

**NORTHEAST UTILITIES**



THE CONNECTICUT, NEW YORK AND MASSACHUSETTS  
THE NORTHEAST ELECTRIC LIGHT COMPANY  
THE MASSACHUSETTS ELECTRIC COMPANY  
THE NEW JERSEY ELECTRIC COMPANY  
THE NEW YORK STATE ELECTRIC COMPANY  
THE NEW YORK STATE LIGHT COMPANY  
THE NEW YORK STATE GAS COMPANY  
THE NEW YORK STATE WATER COMPANY

8431027094

SPECIFICATION SP-EE-146

P.A. 83-068

SPECIFICATION

FOR

MILLSTONE UNIT ONE

REPLACEMENT 125V STATION BATTERIES

NORTHEAST UTILITIES SERVICE COMPANY

FOR

NORTH EAST NUCLEAR ENERGY COMPANY

QA CATEGORY 1

REV. #/DATE	DESCRIPTION	ORIGINATED BY	REVIEWED BY	QA APPROVAL	APPROVED BY
Rev. 0 12/1/83	ISSUE FOR BIDS	<i>R. E. Ewing</i> 12/1/83	<i>Thomas T. Shaw</i> 12.1.83	<i>Wm. C. Long</i> 12/1/83	<i>J. B. Reagan</i> 12/1/83
Rev. 1 2/1/84	ISSUE FOR PROCUREMENT	<i>R. E. Ewing</i> 2/1/84	<i>Thomas T. Shaw</i> 2.2.84	<i>Wm. C. Long</i> 2/2/84	<i>J. B. Reagan</i> 2/2/84

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PDR ADOCK 05000245  
Q PDR



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## 1.0 Description

This specification is for furnishing two (2) replacement station batteries for the Millstone Unit 1 (MP-1) Nuclear Generating Station, located in Waterford, Connecticut. These batteries are a basic component of the plant's nuclear Class 1E power system. Accordingly, the Supplier is subject to the provisions of Part 21, Chapter 1 of Title 10 of the Code of Federal Regulations.

## 2.0 Technical Requirements

- 2.1 Batteries shall be lead calcium flat plate type for 125 VDC nominal operation, manufactured by Gould National Batteries, Inc., (GNB). Gould cell type shall be NCX-2550 with physical characteristics as shown on Attachment (1), manufacturer's specification sheets.
- 2.2 Standard accessories shall be included per Supplier catalog. Inter-tier and inter-step connectors and cable connectors shall be supplied to accommodate the battery arrangement as shown on SK-1, Rev. 1, attached.

## 3.0 Testing, Qualification, & Documentation

- 3.1 A factory acceptance test shall be performed on each battery per IEEE 450-1980 to demonstrate capacity to be 90% or greater of rated capacity at the eight (8) hour discharge rate, corrected to 77°F.
- 3.2 Batteries and racks are required to be qualified per IEEE 323-1974 and IEEE 344-1975 for the environmental and seismic conditions attached. The method of qualification shall be by certification that the batteries furnished are substantially similar to those tested through the Supplier's generic qualification type tests to the above standards. For racks supplied, seismic certification shall be by calculation using acceleration values from the attached response spectra.
- 3.3 The following documentation will be required to be submitted for Purchaser's approval at least three weeks prior to shipment.
  - 3.3.1 Reproducible (mylar) and two copies of assembled racks and assembly details, cell details, and complete material and parts list.
  - 3.3.2 Battery rack seismic calculations (2 copies).
  - 3.3.3 Rack assembly and installation instructions (5 copies).
  - 3.3.4 Battery installation and maintenance instructions (10 copies).

3.4 The following documentation will be required to be shipped with the batteries.

3.4.1 Certification to the qualification requirements stated above and that the equipment supplied was manufactured under the Supplier's QA/QC program for nuclear plant orders (2 copies).

3.4.2 Certification that each battery has successfully passed the acceptance capacity test; including a summary of the results (2 copies).

3.4.3 Complete set of all data taken during the acceptance test of battery capacity for each battery (2 copies).

4.0 (Deleted)

(1)

5.0 Schedule Requirements

5.1 Documentation per Section 3.3 shall be submitted for Purchaser's approval no later than three (3) weeks prior to scheduled shipping date.

5.2 Shipment of batteries and racks shall be no later than eight (8) weeks after receipt of order.

(1)

5.3 Batteries and racks shall be received by Purchaser no later than one (1) week after shipment from factory.

6.0 Quality Assurance

6.1 Purchaser's QA representative shall witness the factory acceptance test of battery capacity and verify through review of manufacturing records that the items supplied were built in accordance with the same requirements as those used for qualification per manufacturer's generic test reports.

6.2 This procurement is to be processed in accordance with your Quality Assurance Program for nuclear work.

(1)

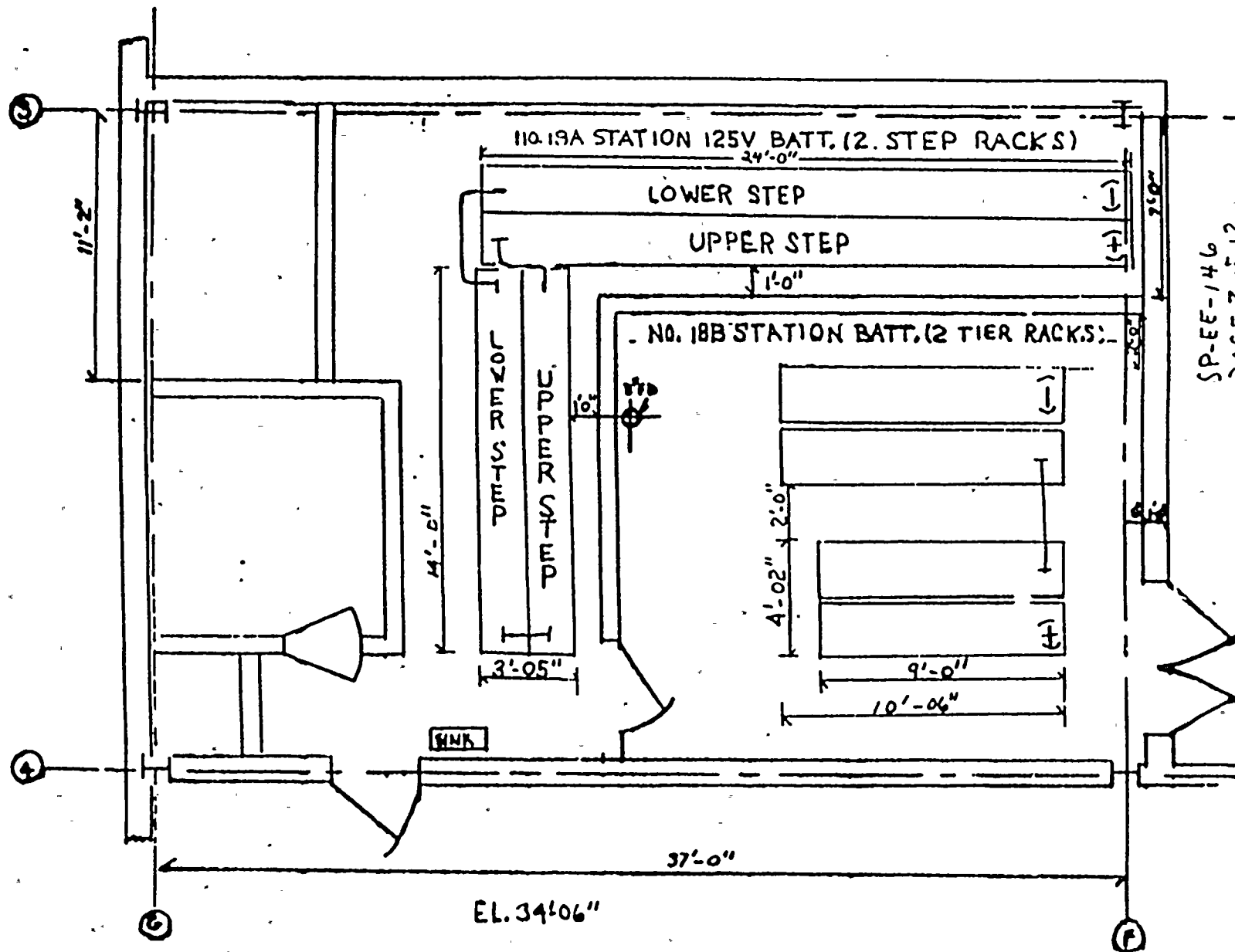
7.0 Packaging & Shipping

7.1 Packaging and shipping shall be in accordance with ANSI N45.22 - 1972, Level B.

BY RSE... DATE 2-1-84  
 CMD. BY... DATE

**BATTERY ARRANGEMENT**  
**MILLSTONE UNIT ONE**  
 SK-1 REV. 1

DRAWING NO. 1 OF 1  
 JOB NO. PA 83-068





### Definitions

Definitions of terms used to describe temperature conditions shown are as follows:

NMA - Normal Maximum Average

MNE - Maximum Normal Excursion

MAE - Maximum Abnormal Excursion

The NMA is a weighted average temperature within the given temperature range. For purposes of aging components, the component should be considered to be continuously exposed to the NMA temperature for 40 years with the MNE and MAE temperature cycles superimposed on this profile.

### Normal Environment Battery Room (40 year life)

#### Temperature

Range: 65-85°F

NMA: 75°F

104°F

MNE: 104°F

75°F

7 Days

5 Cycles/Year

Pressure: Atmosphere

Relative Humidity: 10-70 percent

One-Time Accident Environment: N/A

Radiation Doses (RADS) - 40 year life plus accident:  $< 1 \times 10^4$

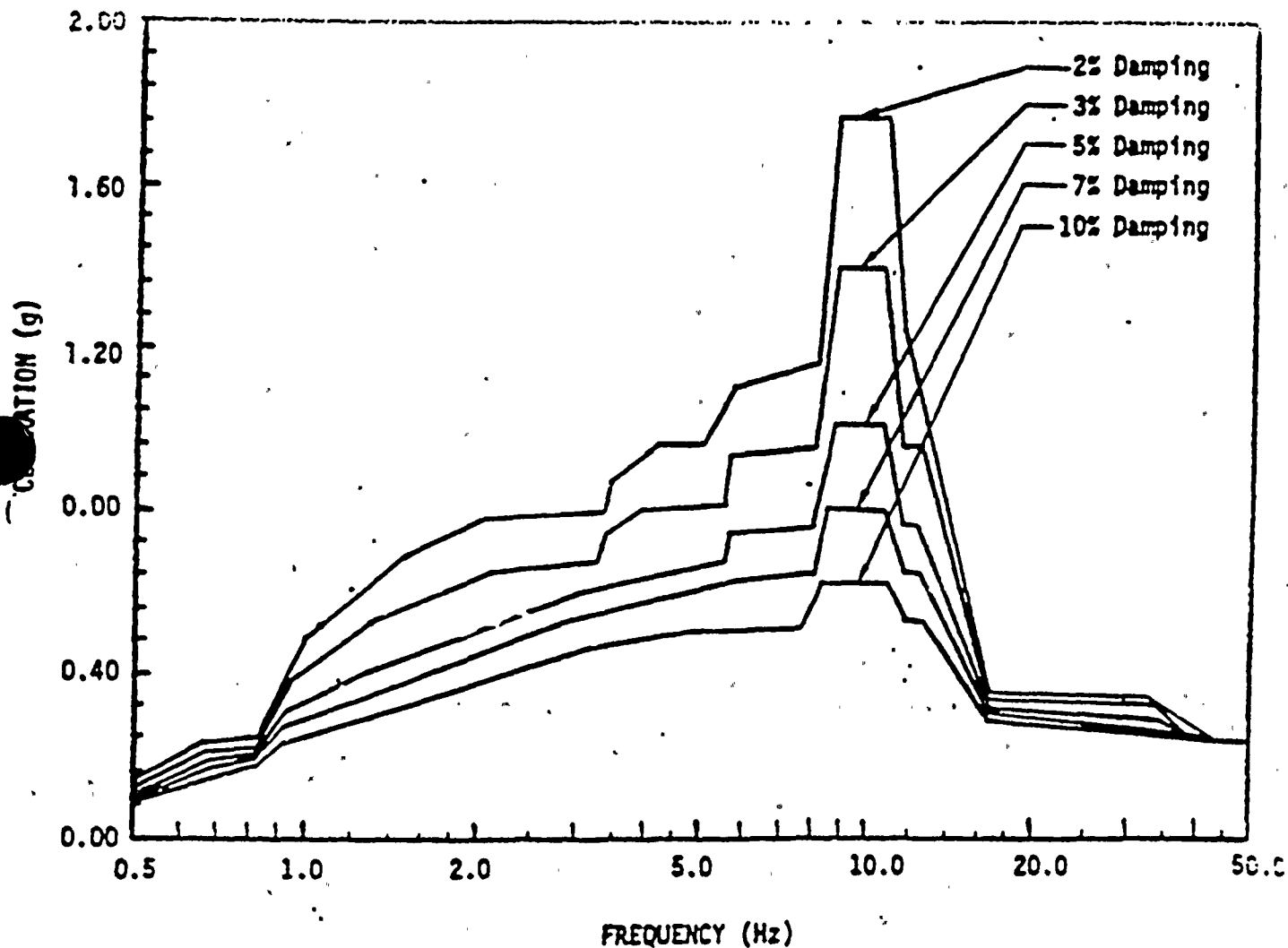
SP-EE-146

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TURBINE BUILDING  
N-S DIRECTION  
34'-06" Elevation  
Mezzanine



SSE CURVES

USE 3% DAMPING

FIGURE B-1 INSTRUCTURE SSE RESPONSE SPECTRA  
MILLSTONE UNIT 1  
SYSTEMATIC EVALUATION PROGRAM  
EDS REPORT NO. 02-0240-1094  
REVISION 2  
MARCH 1982

OBE = 2/3 SSE

USE 2% DAMPING

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TURBINE BUILDING

E-W DIRECTION

34'-06" Elevation

Mezzanine

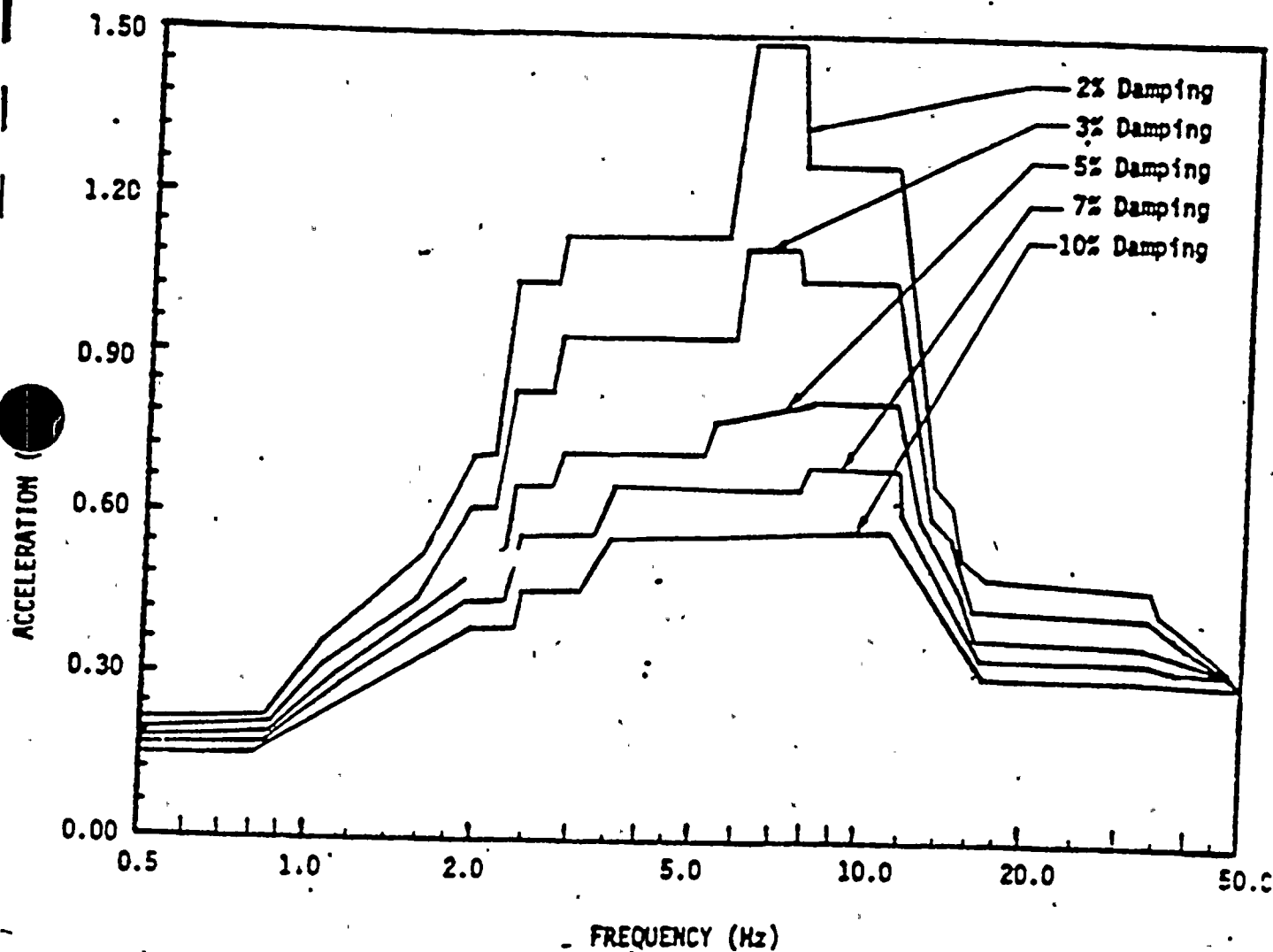


FIGURE B-2

SSE CURVES USE 3% DAMPING  
INSTRUCTURE SSE RESPONSE SPECTRA  
MILLSTONE UNIT 1  
SYSTEMATIC EVALUATION PROGRAM  
EDS REPORT NO. 02-0240-1094  
REVISION 0  
MARCH 1982

OBE = 2/3 SSE

USE 2% DAMPING

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TURBINE BUILDING  
VERTICAL (Vt - 1)  
34'-06" Elevation

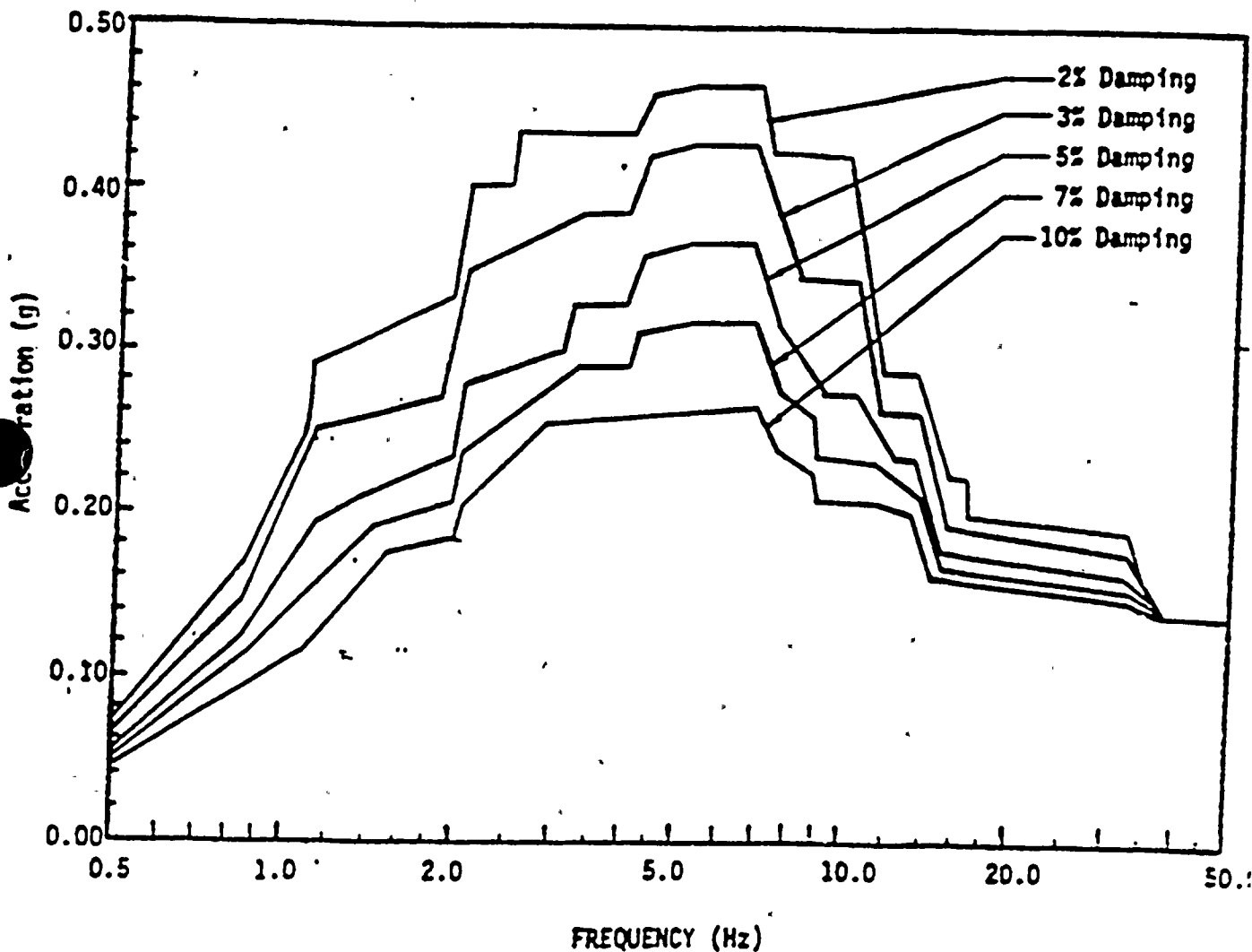


FIGURE 6-9 INSTRUCTURE SSE RESPONSE SPECTRA  
MILLSTONE UNIT 1  
SYSTEMATIC EVALUATION PROGRAM  
EDS REPORT NO. 02-0240-100  
REVISION 0  
MARCH 1982

OBE = 2/3 SSE USE 3% DAMPING

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# Switchgear and General Industrial Stationary Power Cells

**CAPACITIES—600 A.H. to 2550 A.H.  
@ 8 HOUR RATE TO 1.75 V.P.C. AVERAGE**

**Type: NAX and NCX  
Antimony and Calcium**

## SPECIFICATIONS

Container — Styrene-Acrylonitrile Plastic

Cover — Butadiene Styrene

Separators — Microporous Material

Retainers — Fiberglass Mats

Posts — See Below<sup>1</sup>

Post Seals — Floating O-Ring—Seal Nut

Vents — Gould (GNB) "Pre-Vent"™

Level Lines — High and Low - All Jar Faces

Electrolyte — Height Above Plates — 2.75" (70 mm)

Sediment Space — 1.06" (27 mm)

Specific Gravity — 1.215 @ 77°F (25°C)

Inter-Cell Connectors — Lead Plated Copper

NAX/NCX-1650

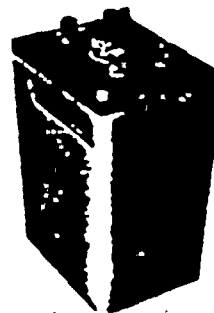


Plate Dimensions	Height	Width	Thickness
Positive Plate	15 in 381.3 mm	12.5 in 317.5 mm	320 in 8.13 mm
Negative Plate	15 in 381.3 mm	12.5 in 317.5 mm	276 in 6.96 mm

<sup>1</sup> Posts—600 A.H. to 1200 A.H. Two—1½" squares. 1350 A.H. to 1950 A.H. Four—1" squares. 2100 A.H. to 2550 A.H. Four—1½" squares.

## PHYSICAL CHARACTERISTICS

Cell Type		Plates Per Cell	Overall Dimensions			Antimony		Calcium		Elect. Per Cell	
Antimony	Calcium		L	W	H	Net Weight	Packed Weight	Net Weight	Packed Weight	Gals.	Liters
NAX-600	NCX-600	9	15.4 in 391.4 mm	14.50 in 368.3 mm	22.13 in 564.2 mm	173 lb 78 kg	186 lb 84 kg	177 lb 80 kg	189 lb 86 kg	8.8	25.1
NAX-750	NCX-750	11	7.30 in 184.8 mm	14.50 in 368.3 mm	22.13 in 564.2 mm	191 lb 87 kg	203 lb 92 kg	195 lb 88 kg	207 lb 94 kg	9.8	23.4
NAX-900	NCX-900	13	7.30 in 184.8 mm	14.50 in 368.3 mm	22.13 in 564.2 mm	209 lb 95 kg	221 lb 100 kg	213 lb 97 kg	225 lb 102 kg	9.1	21.3
NAX-1050	NCX-1050	15	7.30 in 184.8 mm	14.50 in 368.3 mm	22.13 in 564.2 mm	227 lb 103 kg	239 lb 108 kg	231 lb 106 kg	243 lb 110 kg	4.9	28.5
NAX-1200	NCX-1200	17	7.30 in 184.8 mm	14.50 in 368.3 mm	22.13 in 564.2 mm	245 lb 111 kg	257 lb 117 kg	249 lb 113 kg	261 lb 119 kg	5.8	20.9
NAX-1350	NCX-1350	19	8.25 in 214.2 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	277 lb 126 kg	290 lb 131 kg	282 lb 128 kg	294 lb 134 kg	6.3	28.4
NAX-1500	NCX-1500	21	8.25 in 214.2 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	296 lb 136 kg	308 lb 140 kg	301 lb 137 kg	313 lb 142 kg	6.8	25.1
NAX-1650	NCX-1650	23	11.30 in 286.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	342 lb 156 kg	356 lb 164 kg	348 lb 158 kg	360 lb 166 kg	8.8	33.5
NAX-1800	NCX-1800	25	11.30 in 286.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	367 lb 167 kg	379 lb 173 kg	364 lb 166 kg	382 lb 174 kg	7.8	31.8
NAX-1950	NCX-1950	27	11.30 in 286.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	373 lb 170 kg	381 lb 173 kg	368 lb 173 kg	386 lb 181 kg	7.3	28.5
NAX-2100	NCX-2100	29	14.50 in 368.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	438 lb 200 kg	457 lb 208 kg	448 lb 203 kg	464 lb 211 kg	11.5	48.1
NAX-2250	NCX-2250	31	14.50 in 368.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	464 lb 209 kg	472 lb 215 kg	462 lb 216 kg	480 lb 218 kg	12.9	46.8
NAX-2400	NCX-2400	33	14.50 in 368.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	471 lb 214 kg	480 lb 222 kg	478 lb 218 kg	487 lb 225 kg	10.3	42.1
NAX-2550	NCX-2550	35	14.50 in 368.4 mm	14.50 in 368.3 mm	22.50 in 564.8 mm	483 lb 222 kg	496 lb 226 kg	486 lb 225 kg	514 lb 234 kg	8.7	48.8

NOTE: Available per IEEE 323 for Class 1E installation.

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**AMPERE HOUR CAPACITIES**  
77°F (25°C)

Cell Type		Ampere Hour Capacities To 1.75 V.P.C.					Ampere Hour Capacities To 1.81 V.P.C.				
Antimony	Calcium	8 hr	5 hr	3 hr	2 hr	1 hr	8 hr	5 hr	3 hr	2 hr	1 hr
NAX-600	NCX-600	600	540	468	408	300	568	504	428	360	264
NAX-750	NCX-750	750	675	585	510	375	710	630	535	450	330
NAX-900	NCX-900	900	810	702	612	450	852	756	642	540	408
NAX-1050	NCX-1050	1050	945	819	714	525	994	882	749	630	462
NAX-1200	NCX-1200	1200	1080	936	816	600	1136	1008	856	720	528
NAX-1350	NCX-1350	1350	1215	1053	918	675	1278	1134	963	810	594
NAX-1500	NCX-1500	1500	1350	1170	1020	750	1420	1260	1070	900	650
NAX-1650	NCX-1650	1650	1485	1287	1122	825	1562	1386	1177	990	726
NAX-1800	NCX-1800	1800	1620	1404	1224	900	1704	1512	1284	1080	792
NAX-1950	NCX-1950	1950	1755	1521	1326	975	1846	1638	1391	1170	858
NAX-2100	NCX-2100	2100	1890	1638	1428	1050	1988	1764	1488	1260	924
NAX-2250	NCX-2250	2250	2025	1765	1530	1125	2130	1890	1605	1350	990
NAX-2400	NCX-2400	2400	2160	1872	1632	1200	2272	2016	1712	1440	1056
NAX-2550	NCX-2550	2550	2295	1989	1734	1275	2414	2142	1819	1530	1122

**DISCHARGE CHARACTERISTICS**  
AMPERES vs. HOURS OF DISCHARGE TO 1.75 V.P.C. @ 77°F (25°C)

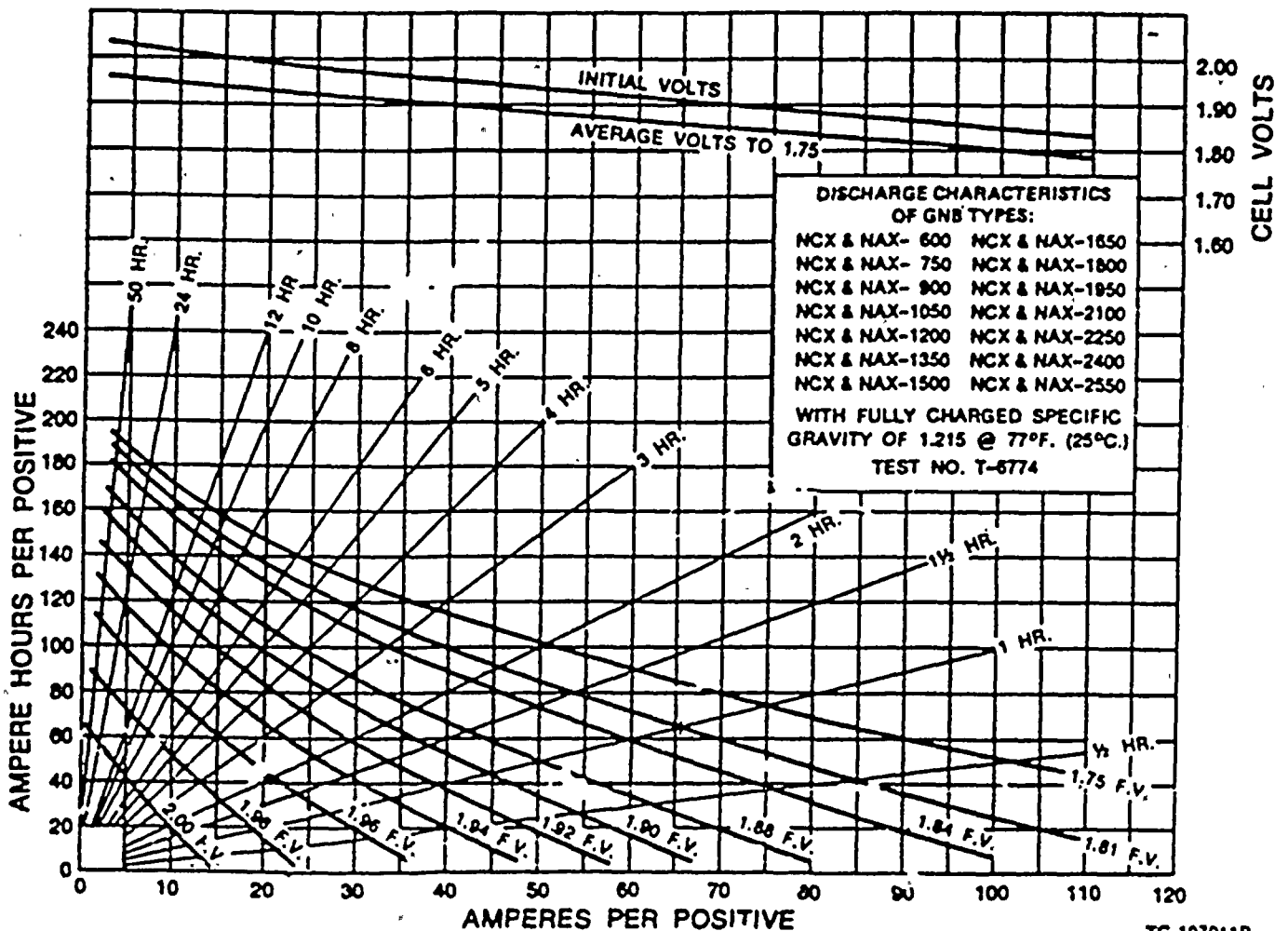
Cell Type		1 Min Rate In Amps	Discharge Time in Hours									
Antimony	Calcium		.25	.50	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
NAX-600	NCX-600	712	515	454	300	204	156	127	108	94	83	75
NAX-750	NCX-750	880	686	581	375	265	195	158	135	117	104	93
NAX-900	NCX-900	1044	814	666	450	306	234	190	162	141	125	112
NAX-1050	NCX-1050	1204	939	768	525	357	273	222	189	164	146	131
NAX-1200	NCX-1200	1306	1060	867	600	408	312	254	216	188	166	150
NAX-1350	NCX-1350	1494	1185	953	675	459	351	285	243	211	187	168
NAX-1500	NCX-1500	1620	1283	1033	750	510	390	317	270	235	208	187
NAX-1650	NCX-1650	1782	1389	1136	825	561	429	349	297	258	229	206
NAX-1800	NCX-1800	1932	1506	1232	900	612	468	381	324	282	250	225
NAX-1950	NCX-1950	2080	1622	1327	975	663	507	412	351	305	271	243
NAX-2100	NCX-2100	2240	1747	1429	1050	714	546	444	378	329	292	262
NAX-2250	NCX-2250	2400	1872	1531	1125	785	585	476	405	352	312	281
NAX-2400	NCX-2400	2560	1996	1633	1200	818	624	508	432	376	333	300
NAX-2550	NCX-2550	2720	2121	1735	1275	867	663	539	459	399	354	318

NOTE: All ratings include voltage drop across intercell connections using standard layouts.



**DISCHARGE CHARACTERISTICS**  
**AMPERES vs HOURS OF DISCHARGE TO 1.81 V.P.C. @ 77°F (25°C)**

Cell Type		1 Min Rate In Amps	Discharge Time in Hours									
Antimony	Calcium		.25	.50	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0
NAX-600	NCX-600	555	380	348	284	184	144	112	104	88	80	68
NAX-750	NCX-750	696	475	425	330	230	180	140	130	110	100	85
NAX-900	NCX-900	814	570	510	396	278	218	168	156	132	120	102
NAX-1050	NCX-1050	939	665	585	452	322	252	196	182	154	140	118
NAX-1200	NCX-1200	1061	760	680	528	368	288	224	208	176	160	136
NAX-1350	NCX-1350	1165	855	765	594	414	324	252	234	188	180	153
NAX-1500	NCX-1500	1264	950	850	660	460	360	280	260	220	200	170
NAX-1650	NCX-1650	1390	1045	935	728	506	396	308	286	242	220	187
NAX-1800	NCX-1800	1507	1140	1020	792	552	432	338	312	264	240	204
NAX-1950	NCX-1950	1622	1235	1105	858	598	468	354	338	286	260	221
NAX-2100	NCX-2100	1747	1330	1190	924	644	504	392	364	308	280	238
NAX-2250	NCX-2250	1872	1425	1275	990	690	540	420	390	330	300	255
NAX-2400	NCX-2400	1997	1520	1360	1056	736	578	448	416	352	320	272
NAX-2550	NCX-2550	2122	1615	1445	1122	782	612	476	442	374	340	288



TC-107011B





Single Hole Lug - Soldering

Part No.	Description
L07-001701	#6 - 1/4" Stud
L07-002797	#4 - 1/4" Stud
L07-000598	#2 - 1/4" Stud
L07-005004	#2 - 5/16" Stud
L07-001497	#0 - 1/4" Stud
L07-002786	#0 - 5/16" Stud
L07-002798	#00 - 5/16" Stud

Single Hole Lug - Solderless

Part No.	Description
L07-086182	#14-4 - 1/4" Stud
L07-086040	#8-2 - 1/4" Stud
L07-087432	#2-1/0 - 1/4" Stud
L07-086041	#4-3/0 - 3/8" Stud
L07-086019	#2-4/0 - 5/16" Stud
L07-086042	350 MCM - 3/8" Stud
L07-086027	500 MCM - 3/8" Stud
L07-085682	1000 MCM - 1/2" Stud

Two Hole Lug - Solderless

Part No.	Description
L07-086043	#1/0-350 MCM
L07-086020	#1/0-500 MCM
L07-086044	600-1000 MCM



Terminal Plates

Part No.	Description
L01-087510	NAX & NCX 1050 thru 1200
L01-087511	NAX & NCX 1344 thru 1950
L01-087499	NAX & NCX 1848 thru 2550
L01-055897	FFS 11 thru 17
L01-085888	FFS 19 thru 25

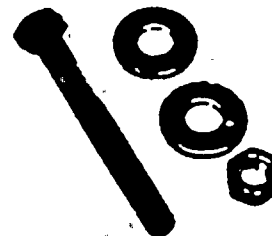


Seal Nut Wrench



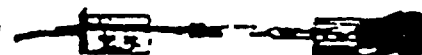
Connector Bolt Wrench

Refer to GB-4066 For  
Part Numbers and Description



Bolts, Nuts, Studs and Washers

Part No.	Description
L13-001113	Lead covered nut 1/4" dia.
L13-001476	Lead covered nut 1/4" dia.
L13-016771	Lead covered nut 5/16" dia.
L13-041849	Lead covered nut 1/4" dia.
W06-104186	Lead plated bronze 3/8" dia.
W06-104286-001	Stainless Steel hex nut 1/2" dia.
W06-105758	Stainless Steel hex nut 5/16" dia.
W06-106779	Stainless Steel hex nut 1/4" dia.
L11-028060	Brass stud 5/16" x 1-3/8" lg.
L11-028062	Brass stud 5/16" x 1-7/8" lg.
L11-028063	Brass stud 5/16" x 2-1/4" lg.
L11-005202	Lead covered bolt 10-24" x 5/8" lg.
L11-005203	Lead covered bolt 1/4" x 7/8" lg.
W02-104184	Lead plated bronze bolt 3/8" x 2" lg.
W02-104525-002	Stainless Steel Bolt 5/16" x 2-1/2" lg.
W02-104525-003	Stainless Steel Bolt 5/16" x 2-3/4" lg.
W02-104525-004	Stainless Steel Bolt 1/4" x 1-1/4" lg.
W02-104525-005	Stainless Steel Bolt 5/16" x 3-1/4" lg.
W02-104525-006	Stainless Steel Bolt 1/2" x 1-1/4" lg.
W02-105757	Stainless Steel Bolt 5/16" x 1-1/4" lg.
W02-105909	Stainless Steel Bolt 5/16" x 2" lg.
W03-104185	Lead plated bronze washers 3/8" dia.
W03-104523-002	Stainless Steel Washer 1/2" dia.
W03-104523-003	Stainless Steel Washer 5/16" dia.
W03-106254	Stainless Steel Washer 1/4" dia.
W03-105759	Stainless Steel Washer 5/16" dia.



Hydrometers & Thermometers

Part No.	Description
Z02-107801-170	Hydrometer Kit Complete (1.070 - 1.170 sp. gr.)
Z02-107801-250	Hydrometer Kit Complete (1.150 - 1.250 sp. gr.)
Z02-107801-280	Hydrometer Kit Complete (1.180 - 1.280 sp. gr.)
Z02-107801-330	Hydrometer Kit Complete (1.230 - 1.330 sp. gr.)
Z02-107801-310	Hydrometer Kit Complete (1.090 - 1.310 sp. gr.)
Z02-001408	Hydrometer Holder
Z03-043529-002	Thermometer 8-1/2"
Z03-043529-003	Thermometer 10"

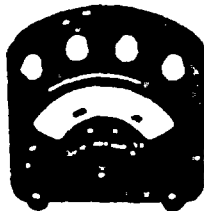
### Flash Arrestor Vent

Part No.	Description
N03-039485	PAX-PCX
N03-042237	DS-DJC
N03-103511	DC, DKR & DPR
N03-108027	AS-AT-B5-BT



### Pre-Vent™ Filter/Vent with Dust Cover

Part No.	Description
N03-104881	MAX, MCX, NAX, NCX-600-1200
N03-104882	ALL EC, EKR, & EPR
N03-104876-001	ALL FPS
N03-104870	NAX & NCX 1344 thru 2550



### Voltmeters

Part No.	Description
V02-107151-001	Voltmeter, with leads (Weston Model 281), 0-3, 0-60, 0-150 Scale. W/5' Leads
V02-107151-002	Voltmeter, with leads (Weston Model 931), 3-0-3 Scale. W/5' Leads
V02-107151-003	Leads for Voltmeter (Weston P/N 254761-901) Insulated Forked Terminal on one End, Test Prod Other End, 5' long



### Lifting Spreaders

Part No.	Description
Z07-107250	MAX-MCX-170-255
Z07-107251-001	MAX-MCX-285-340
Z07-107251-002	MAX-MCX-380-425
Z07-107251-003	MAX-MCX-475-595
Z07-107141-001	NAX-NCX-600-1200
Z07-044098	NAX-NCX-1344-1500
Z07-044096-001	NAX-NCX-1650-1950
Z07-107072-001	NAX-NCX-1848-2550
Z07-043449	FPS-11-17
Z07-043450	FPS-19-21
Z07-043451	FPS-23-25

### Lifting Straps

Part No.	Description
Z07-077119	MAX-MCX-285-425
Z07-077121	MAX-MCX-170-255, 475-595
Z07-002083	ALL NAX-NCX
Z07-043476	FPS-11-17
Z07-043477	FPS-19-21
Z07-043478	FPS-23-25

### — ACCESSORIES — INCLUDED WITH BATTERY

- Lead-plated Copper Inter-cell Connectors, as necessary for 1/2" spacing between cells, side-to-side arrangement.
- Inter-tier or Inter-step Cable Connectors as necessary for standard battery make-up.
- Terminal Lugs as necessary for standard battery make-up.
- Terminal Plates as necessary for standard battery make-up.
- Gould Pre-Vents™ or flash arrestor vents for each cell.
- Cell Lifting Strap and Spreader  
1 with 12 cells or more of type: FPS, MAX, MCX, NAX, NCX
- One each, Thermometer, Hydrometer, Hydrometer Holder and Cell Numerical Set  
12 cells or more of type: FPS, MAX, MCX, NAX, NCX, PAX, PCX  
23 cells or more of type: DS, D-JC, DC, DKR, DPR, EC, EKR, EPR
- One each, Thermometer and Hydrometer  
23 cells or more of type: AS, AT, BS, BT, CPE
- Connector Bolt Wrenches  
1 with 23 cells or more of type: DS, DSC, DC, DKR, DPR, EC, EKR, FPS, EPR  
NOTE: For MAX, MCX, NAX and NCX cells, standard 3" open end wrenches may be used.
- Seal Nut Wrench  
1 with 23 cells or more of type: DC, DKR, DPR, EC, EKR, EPR  
1 with 12 cells or more of type: FPS, MAX, MCX, NAX, NCX
- Non-corrosive grease as required for standard battery make-up.
- Instruction Manuals  
One copy of Stationary Battery Installation and Operating Instructions (GB-3384) furnished with each battery shipment. Four soft covered custom instruction manuals with each order (minimum of 8 cells), upon request.

Gould Inc., Industrial Battery Division  
350 Cabot Boulevard West, Langhorne, Pa 19047  
Telephone (215) 752-0555

CABLE: GOULNATBAT, LANGHORNE, PA - TWX: GOULD LAHN. 810-867-2086  
GB-3446A 2.5M 6/78 Printed in U.S.A.

**GOULD**

An Electrical/Electronics Company












SP-EE-146 PAGE 12 of 12



Table 20

CURRENT CARRYING CAPACITY OF RECTANGULAR COPPER BARS,

8431027095

SIZE											
	A	B	C	D	E	F	G	H	J	K	L
1/8" x 1".....	347	450	300	404	549	632	672	469	700	931	1,075
1/8" x 2".....	447	813	705	804	1,088	1,144	1,215	849	1,430	1,685	1,944
1/8" x 3".....	606	1,367	1,100	1,392	1,600	1,722	1,893	1,322	2,227	2,684	3,028
1/8" x 4".....	900	1,638	1,420	1,800	2,070	2,304	2,448	1,710	2,880	3,393	3,915
1/4" x 1".....	306	666	578	732	842	937	995	695	1,171	1,360	1,592
1/4" x 1 1/4".....	443	806	700	886	1,019	1,134	1,205	842	1,418	1,670	1,927
1/4" x 2".....	647	1,178	1,020	1,294	1,488	1,656	1,760	1,229	2,070	2,440	2,814
1/4" x 3".....	973	1,770	1,540	1,946	2,228	2,490	2,647	1,849	3,114	3,668	4,232
1/4" x 4".....	1,220	2,220	1,925	2,440	2,800	3,123	3,318	2,318	3,904	4,600	5,307
1/4" x 5".....	1,460	2,657	2,300	2,980	3,258	3,738	3,971	2,774	4,672	5,504	6,350
1/4" x 6".....	1,660	3,020	2,620	3,320	3,818	4,250	4,515	3,154	5,312	6,258	7,220
1/2" x 1".....	2,020	3,676	3,190	4,040	4,646	5,171	5,494	3,828	6,464	7,615	8,787
1/2" x 2".....	502	914	792	1,004	1,153	1,285	1,365	954	1,606	1,892	2,184
1/2" x 3".....	865	1,574	1,347	1,700	1,990	2,214	2,253	1,643	2,768	3,260	3,763
1/2" x 4".....	1,180	2,148	1,860	2,360	2,714	3,080	3,210	2,242	3,776	4,449	5,133
1/2" x 5".....	1,440	2,620	2,280	2,880	3,312	3,686	3,917	2,736	4,608	5,499	6,364
1/2" x 6".....	1,685	3,067	2,660	3,370	3,875	4,314	4,583	3,201	5,392	6,352	7,330
3/4" x 1".....	1,960	3,576	3,100	3,920	4,508	5,018	5,331	3,724	6,272	7,389	8,525
3/4" x 2".....	2,420	4,404	3,820	4,840	5,566	6,195	6,582	4,598	7,744	9,123	10,527
3/4" x 3".....	603	1,097	953	1,206	1,367	1,544	1,640	1,146	1,930	2,273	2,623
3/4" x 4".....	990	1,802	1,560	1,980	2,277	2,534	2,693	1,881	3,168	3,732	4,306
3/4" x 5".....	1,325	2,411	2,090	2,650	3,047	3,392	3,604	2,517	4,240	4,995	5,764
3/4" x 6".....	1,630	2,967	2,570	3,260	3,750	4,173	4,434	3,097	5,216	6,145	7,090
1" x 1".....	1,915	3,522	3,050	3,870	4,450	4,954	5,263	3,676	6,192	7,295	8,417
1" x 2".....	2,220	4,040	3,500	4,440	5,106	5,683	6,038	4,218	7,104	8,370	9,647
1" x 3".....	2,760	5,023	4,350	5,220	6,348	7,065	7,507	5,244	8,822	10,405	12,005

\*Capacity based on 40°C. Ambient—20°C. Rise and 98% conductivity.  
 Spacing between bars is 1/4" unless otherwise indicated.  
 For other basis of table, refer to page 73.  
 Table used by permission of Chase Brass and Copper Company.

Table 71

CORRECTION FOR PROXIMITY EFFECT IN BUSES

Single Phase Circuits - Horizontal Plane - 12" separation or less.


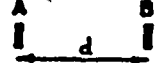




Relative current-carrying capacity referred to 1.00 for a conductor remote from its return conductor.

Size	CORRECTION FACTOR			Size	CORRECTION FACTOR		
	S=3 in.	S=6 in.	S=12 in.		S=3 in.	S=6 in.	S=12 in.
MCM				Extra Heavy Pipe Size			
500	0.99	1.00	1.00	3 1/2"	0.99	1.00	1.00
750	0.99	1.00	1.00	4"	0.98	0.99	1.00
1,000	0.98	0.99	1.00	5"	0.95	0.98	0.99
1,500	0.97	0.98	1.00	6"	0.90	0.97	0.98
2,000	0.96	0.98	0.99	8"	0.85	0.96	0.97
IPS				10"		0.95	0.96
1 1/2"	0.99	1.00	1.00	12"		0.93	0.95
2"	0.93	0.98	0.99	14"		0.80	0.94
2 1/2"	0.88	0.97	0.99	16"		0.75	0.93
3"		0.95	0.98				
3 1/2"		0.90	0.96				
4"		0.83	0.95				
			0.94				

S=Separation Between Conductor Center Lines.

Table 72

FORCES ON BUSES DUE TO SHORT CIRCUIT CURRENTS

Max. Force "F" in Lbs. Per Ft.	Short Circuit Current I	Type of Fault	Configuration	Force on Conductor
$F = K \frac{5.41 \times 10^{-7}}{d}$				+ or -
$F = K \frac{10.81 \times 10^{-7}}{d}$	RMS Symmetrical	Single Phase Symmetrical		A or B
$F = K \frac{43.21 \times 10^{-7}}{d}$	RMS Symmetrical	Single Phase Asymmetrical		A or B
$F = K \frac{34.91 \times 10^{-7}}{d}$	RMS Symmetrical	Three Phase Asymmetrical		A or C
$F = K \frac{37.51 \times 10^{-7}}{d}$	RMS Symmetrical	Three Phase Asymmetrical		B
$F = K \frac{37.51 \times 10^{-7}}{d}$	RMS Symmetrical	Three Phase Asymmetrical		A, B or C

F=Maximum lateral force between conductors (either attractive or repulsive) in pounds per linear foot of conductor

K=Shape correction factor (same table on page 63) important only when the dimensions of the conductors are relatively large compared with the distances between the conductors. K=1 for round conductors.  $K \leq 1.0$  FOR  $\frac{b}{d} \leq 1$

I=Short circuit current in the equations for the AC circuits I represents the RMS value of the symmetrical wave short circuit current.

$$= 20,808 A$$

d=Conductor spacing in inches—center to center.

(8 IN. MAX.)

The above equations are based upon the formula  $F = \frac{k \cdot I^2}{d}$

in which the quantities are in cgs units: the force "F" in Dynes per centimeter, the "I" in absolute amperes, the distance "d" in centimeters.

8431027096

EXEIGN INENT #10

## EASCO SERVICES

TWO RECTOR STREET, NEW YORK, N. Y. 10006

PURCHASE CONTRACT

NO. NY-481104

DATE OF CONTRACT February 17, 1964

SUPPLEMENT NO. 9

DATE June 12, 1968

PAGE 1

General Electric Company  
111 Eighth Avenue  
New York, New York

MILLSTONE NUCLEAR POWER STATION  
1949 - 650 MW(e)  
POWER & CONTROL CABLE

## Conclusion:

This supplement authorizes the Seller to add the following new Item as specified.

Item No.	Quantity	Description
95	2,000 ft	Single 600v Polyside EHM or EHW (E1-5807) Power Cables 1/c 1,000 Mcm, 61 strands, single conductor OD 1.45 in. BM No. K1-32

MILLSTONE  
N. Y. 10006

## Reel Length and No.

Item No.	Quan. Ft.	Conductor Size	Reel No.	Reel Length, Ft.	B/M No.
95	2,000	1/c 1,000 Mcm	150	2,000	K1-32

## SHIPPING

Purchaser requires shipment not later than August 1, 1968 and will accept prior shipment. Seller shall advise shipping schedule without undue delay.

## PRICING

Pricing shall be shown on a separate "PRICING DATA SHEET" attached hereto and forming a part hereof.

Except as expressly modified herein, all terms and conditions of this Contract remain unchanged and shall also apply to this supplement.

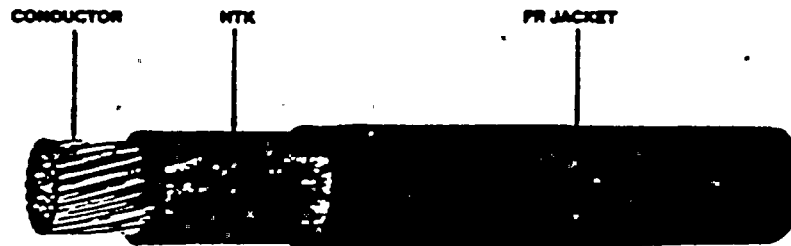
KHH 90°C 615A / C X 2 = 1230A  
11983 NEC @ 30°C AMB. (86°F)  
TABLE 310-16) 1230 AX. 87 = 1070A  
@ 105°F





## 600 VOLTS

Single Conductor (Copper or Aluminum), High Temperature  
Kerite (HTK) Insulation, Flame Retardant (FR) Jacket



## 600 VOLTS

Conductor Size AWG/kcmil	Insulation Wall Mils	Jacket Wall Mils	Cable O.D. Inches	Net Weight Lbs/1000 Ft.	
				Copper	Aluminum
14	40	50	0.27	45	37
12	40	50	0.28	56	42
10	40	50	0.31	73	50
8	55	50	0.37	107	72
6	55	50	0.40	145	89
4	55	50	0.45	203	114
2	55	50	0.51	292	149
1	65	50	0.57	365	185
1/0	65	50	0.61	441	214
2/0	65	50	0.65	537	251
3/0	65	50	0.70	656	295
4/0	65	50	0.78	804	349
250	80	50	0.84	957	420
350	80	50	0.97	1292	541
500	80	50	1.07	1788	715
750	95	80	1.35	2736	1124
1000	95	80	1.50	3559	1412
1250	110	95	1.51	4164	1478
1500	110	95	1.63	4964	1735
1750	110	110	1.96	6194	2434
2000	110	125	2.10	7066	2787
2250	125	125	2.27	8027	3166
2500	125	125	2.36	8884	3480
2750	125	125	2.45	9709	3744
3000	125	125	2.54	10530	4025

For terminating and splicing instructions refer to prints IT/OT-2NS and S-2NS. Consult factory for ints suitable for nuclear applications.

\*For utility generating station applications we recommend that the jacket wall thickness in these sizes be increased to 65 mils. Cable diameters will increase by 0.03 inches.

The diameters and weights shown are approximate and are subject to normal manufacturing tolerances.

## INTER OFFICE MEMO

DESIGN INPAT #12

TO	RKH EWING	DEPT. LOCATION	GEE W3
FROM	MARK FRANCESCHINA	DEPT. LOCATION	GCE W17
SUBJECT	PA B3-06B, MPI STN. BATTERY REPLACEMENT		DATE
			4/16/84

## MESSAGE

WITH REGARD TO TEMPORARY STORAGE OF THE NEW BATTERIES (60 CELLS) PRIOR TO THEIR INSTALLATION, GCE HAS DETERMINED THE FOLLOWING:

IF THE CELLS ARE TO BE STORED ON THE TURBINE BLDG. MEZZANINE LEVEL, THEY MUST BE PLACED ON SKIDS (WOOD PLANKS RECOMMENDED) TO SPREAD OUT THE LOAD. THESE SKIDS SHOULD BE AT LEAST 1" THICK.

THE CELLS SHOULD BE SPACED NO LESS THAN 1 FT FROM EACH OTHER, FROM EDGE TO EDGE, AND SHALL NOT BE STACKED AT ALL.

ORIGINATOR DO NOT WRITE BELOW THIS LINE

SIGNED

IF ALL 60 CELLS ARE STORED AT ONE TIME, THEY SHOULD COVER AN AREA APPROXIMATELY 17' x 17', AND THE SKIDS WOULD SUPPORT THEM OVER THAT ENTIRE AREA.

*Mark Franceschina*

CC WJB

ATION

SIGNED

DATE



# Application Guide

## Major application requirements

DESIGN INQUIRY #13  
1055

High tensile, flexural and compressive strength (uses where machining or humidity characteristics are not important)	Insulating washers
Electrical insulation in dry or humid conditions where fair mechanical strength and good machining are needed	Switchboard panels; relay and switch bases
High humidity resistance; good dimensional stability; excellent resistance to splitting	Panelboards
Electrical insulation in applications requiring low dielectric losses in severe humidity conditions	Punched parts for electronic equipment
Low 60-cycle power factor—Low cold flow and dielectric constant	Tap-changer boards—Transformers
Economical plate with fair electrical strength	Panelboards
Cold shearing and cold punching under normal conditions; low loss at high humidity. Excellent electrical properties.	Radio and TV terminal boards
Self-extinguishing; punchable, good dimensional stability	Commercial computer terminal boards
Excellent cold punching and cold shearing characteristics under normal conditions; punchable up through 3/32" thickness only.	Intricate punched parts requiring little or no preheating
Good warm shearing and warm punching under normal conditions; punchable up through 3/32" thickness only; laminate should be preheated between 100°-150° F.	Intricate punched parts requiring little or no preheating
Ultra-soft punch plate	Thick punched parts
Fair to good electrical and mechanical properties with decorative surface for exposed general purpose panels. Good arc and track resistance.	Switchboard panels, control panels, appliance panels, relay and switch bases, panelboards.
Same as above grade 51P64 plus flame retardance, 94-VO when tested per U.L. method 94. Good electrical insulation under humid conditions. Properties similar to NEMA XX.	Same as above (grade 51P64)
Good machining qualities; mechanical and electrical strength; moisture resistance; toughness; good appearance	Marine relay bases; terminal boards; radio parts
Economical fine weave with good machining & mechanical properties and fair electrical properties	Intricate, high strength machined parts
Low moisture absorption; toughness; fair dimensional stability	Paper mill doctor blades; pump valves; marine bearings; piston and packing rings
High mechanical strength; good appearance, strength in punching	Fine tooth gears; radio parts; terminal boards
Good mechanical properties with especially high impact strength	Gears; pinions; spacers
Good mechanical properties; good machining qualities	Gears; pinions
Low moisture absorption; good dimensional stability; good resistance to acids and alkalis	Valves and plating tanks
Low-voltage, low-frequency electrical performance; mechanical performance in moderately humid conditions	Marine switchboard panels; small gears and pinions; radio parts
Low coefficient of friction, self-lubricating (graphite filled)	Textile mill bearings; pistons, packing rings
Good mechanical heat resistance and low abrasion	Bearings; slot wedges and gears. A replacement for asbestos in many applications.
High mechanical strength and hardness; high arc and heat resistance; excellent electrical properties under dry conditions; self-extinguishing	Switchboard panels; arc barriers; circuit-breaker parts; structural electrical parts
Retention of high mechanical strength at temperatures up to 150° C; self-extinguishing; retention of 50% of initial flexural strength at 150° C	Rotor-slot insulation, structural members at elevated temperature
Good machining qualities; high flexural, impact and bond strength at room temperatures; good electrical properties under dry and humid conditions; should not be used under mechanical load at elevated temperatures	Electrical-mechanical applications—good for high humidity areas. Terminal boards
High mechanical strength, high arc and heat resistance; excellent electrical properties under dry and humid conditions; self-extinguishing	Marine switchboard panels and structural parts
Self-extinguishing; good machining and punching qualities; high flexural, impact and bond strength at room temperatures; should not be used under mechanical load at elevated temperatures	Terminal boards
Excellent heat and arc resistance; good electrical properties under humid conditions; good mechanical properties; self-extinguishing	Class H insulation; heating appliance insulation
Excellent heat resistance—self-extinguishing. Excellent mechanical and machining properties—stable at high temperature	High temperature mechanical applications
Good heat resistance. Excellent mechanical and machining properties	Gaskets, seals; a replacement for asbestos in many applications

Paper base materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

Cellulose materials

(4) MICACTA

Glass cloth base materials

## Grade Selection Guide

2 of 5

Mil-Air Grade	NEMA grade	Military specifications type and number	Base material	Color	Resin
213	X	—	Paper	Tan	Phenolic
423	X	—	Paper	Black	Phenolic
219	XX	LP 513a-PBG	Paper	Tan	Phenolic
129	XX	—	Paper	Black	Phenolic
154	XXX	LP 513a-PBE	Paper	Tan	Phenolic
17900	XXP	—	Paper	Tan	Phenolic
1720	—	—	Paper	Natural	Phenolic
128	X	—	Paper	Natural	Phenolic
129	XXPC	LP 513a-PBEP	Paper	Tan	Phenolic
	FR-3	—	Paper	Cream	Epoxy
	XPC	—	Paper	Chocolate	Phenolic
	XPC	—	Paper	Tan	Phenolic
	XPC	—	Paper	Black	Phenolic
	—	—	Paper	Tan-Choc.-Black	Phenolic
	XP	—	Paper	Tan	Phenolic
	XP	—	Paper	Black	Phenolic
	XP	—	Paper	Chocolate	Phenolic
	—	—	Paper	Tan-Choc.-Black	Phenolic
	XPC	—	Paper	Tan	Phenolic
	—	—	Paper	Red-Orange-Blue-Gray-Black	Metamine/ Phenolic
	—	—	Paper	Red-Orange-Blue-Gray-Black	Metamine/ Phenolic
	LE	Mil-P-15035-FBE	Fine weave fabric	Tan	Phenolic
	LE	—	Fine weave fabric	Black	Phenolic
110	—	—	Fine weave fabric	Natural	Phenolic
13	—	Mil-P-18324	Medium weave fabric	Tan	Phenolic
138	L	Mil-P-15035-FBI	Fine weave fabric	Natural	Phenolic
262	C	Mil-P-15035-FBM	Medium weave fabric	Natural	Phenolic
H-26000	C	2-15035-FBM	Medium weave fabric	Natural	Phenolic
H-25128	—	—	Fine weave fabric	Natural	Phenolic
281	—	—	Medium weave fabric	Natural	Phenolic
286	CE	Mil-P-15035-FBG	Medium weave fabric	Natural	Phenolic
H-24721	CE	Mil-P-15035-FBG	Medium weave fabric	Natural	Phenolic
51F33	CE	Mil-P-15035-FBG	Medium weave fabric	Natural	Phenolic
496	CE	—	Medium weave fabric	Black	Phenolic
400	—	Mil-P-5431	Medium weave fabric	Black	Phenolic
H-24907	—	—	Synthetic fiber	Tan	Phenolic
259-2	G-5	—	Glass cloth	Gray	Metamine
H-23842	G-11	Mil-P-18177-GEB	Glass cloth	Green	Epoxy
H-22033	G-10	Mil-P-18177-GEE	Glass cloth	Green	Epoxy
H-1426	G-9	Mil-P-15037-GME	Glass cloth	Gray	Metamine
H-16010	FR-4	Mil-P-18177-GEE	Glass cloth	Green	Epoxy
H-17825	G-7	Mil-997D-GSG	Glass cloth	White	Silicone
H-25219	—	—	Glass cloth	White	Silicone
51G19	G-3	—	Glass Cloth	Natural	Phenolic

# Physical Properties

3.75

Property	Density	Water absorbance (1/16" thick)	Hardness	Tensile (with grain)	Compressive (flatwise)	Modulus (flatwise with grain) (1/16" thick)	Bonding strength (1/16" thick)
Dimension	(lb per cu in.)	percent	Rockwell "M"	psi	psi	psi	lb
ASTM method		D229	D229	D229	D229	D229	D229
Condition		E-1/105 D-24/23 T-23/50	A	A	A	A	A
Grade							
213, 423	.049	3.2	115	18,000	41,000	26,000	800
219, 429	.049	0.8	100	14,000	30,000	17,000	900
254	.049	0.4	110	15,000	36,000	20,000	1,200
H-17900	.049	0.9	95	11,000	30,000	17,000	—
H-18720	.047	3.3	115	12,000	36,000	20,000	1,100
H-2898	.050	3.3	105	27,000	42,000	30,000	1,050
H-5638	.047	0.4	100	14,000	30,000	20,000	—
H-8454	.055	0.3	105	18,000	31,000	24,000	1,200
H-18331 H-18332 H-18333	.049	3.5*	95	12,000	—	22,000	—
51P88	.049	3.8*	97	12,000	—	23,000	—
H-19128 H-19242 H-19243	.049	3.0*	105	—	—	24,000	—
51P77	.049	5.0*	105	—	—	28,000	—
H-23855	.049	1.5	80	10,000	25,000	16,000	—
221, 431	.048	0.7	100	14,000	36,000	22,000	1,800
223	.049	1.0	110	10,000	37,000	16,000	1,800
238	.048	1.1	105	12,000	36,000	20,000	1,900
282 H-28000	.051	1.5	100	11,000	40,000	19,000	2,200
H-25128 51F60	.048	1.7	105	12,000	36,000	20,000	1,800
281	.049	1.0	110	10,000	36,000	16,000	1,800
51F33 H-24721	.050	1.1	105	13,000	37,000	19,000	2,000
286, 496	.049	1.1	105	13,000	39,000	22,000	1,900
400	.051	1.1	109	13,000	45,000	21,000	2,200
H-24907	.046	—	—	29,500	85,000	34,000	1,700
258-2	.074	0.4	115	40,000	65,000	50,000	1,800
H-23842	.070	0.04	115	45,000	80,000	75,000+	2,000
H-22033	.067	0.05	115	50,000	50,000	60,000	2,600
H-12426	.074	0.2	120	45,000	65,000	55,000	2,300
H-17825	.064	0.02	105	—	—	25,000	900
H-25219	.064	0.04	—	—	55,000	70,000	900

Condition A—Conditioned for 24 hours and tested in laboratory atmosphere (23 °C, 50% RH. This is representative data taken from production material. Properties may vary slightly, but in all cases are guaranteed to meet the applicable NEMA standards only.  
 \*Values based on 1/16" laminate

Paper base materials  
 Cotton cloth-synthetic base  
 Glass cloth base materials

~ H16010 PER (3)

# Electrical Properties

4 of 5

Impact Strength (Izod, edgewise with grain)	Shear (fishwise) (1/8" thick)	Dielectric strength (perpendicular) (1/8" thick)	Dielectric factor (at 10 <sup>6</sup> cycles/sec)	Dielectric constant (10 <sup>6</sup> cycles/ sec)	Volume resistivity	Surface resistivity	Arc resistance	Property
ft-lb/in. (notch)	psi	vpin (short time)			megohm-cm	megohms	seconds	Dimension
D732	D229	D229	D229	D229	D229	D229	D405	ASTM method
E-18/50 <sup>a</sup>	A	Tested in transformer oil, 23° C	A	A	C-86/35/90 T-35/90	C-86/35/90 T-35/90	A	Condition
								Grade
	9,000	300	0.050	5.5	—	—	—	213, 423
	7,000	500	0.045	5.4	4 x 10 <sup>6</sup>	4 x 10 <sup>6</sup>	—	218, 429
	7,000	600	0.037	5.2	3 x 10 <sup>6</sup>	7 x 10 <sup>6</sup>	—	254
	6,000	500	0.040	4.9	—	—	—	H-17900
	9,000	400	0.060 @ 60 cy	—	—	—	—	H-18720
	—	200	—	—	—	—	—	H-2898
	—	550	0.035	4.1	8.0 x 10 <sup>6</sup>	2 x 10 <sup>6</sup>	—	H-5639
	—	550	0.034	4.2	5.0 x 10 <sup>6</sup>	1 x 10 <sup>6</sup>	100	H-8454
	—	450	—	—	—	—	—	H-18331 H-18332 H-18333
	—	450	—	—	—	—	—	51P88
	—	375	—	—	—	—	—	H-18128 H-19242 H-19243
	—	300	—	—	—	—	—	51P77
	—	—	—	—	—	—	—	H-23655
3	11,000	350	0.040	5.1	7 x 10 <sup>6</sup>	6 x 10 <sup>6</sup>	—	221, 431
4	9,500	200	—	—	—	—	—	223
7	12,000	350	—	—	—	—	—	238
2.5	11,000	150	—	—	—	—	—	262 H-26000
1.4	11,000	300	—	—	—	—	—	H-25126 51F60
1.4	10,000	—	—	—	—	—	—	281
1.8	10,000	200	—	—	—	—	—	51F33 H-24721
2.0	10,000	200	—	—	—	—	—	286, 496
1.7	15,000	—	—	—	—	—	—	400
10.0	—	—	—	—	—	—	—	H-24907
10.0	30,000	300	0.019	6.3	6 x 10 <sup>6</sup>	6 x 10 <sup>6</sup>	180	259-2
13.0	25,000	—	0.017	5.2	5 x 10 <sup>6</sup>	1 x 10 <sup>6</sup>	—	H-23842
10.0	—	550	0.020	5.0	6 x 10 <sup>6</sup>	1 x 10 <sup>6</sup>	100	H-22033
13.0	—	—	0.018	7.2	1.5 x 10 <sup>6</sup>	1.5 x 10 <sup>6</sup>	180	H-12426
8.5	—	—	0.003	4.2	—	—	190	H-17825
19.0	—	—	0.032	4.4	—	—	190	H-25219

<sup>a</sup>Retains 50% of Condition A flexural strength at E-1/150° C, T-150° C. \*These values are for 1/16-inch thickness.  
\*Up to 1/8-inch thickness only



# Tolerances of Molded Plate

5 of 5

Nominal thickness (inches)	Thickness tolerance (inches)								
Grade	213 219 254 423 429 S1P77 S1P88 H-23193 H-24753 H-2898	H-8638 H-8454 H-17900 H-18331 H-18332 H-18333 H-19128 H-19242 H-18243 H-23655	238	221 431 S1P80	282 400 H-28000	223 281 286 496 S1F33 H-24721 H-25128	H-24907	258-2 H-12428 H-22033	H-18010 H-17825 H-23842 H-25219
1/32	±.0035		±.005	±.005	±.0065	±.0065		±.0065	
3/64	±.0045		±.0055	±.0055	±.0075	±.0075	±.018	±.0075	
1/16	±.005		±.006	±.006	±.0075	±.0075	±.018	±.0075	
3/32	±.007		±.007	±.007	±.008	±.009	±.018	±.009	
1/8	±.008		±.008	±.008	±.010	±.010	±.020	±.012	
5/32	±.009		±.009	±.009	±.011	±.011	±.024	±.015	
3/16	±.010		±.010	±.010	±.0125	±.0125	±.024	±.019	
7/32	±.011		±.011	±.011	±.014	±.014	±.028	±.021	
1/4	±.012		±.024	±.012	±.030	±.015	±.028	±.022	
5/16	±.0145		±.029	±.0145	±.035	±.0175	±.034	±.026	
3/8	±.017		±.034	±.017	±.040	±.020	±.038	±.030	
7/16	±.019		±.038	±.019	±.044	±.022	±.044	±.033	
1/2	±.021		±.042	±.021	±.048	±.024	±.048	±.036	
5/8	±.024		±.048	±.024	±.053	±.027	±.058	±.040	
3/4	±.027		±.054	±.027	±.058	±.029	±.068	±.043	
7/8	±.030		±.060	±.030	±.062	±.031	±.076	±.046	
1	±.033		±.065	±.033	±.065	±.033	±.086	±.049	
1 1/4	±.037		±.073	±.037	±.073	±.037	±.106	±.055	
1 1/2	±.041		±.081	±.041	±.081	±.041	±.124	±.061	
1 3/4	±.045		±.089	±.045	±.089	±.045	±.144	±.067	
2	±.049		±.097	±.049	±.097	±.049	±.160	±.073	

NOTE: Tolerance of length and width of trimmed plate is plus or minus 1" from standard size. To minimize warpage material should be stored flat, not on edge.



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Rev. 2  
Date 9/83  
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ATTACHMENT 1

ALARA DESIGN REVIEW CHECKLIST.

PA No. 83-068

PDCR No. 1-54-84

Title STATION BATTERY REPLACEMENT - B

Will this project assignment or design change  
require more than one person-rem to install or  
complete?

YES/NO

Will this design change create a new radiation  
source or new radiation area onsite or cause an  
increase in dose rates from an existing source?

YES/NO

Will this design change create or increase routine  
maintenance, operation, service, or surveillance  
requirements in a radiation area?

YES/NO

If any answer is "YES" - complete the applicable sections.

Applicable Sections (Circle) 1 2 3 4 5 6 7 8

If all three answers are "NO" - no further action  
is required.

ALARA Design Review Completed by

RA Ewing

Project Engineer

Date 1/12/84

Reviewed by

James H. McAlister

MUSCO RAB or Unit ALARA Personnel

Date

1/12/84

PROJECT NO. <b>PA-83-068</b>	SERIAL NO.
FILE NO.	SUBJECT:

**Block Wall modifications for  
Station Battery 18B Replacement.**  
NORTHEAST UTILITIES SERVICE COMPANY  
TELEPHONE MEMORANDUM  
PROJECT

INSTRUCTIONS: Summarize your telephone discussion, noting participants and date and time of call. Indicate desired routing at right. Call reporter must insert File Number, Serial Number and Subject(s) in spaces above. File Clerk takes care of chronological File copy.

CALL DATE <b>4/26/84</b>	TIME <b>4:00</b>	<input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	<input checked="" type="checkbox"/> INCOMING <input type="checkbox"/> OUTGOING
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NAME		COMPANY NAME
BETWEEN	<b>Kevin Murphy</b>	<b>NUECO</b>
	<b>Janice Lapper</b>	<b>NUSCO</b>

CALL REPORTERS  
NAME & DATE

**K.E. Murphy 4/26/84**

CC: Chronological file

SUMMARY:

**Block wall modifications for PA 83-068 were approved.**



ATTACHMENT No. 3  
ENCLOSURE No. 6

Millstone Unit 1  
Original 125vdc System  
Design Specifications  
And  
Sizing Calculations

