ATTACHMENT 1

Outline
For
Sampling, Preparation
And
Testing
Of
Spot-Welded Superstrut Members
For
Diablo Canyon Power Plant

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Approved by

6/2/83

Rev. 0 Date May 1983

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1.0 GENERAL

The following outline shall be used for the sampling, test preparation, and testing of spot welds for Superstrut members obtained from the Diablo Canyon Power Plant. All work is to be performed under the direct supervision and control of Project Engineering, and observed by a Project Engineering Representative. Deviations from the provisions set forth in this outline may be made on a case-by-case basis only when documented and approved by the Project Engineering Representative.

2.0 SAMPLING AND TESTING

2.1 Sample Selection

2.1.1 Specimens to be tested are back-to-back, spot welded Superstrut members, types A1202, E1202, and H1202 (See Figure 1).

2.1.2 270 Superstrut members (150-A1202, 90-E1202 and 30-H1202) shall be randomly selected for testing from existing Seismic Category I cable tray and conduit supports located in Units 1 and 2 of the Plant. Random selection will be accomplished by numbering each raceway support (e.g., #1 to #22,000). Random numbers shall then be selected which will identify the supports from which test members will be taken.

2.1.3 The field shall remove members as instructed by Project Engineering. Each member shall be tagged with its appropriate sample number. The support number from which each member was taken shall also be recorded (see Sample Log Sheet - Attachment 2).

2.1.4 After all specimens have been labeled, they shall be packaged and sent to: Bechtel M&QS Testing Lab, 301 Mission St., San Francisco, CA.

2.2 Specimen Preparation

2.2.1 Upon receipt, the test lab shall cut the Superstrut members into test specimens in accordance with Figure 2, and in accordance with AWS C1.1-66; Section 503 (see Attachment 1).

2.2.2 Test specimens shall be secured in drilling and cutting apparatus in such a manner that no loads are induced in test weld as the specimen is being cut to its proper configuration.

2.2.3 If any of the test specimen spot welds fail during preparation of the specimen, the specimen number shall be recorded with the notation "WELD FAILED WHILE CUTTING SPECIMEN". A tabulation of the failed specimens, if any, shall be included in the report to Project Engineering. Additional specimens shall then be cut from the same member and tested as described in Section 2.3.3.

2.2.4 As specimens are being cut from the selected members, each test specimen shall be indelibly labeled with the sample number as outlined in Section 2.1.3.

2.2.5 Each specimen shall be visually inspected by Project Engineering Representative after test preparation is complete, and prior to testing.

2.2.6 All residual material shall be retained, until released by Project Engineering.

2.3 Specimen Testing

2.3.1 Testing shall be performed on all specimens by applying a tensile load to the test specimen, thereby inducing shear in a single spot weld (see Figure 2). Testing shall be performed in accordance with AWS C1.1-66, Section 504 (see Attachment 1). The requirement stating that "the record of the specimen should also include a complete description of the properties of the metal such as thickness, tensile strength, ductility and chemical composition" may be deleted.

2.3.2 Load shall be applied at a slow uniform rate until the ultimate (failure) load is obtained.

2.3.3 If, during testing, any of the specimens shown an ultimate strength of 1600 pounds or less, the following steps shall be taken: A) The remaining member, if any, from which the specimen was cut, shall be made into additional specimens and tested; B) These additional specimens shall be clearly identified in the report as additional tests and shall identify the members from which they were taken.

3.0 TEST REPORT

3.1 Test results shall be submitted to Project Engineering at the conclusion of testing. Results shall include:

a) Ultimate strength of each specimen spot weld,
b) Manner of failure,
c) Signature of Project Engineering Representative,
d) Signature of Lab Technician.

Data shall be recorded on form provided in Attachment 3.

3.2 The test report shall also include:

a) A sketch of the apparatus set-up used in the test,
b) A list of specimens that failed during preparation (if any),
c) A list of the test lab's machinery used in the testing along with calibration data and dates, when appropriate.

4.0 FIGURES AND ATTACHMENTS

Figure 1: Back-to-Back, Spot Welded Superstrut Members

Figure 2: Test Specimen Configuration

Attachment 1: AWS C1.1-66 "Recommended Practices for Resistance Welding"

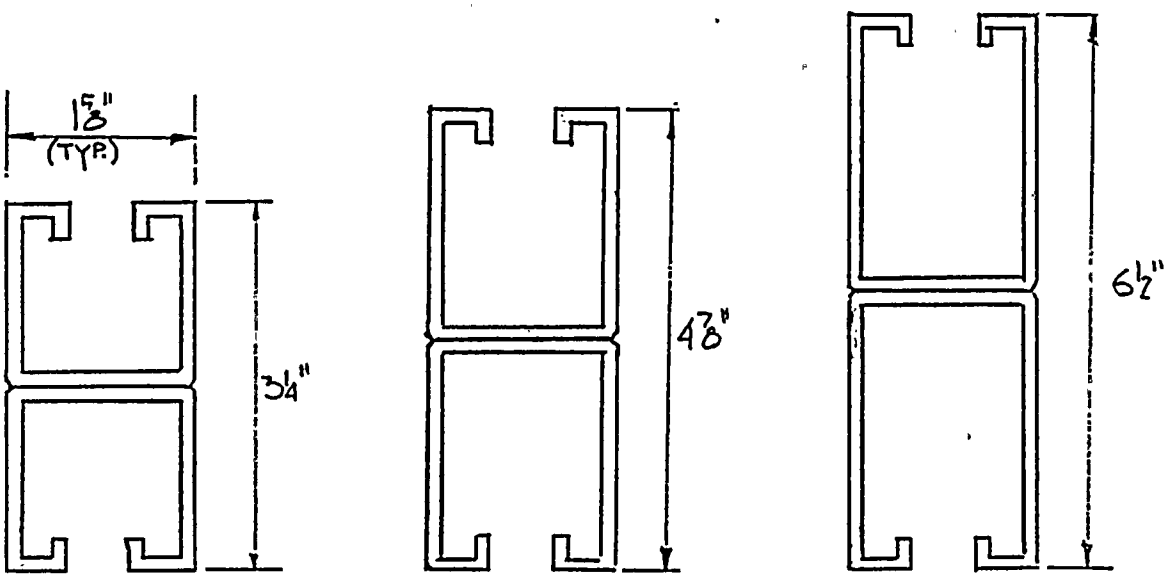
Attachment 2: Superstrut Sample Log Sheet

Attachment 3: Summary of Test Results

5.0 QUALITY PROGRAM

Work covered herein shall be performed in accordance with the Quality Program and additional related procedures, which currently apply to design engineering work on the Diablo Canyon Project.

Back to Back Superstrut Members



A1202 E1202 H1202

Figure 1.

TEST SPECIMEN CONFIGURATION

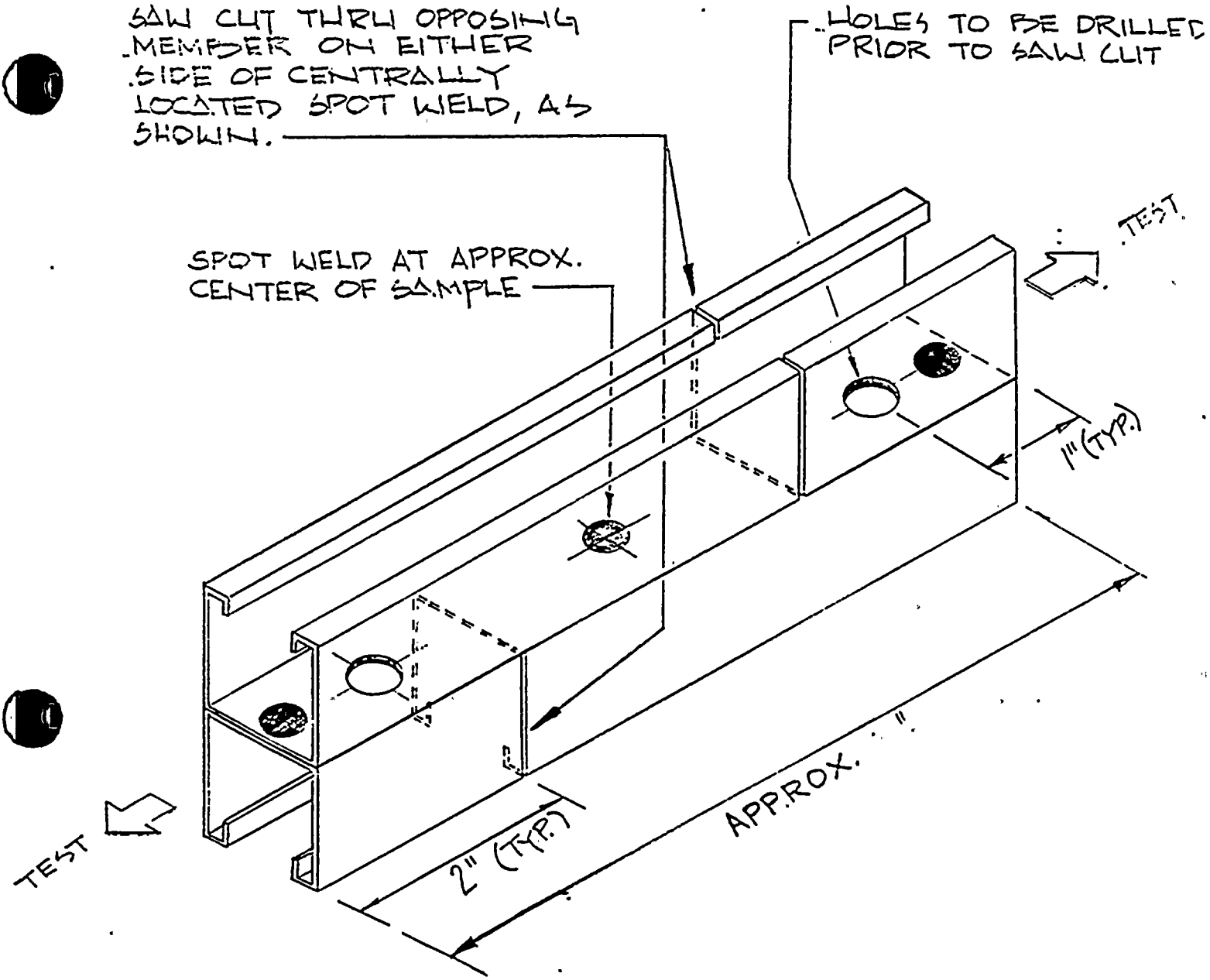


FIGURE 2

AWS C1.1-66

Recommended Practices for Resistance Welding

Superseding 1950 Edition

Prepared by
AWS Resistance Welding Committee

Under the Direction of
AWS Technical Activities Committee

Edward A. Fenton
Technical Director

Price $4.00

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Projection Welds

Test No. 1 Tension-Shear Test
Test No. 2 Tension Test
- *(a)* Cross-Tension Test
- *(b)* U-Tension Test

Test No. 3 Impact Test
- *(a)* Shear-Impact Test
- *(b)* Drop-Impact Test
- *(c)* Shear-Impact Loading Test
- *(d)* Tension-Impact Loading Test

Test No. 4 Fatigue Test
Test No. 5 Macroetch Test
Test No. 7 Radiographic Test
Test No. 8 Torsional Test
Test No. 9 Hardness Test
Test No. 10 Peel Test
Test No. 11 Bend Test (Aluminum & Aluminum Alloys)

Flash Welds

Test No. 5	Macroetch Test
Test No. 7	Radiographic Test
Test No. 9	Hardness Test
Tension Test	Refer to ASTM E 8-61T
Bend Test	Refer to ASTM E 190-64
Cupping Test	Refer to ASTM A 344-60T
Charpy Impact Test.	Refer to ASTM E 23-64
Torsion Test	Refer to ASTM (when issued)

503. PREPARATION FOR TESTING

Consistent test results can be obtained only with careful attention to surface condition. The material should be essentially free of grease, scale or other foreign substances likely to cause a high surface resistance.

The sheared specimen should be essentially flat and free of burrs. Sheared burrs on heavy stock may be sufficient to cause shunting of the current through the edges of the pieces and therefore the burrs should either be removed or the parts placed together with the burrs toward the outside faces of the specimens.

Specimens showing obvious misalignment or lack of centering should be discarded.

504. TEST METHODS

504.1 Tension-Shear Test (Test No. 1)

This test consists of pulling in tension, to destruction, on a standard testing machine, a test specimen obtained by lapping two strips of metal

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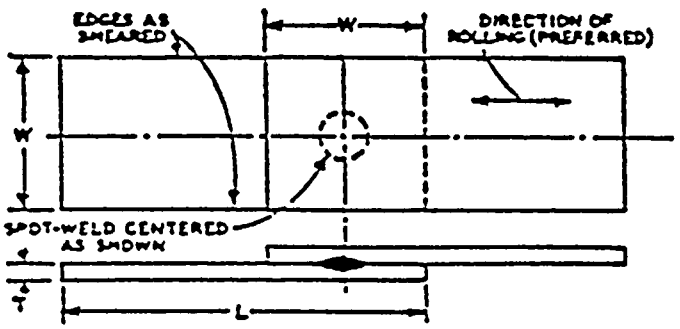
and joining them by a single weld. The dimensions of the test specimens are shown in Fig. 5.1.

The ultimate strength of the specimen and the manner of failure, whether by shear of the weld metal, or by tear of the base metal, and whether a ductile or brittle fracture is obtained, should be recorded.



T Thickness of thinner sheet, in.	W Specimen width, in.	L Recommended length, in.
Up to 0.030	⅝	3
0.031 to 0.050	¾	3
0.051 to 0.100	1	4
0.101 to 0.130	1¼	5
0.131 to 0.190	1½	5
0.191 and over	2	6

Fig. 5.1—Tension-Shear Test Specimen

Measurement of the diameter of a weld corresponding to the weld in the tension-shear specimen is desirable. When no other test is contemplated an approximate value of the diameter can be obtained by measurement on the fracture transverse to the direction of pull. More precise measurements can be made with Tests Nos. 2, 3, 5 and 8.

The record of the specimen should also include a complete description of the properties of the metal such as thickness, tensile strength, ductility and chemical composition.

The effect of eccentricity in the use of the above specimens may be disregarded. For specimens 0.101 in. in thickness and over it is recommended that the grips of the testing machine be offset to avoid bending at the grips.

504.2 Tension Test (Test No. 2)

The purpose of the tension test is to provide a better measure of notch sensitivity than is obtained with the tension-shear test. The ratio of the

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SUPERSTEUT SAMPLE LOG SHEET

SAMPLE NO.	TYPE	SUPPORT NO.	COMMENTS
- 1202 - S71	20	2GW-100-4-107	
- 1202 - S72	296	H-128-3-77	
- 1202 - S73	18	G-140-7-237	
- 1202 - S74	202	2D-119-10-21	
X - 1202 - S75	87	—	NOT BACK TO BACK
- 1202 - S76	20	2K-85-9-4	
- 1202 - S77	183	2CSR-127-4-81	
- 1202 - S78	102	H-115-5-78	
- 1202 - S79	20	J-115-12-49	
X - 1202 - S80	87	—	NOT BACK TO BACK
- 1202 - S81	20	GE/GW-140-4-530	
- 1202 - S82	202	2GE-115-3-204	
- 1202 - S83	620	F-140-1-584	
X - 1202 - S84	235	—	NOT BACK TO BACK

UNDER SAMPLE NO: A ; A1202 H ; H1202
E ; E1202 X ; N/A

Attachment 3

SUMMARY OF TEST RESULTS

Specimen Number	Shear Load @ Failure (lbs)	Manner of Failure *	Remarks	Signature	
				Lab. Tech.	P. E. Rep.

Tests Performed At _____ Date _____

* Manner of Failure:
A. Shear of Spot Weld
B. Weld Failure During Preparation
C. Other (describe)

Signed: _____ (Project Engr. Rep.)

_____ (Lab Tech.)