or transparent) or nonreproducible (opaque).
- E. Insofar as practicable, Documentation shall be typed and arranged in a neat and professional manner. Handwritten documents shall conform to the legibility requirements of Item 1, above, and the quality requirements of Item 2, above.
- F. Documents, when applicable, shall contain a table of contents, list of figures, and tables of applicable, referenced or complementary documents.

2A.2.2 Aperture Cards (35 mm)

- A. Microfilm shall be silver halide type in negative form. (Clear lines on a black background.)

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

DOCUMENTATION

- B. The frame size shall remain constant at 1.250 inch, plus .000 inch minus .032 inch, across the width of the microfilm by 1.750 inch, plus 0.62 inch minus .000 inch, along the length of the microfilm. The frame shall be centered across the width of the microfilm.
- C. Film chip shall cover the entire aperture of the card.
- D. The document image area shall not occupy an area larger than 1.197 inch by 1.615 inch in the microfilm frame.
- E. The reduction ratio shall be as follows and be included in the image area:

Width \leq 18 inches 14.5X or 16X

Length \leq 24 inches

18 inches < Width \leq 24 inches 24X

24 inches < Length \leq 36 inches

Width > 24 inches 29X or 30X

Length > 36 inches

Drawings more than 34 inches but not more than 48 inches in width shall be rotated 90° when microfilming.

- F. The background density of processed microfilm shall be 0.90 through 1.20. All densities are gross densities.
- G. Each frame of microfilm shall be exposed and processed so that every line and character on the document appears on the microfilm with sufficient clarity to permit reproducibility through three successive microfilm reproductions. Film shall be free of scratches, light patches, fogged areas, water marks and air bells.

The third generation microfilm shall be used to make paper prints using any enlargement ratio in the range of 14X through 16X. The quality of this print shall be such that every line, number and character be clearly legible.

- H. The microfilm shall meet the conditions for residual hypo content as specified by ANSI Standard PH4.8-1971. If one or more of the samples fail to pass the hypo residual test, the lot shall be rejected.

- I. Each microfilm aperture card shall be clearly and legibly identified as follows:

Supplier's	Revision		Company's Purchase
<u>Drawing No.</u>	<u>Number</u>	<u>Date</u>	<u>Order Number</u>

SPECIFICATION A11-1978
 Lead Acid Battery Cells for
 Substation, Generation, Tele-
 Communication and Related Facilities

SPECIFICATION A11-1978
(Revision of A11-1976)

LEAD ACID BATTERIES FOR SUBSTATIONS, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

SECTION 3

TECHNICAL REQUIREMENTS

3.1 SCOPE

This Specification covers the requirements of lead-acid batteries used in Company substations, generating stations, telecommunication and related facilities. The batteries are listed by eight hour and one minute ratings on Table 3-2, Pages 3-9 through 3-14.

3.2 SERVICE CONDITIONS

- A. The batteries covered by this Specification may be used to supply dc power for circuit breaker operation, relay and control circuits, pilot and emergency lights, emergency motor loads, electronic devices, communication equipment or for any other station requirements for dc power.
- B. Each battery will be floated continuously on a battery charging device of sufficient capacity to carry any floating load, and also to give the battery a periodic overcharge. The battery charging device will have 1/2 percent voltage regulation.
- C. The elevation of a battery location may vary between sea level and 11,000 feet (3,353 meters).
- D. All batteries shall be located indoors and protected from the weather; however, the relative humidity will range from 5 percent to 95 percent.
- E. Unless otherwise specified in the proposal request, the batteries will be located in an area where the ambient temperature may vary from a 25°F (-3.9°C) to 110°F (43.3°C) with a yearly average ambient temperature at 80°F (26.7°C).
- F. Batteries located in substation and generation facilities will be connected to an ungrounded or a high resistance grounded dc system. In telecommunication facilities, the battery will be grounded on the positive polarity.

3.3 CONFORMANCE TO NATIONAL STANDARDS

Unless otherwise specified herein, batteries purchased under this Specification (A11-1978) shall conform to the following standards:

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communications and Related Facilities

TECHNICAL REQUIREMENTS

ANSI/IEEE 100-1977	Dictionary of Electrical and Electronic Terms.
ANSI/IEEE 450-1975	Recommended Practice for Maintenance, Testing and Replacement of Large Stationary Type Power Plant and Substation Lead Storage Batteries.
ANSI/IEEE 484-1975	Recommended Practice for Installation of Lead Storage Batteries for Generating Stations and Substations.
IEEE ST. 485-1978	IEEE Recommended Practice for Sizing Large Lead Storage Batteries for Generating Stations and Substations.

3.4 DEFINITIONS OF TECHNICAL TERMS

Unless otherwise specified, the definitions of technical terms contained in ANSI/IEEE Standard 100-1977, Dictionary of Electrical and Electronic Terms, shall apply.

3.5 BATTERY CELL PLATES

- A. The positive plates of cells for applications covered by this Specification may be of the Plante type, Tubular type, or of the Pasted plate type.
- B. The negative plates shall have a life expectancy equal to or greater than the life expectancy of the positive plates.
- C. The grids of positive and negative plates shall be so constructed as to resist warping.
- D. The material used for the tubes in tubular-type batteries shall not crack or split as a result of a "deep" or over-discharge.

3.6 PLATE SEPARATORS

Wood shall not be used for plate separators. Separators shall be made of rubber or plastic, and shall be microporous with a minimum porosity of 50 percent. They shall not crack, crumble, disintegrate or break down.

3.7 BATTERY CELL CONTAINERS

- A. The battery cell containers shall be made of heat-resistant transparent, high-impact plastic, or Company approved equivalent material.
- B. Containers shall be of sufficient size to allow ample sediment space so that cleaning will not be required during the normal life of the cells.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communications and Related Facilities

TECHNICAL REQUIREMENTS

C. Containers shall have adequate space above the top of the plates to allow a sufficient level of electrolyte to eliminate the need for watering more frequently than is customary for the service intended.

D. Containers shall be marked with high and low water lines to permit a visual check of the water level while the cells are in service.

E. Acid absorption of the container material shall not exceed one percent by weight.

F. When additional containers are required, the quantity will be specified in the proposal request.

3.8 ELECTROLYTE

A. The electrolyte shall be of the highest grade of battery acid. It shall be free of all impurities that are harmful to battery performance and service life.

B. Unless otherwise specified in the proposal request, the specific gravity of the electrolyte, in a fully charged cell, shall be 1.21 ± 0.01 at an electrolyte temperature of 77°F (25°C).

3.9 CELL COVERS

A. Cell covers shall be of plastic or other material commercially approved for the application and shall not crack or warp throughout the life of the cell.

B. If the plate assembly is supported by the cell cover, the cover shall have sufficient strength to support the assembly without deformation.

C. Each cell shall be provided with a vented filler cap. The vented filler cap shall not allow the ignition of gases within the cell from an external spark or flame.

D. The joints between the cover and the container shall be gas tight and effectively and permanently sealed against creepage of electrolyte. The sealant used shall be an acid-resisting material.

E. When spare covers are required, the quantity will be specified in the proposal request.

F. Unless otherwise specified in the proposal request, the material used in the battery cell covers shall meet the requirements of ASTM Standard D-703-67, Polystyrene Molding and Extrusion Material.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communications and Related Facilities

TECHNICAL REQUIREMENTS

3.10 CELL POSTS AND INTER-CELL CONNECTORS

- A. Posts and intercell connectors shall be adequate to carry, without excessive heating or voltage drop, the current incident to the service application.
- B. Cell posts shall be effectively and permanently sealed to prevent leakage of the electrolyte.
- C. Non-oxide grease shall be applied to the posts and burn-ring seals of the batteries by the Manufacturer prior to shipment to Company.
- D. Polarity of the cell posts shall be clearly and permanently identified.
- E. Intercell connectors, when bolted to the cell posts, shall not obstruct the vented filler cap.
- F. Unless otherwise specified in the proposal request, the Manufacturer shall furnish lead-coated copper inter-cell connectors of sufficient length to permit 1/2-inch separation between the cells. The connectors shall be furnished complete with bolts, nuts, and any special tools or wrenches.
- G. Inter-unit connectors for multiple cell units shall not be bolted to the cell posts but shall be shipped with the cells in a properly identified package. The connectors, when installed by Company, shall be at right angles (horizontally) to the appropriate sides of the unit and not on a diagonal.

3.11 TERMINAL LUGS

If required, the size and quantity of the terminal lugs for Company cables will be specified in the proposal request.

3.12 TESTS

3.12.1 General

- A. As part of the acceptance of the batteries, Company reserves the right to make any of the tests listed in Sections 3.12.2 through 3.12.6, inclusive.
- B. When it is not possible, prior to delivery, to complete any test such as "Life Test" on cells or batteries taken from current production, the Manufacturer shall make available his records of tests on the preceding "lot" to establish proof that cells and batteries of like design and

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communications and Related Facilities

TECHNICAL REQUIREMENTS

manufactured under substantially identical conditions meet the requirement of this Specification.

NOTE

A "lot" is defined as being all cells or batteries produced during an identifiable production period, in one plant, under substantially identical conditions.

3.12.2 Efficiency Test

A. Ampere-Hour Efficiency: A new and fully charged battery shall be discharged at its 8-hour rate to 1.75 volts per cell. The exact ampere-hours delivered shall be recorded. On the recharge, the same number of ampere-hours shall be put back at the same current. A second discharge shall then be made at its 8-hour rate to 1.75 volts per cell. The efficiency of the battery is the ratio of the ampere-hours delivered during the second discharge to the ampere-hours put in on the charge. The efficiency of the battery under service conditions shall not be less than 85 percent.

B. Energy Efficiency: The energy or watt-hour efficiency is equal to the ampere-hour efficiency multiplied by the ratio of the average voltage during discharge to the average voltage during charge. The average voltage is obtained from the time integral of the voltage curve. The energy efficiency of the battery under service conditions shall not be less than 75 percent.

3.12.3 Retention of Charge Test

The cell or battery shall be fully charged and then allowed to stand on an open circuit in an ambient temperature of 85°F (29.4°C) for a period of 30 days. The specific gravity drop measured on any cell after the 30-day period shall not exceed the following:

	<u>Percent</u>
Lead Calcium Cells	0.005
Lead Antimony Cells	0.015
Plante Cells	0.015

3.12.4 Life Test

Either normal or proven accelerated test programs approved by Company may be used to determine battery life. In either case, the cells or batteries shall be float charged within the temperature and terminal voltage ranges specified by the Manufacturer for his test program. All necessary data to substantiate

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communications and Related Facilities

TECHNICAL REQUIREMENTS

a predictive claim of 20-year service life for the battery shall be collected and recorded throughout the test period. The following information is a minimum requirement:

- A. Total number of units (cells or batteries) tested.
- B. The distribution of test durations.
- C. The conditions of test (e.g. temperature, humidity, terminal voltage).
- D. The criteria for success.
- E. The justification for any time acceleration claimed.
- F. The justification for any exclusions of failed units from test data and life capability assessment.
- G. The lower 90 percent confidence bound of the mean time to failure, together with the calculations.

3.13 NAMEPLATE

Each battery shall have a non-corrosive nameplate with the following information legibly and permanently marked on it:

- A. Manufacturer's name.
- B. Manufacturer's type and number of plates.
- C. Ampere-hour capacity.
- D. Month and year of manufacture.

3.14 PREPARATION FOR SHIPPING

- A. The cells shall be shipped filled with electrolyte and fully charged unless otherwise specified.
- B. Cells shall be packed in a manner to resist damage due to shipping conditions.
- C. Intercell connectors shall be packed and shipped per Section 3.10.G.

TECHNICAL REQUIREMENTS

3.15 TECHNICAL ASSISTANCE

When specified in the Purchase Order, the Manufacturer shall furnish technical assistance during installation, adjustment, and energizing of the batteries. All special tools, jigs, fixtures, and necessary appurtenances shall be made available to Company to properly align, adjust, and test the batteries.

3.16 SEISMIC WITHSTAND REQUIREMENTS

Seismic withstand requirements will be as specified in the proposal request.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

ITEM	TYPE OF DOCUMENTATION REQUIRED	REFERENCE SECTION	NUMBER AND TYPE OF SUBMITTALS AFTER AWARD OF CONTRACT				APPROVAL DOCUMENTS REQUIRED NO. OF DAYS AFTER AWARD	REMARKS
			FOR APPROVAL		AFTER APPROVAL			
			QTY.	PREF. FORM	QTY.	PREF. FORM		
A.	Outline Dimension Drawings	--	3	N	8	R	30	
B.	Descriptive Bulletins	--	3	N	8	R	30	
	Note: One set of items A and B shall be included with each set of batteries shipped.							

LEGEND: N - Nonreproducible, R - Reproducible, A - 35 mm Aperture Card

TABLE 3-1 DOCUMENTATION SUBMITTAL SCHEDULE

3-8

LEAD CALCIUM BATTERIES

8-HOUR RATING AMPERE-HOUR	C&D (FAURE)		EXIDE (FAURE)		GOULD (FAURE)	
	1-MINUTE RATING AMPERE	CATALOG NUMBER	1-MINUTE RATING AMPERE	CATALOG NUMBER	1-MINUTE RATING AMPERE	CATALOG NUMBER
25	38	3DCU-3	-	-	-	-
30	-	-	45	LC3	-	-
50	75	3DCU-5	75	CC3	75	3DSC-5
75	111	3DCU-7	-	-	105	3DSC-7
100	148	3DCU-9	148	CC5	130	3DSC-9
120	184	2DCU-11	-	-	-	-
150	220	DCU-13	219	CC7	220	DC-13
170	-	-	-	-	234	2MCX-170
175	253	DCU-15	-	-	253	DC-15
190	-	-	-	-	212	2MCX-190
200	288	DCU-17	288	CC9	-	-
250	334	KC-7	299	EC5	-	-
255	-	-	-	-	339	2MCX-255
260	-	-	453	EC7	-	-
275	-	-	279	EU-5	-	-
285	-	-	-	-	303	MCX-285
330	500	KC-9	-	-	-	-

3-9

TABLE 3-2

LEAD CALCIUM BATTERIES

<u>8-HOUR RATING AMPERE-HOUR</u>	<u>C&D (FAURE)</u>		<u>EXIDE (FAURE)</u>		<u>GOULD (FAURE)</u>	
	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>
340	-	-	-	-	448	MCX-340
350	-	-	584	EC9	-	-
360	-	-	411	EU-7	-	-
410	614	KC-11	-	-	-	-
415	-	-	538	EU-9	-	-
425	-	-	-	-	550	MC425
440	-	-	705	EC11	-	-
495	724	KC-13	-	-	-	-
510	-	-	-	-	654	MCX-510
525	-	-	660	EU-11	-	-
530	-	-	816	EC13	-	-
577	830	KC-15	-	-	-	-
590	-	-	777	EU-13	-	-
595	-	-	-	-	756	MCX-595
600	-	-	-	-	712	NCX-600
620	-	-	952	EC15	-	-
660	932	KC-17	-	-	-	-
700	-	-	1040	EC17	-	-

3-10

TABLE 3-2

LEAD CALCIUM BATTERIES

8-HOUR RATING AMPERE-HOUR	C&D (FAURE)		EXIDE (FAURE)		GOULD (FAURE)	
	1-MINUTE RATING AMPERE	CATALOG NUMBER	1-MINUTE RATING AMPERE	CATALOG NUMBER	1-MINUTE RATING AMPERE	CATALOG NUMBER
705	-	-	889	EU-15	-	-
742	1030	KC-19	-	-	-	-
750	-	-	-	-	880	NCX-750
755	-	-	996	EU-17	-	-
790	-	-	1130	EC19	-	-
825	1123	KC-21	856	GC-9	-	-
840	-	-	645	GU-9	-	-
880	-	-	1210	EC21	-	-
900	-	-	-	-	1044	NCX-900
927	1060	LC-13	-	-	-	-
970	-	-	1025	GC-11	-	-
1050	-	-	1070	FHC15	1204	NCX-1050
1082	1223	LC-15	-	-	-	-
1100	-	-	910	GU-13	-	-
1100	-	-	1270	GC-13	-	-
1200	-	-	1420	GC-15	1360	NCX-1200
1236	1400	LC-17	-	-	-	-

3-11

TABLE 3-2

LEAD CALCIUM BATTERIES

<u>8-HOUR RATING AMPERE-HOUR</u>	<u>C&D (FAURE)</u>		<u>EXIDE (FAURE)</u>		<u>GOULD (FAURE)</u>	
	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>
1350	-	-	1330	FHC19	1494	NCX-1350
1390	1572	LC-19	-	-	-	-
1500	-	-	1640	GC-17	1620	NCX-1500
1545	1747	LC-21	-	-	-	-
1510	-	-	1134	GU-15	-	-
1600	-	-	1793	GC19	-	-
1650	-	-	1134	GU-15	1782	NCX-1650
1680	-	-	1280	GU-17	-	-
1700	1888	LC-23	1946	GC-21	-	-
1800	-	-	2100	GC-23	1932	NCX-1800
1850	-	-	1420	GU-19	-	-
1854	2060	LC-25	-	-	-	-
1950	-	-	-	-	2080	NCX-2100
2010	2230	LC-27	-	-	-	-
2020	-	-	1560	GU-21	-	-
2090	2330	LC-29	-	-	-	-
2100	-	-	-	-	2240	NCX-2100
2150	-	-	2340	GC-25	-	-

3-12

TABLE 3-2

LEAD CALCIUM BATTERIES

8-HOUR RATING AMPERE-HOUR	<u>C&D (FAURE)</u>		<u>EXIDE (FAURE)</u>		<u>GOULD (FAURE)</u>	
	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>
2200	-	-	1750	GU-23	-	-
2240	2500	LC-31	-	-	-	-
2250	-	-	2490	GC-27	2400	NCX-2250
2350	-	-	2640	GC-29	-	-
2360	-	-	1885	GU-25	-	-
2400	-	-	-	-	2560	NCX-2400
2450	-	-	2790	GC-31	-	-
2530	-	-	2020	GU-27	-	-
2550	-	-	2940	GC-33	2720	NCX-2550

3-13

TABLE 3-2

LEAD ANTIMONY BATTERIES

<u>8-HOUR RATING AMPERE-HOUR</u>	<u>EXIDE (PLANTE)</u>		<u>EXIDE (TUBULAR)</u>	
	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>	<u>1-MINUTE RATING AMPERE</u>	<u>CATALOG NUMBER</u>
40	71	DMP-5	-	-
60	105	DMP-7	-	-
80	138	DMP-9	-	-
120	179	EMP-7	-	-
160	235	EMP-9	-	-
200	288	EMP-11	-	-
240	339	EMP-13	-	-
2130	-	-	1240	FHGS-29

TABLE 3-3

SPECIFICATION A11-1978
(Revision of A11-1976)

LEAD ACID BATTERIES FOR SUBSTATIONS, GENERATION,
TELECOMMUNICATION AND RELATED FACILITIES

SECTION 4

Drawings and Information to be Furnished with Proposal

4.1 DRAWINGS

Each Bidder shall furnish as part of his proposal three sets of drawings listed on Table 4-1. If available, pictures and general descriptive bulletins shall also be furnished.

4.2 INFORMATION

4.2.1 Each Bidder shall furnish the following:

- A. Manufacturer's type number.
- B. Number of plates per cell.
- C. Height, width, and thickness of both the negative and positive plates.
- D. Grid thickness without paste in positive plate.
- E. Spline diameter if plates are of the tubular type.
- F. Dry weight in ounces of the positive plates.
- G. Dry weight in ounces of the negative plates.
- H. Plate separation in inches.
- I. Separator material.
- J. Material used for cell container.
- K. Quantity of electrolyte per cell.
- L. Specific gravity of fully charged cell at 77°F (25°C).
- M. Ampere discharge rating at 77°F (25°C) to 1.75 volts for 8-hour rating (this shall include the drop through one inter-cell connector).
- N. Ampere-hour efficiency for 8-hour discharge rate.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

PROPOSAL REQUIREMENTS

- O. Watt-hour efficiency for 8-hour discharge rate.
- P. Percent capacity available at 8-hour rate at 25°F (-3.89°C), 40°F (4.44°C), 50°F (10°C), 60°F (15.6°C), 70°F (21.1°C), 80°F (26.7°C) and 110°F (43.3°C).
- Q. Battery temperature at which 100 percent capacity is available at 8-hour rate.
- R. Normal "float" charge: Volts and amperes per cell.
- S. Guaranteed battery cell life expectancy in years.
- T. Minimum and maximum daily average, and yearly average ambient temperatures necessary to guarantee the life expectancy.
- U. Maximum short-circuit current.
- V. Type of inter-cell and inter-rack connectors.
- W. Sizing calculation for each battery supplied.

4.2.2 Cost for Technical Assistance

When technical assistance is required, each Bidder shall state in his proposal the amount included for this service and the number of days such service will be provided. In addition, he shall state the per diem rate for providing technical assistance over that specified above.

SPECIFICATION A11-1978
Lead Acid Battery Cells for
Substation, Generation, Tele-
Communication and Related Facilities

PROPOSAL REQUIREMENTS

Table 4-1

PROPOSAL DOCUMENTATION SUBMITTAL LIST

ITEM	DESCRIPTION	QTY.	FORM
A.	Outline Dimension Drawings,	3	N
B.	Descriptive Bulletins	3	N

Form Legend: N - Nonreproducible
R - Reproducible
M - Microfilm

SPECIFICATION

Bidder _____

Date _____



DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No. DE-AC03-77SF10501
Subcontract No. NA
Report No. (STMPO 492) DOE/SF/10501-015
Date of Report September 1978
Name & Phone No. of DOE Technical Representative Mike Lopez (415) 273-4264

TO: Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: Southern California Edison Company
P.O. Box 800
Rosemead, CA 91770

- Document Title:
Lead Acid Battery Cells for Substation, Generation, Telecommunication and Related Facilities
- Type of Document: Technical Report, Conference Paper, Journal Article, Abstract or Summary,
 Copy of Oral Presentation, Other (please specify): _____
- In order to meet a publication schedule or submission deadline, patent clearance by (Routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

4. I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:
- Attention should be directed to pages _____ of this document.
 - This document describes matter relating to an invention:
 - Contractor Invention Docket No. _____
 - A disclosure of the invention was submitted to DOE on _____ (date)
 - A disclosure of the invention will be submitted shortly _____ (approximate date)
 - A waiver of DOE's patent rights to the contractor:

has been granted, has been applied for; or will be applied for _____ (date)
5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.
- Please provide copy of clearance to Sol. Calif. Edison Co.**
6. Remarks: %Joyce Wells Room 497 P.O. Box 800
Rosemead, CA 91770
- Reviewing/Submitting Official: Name (Print/Type) Bill Von KleinSmid
Title Solar One Program Director
Signature William von KleinSmid/jr Date 9-25-84

TO: INITIATOR OF REQUEST

FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

- No patent objection to above-identified release.
- Please defer release until advised by this office.

Signed

Harold M. Piza

Date Mailed

10/9/84