Southern California Edison Company

P. O. BOX 800
2244 WALNUT GROVE AVENUE
ROSEMEAD, CALIFORNIA 91770

K. P. BASKIN
MANAGER OF NUCLEAR ENGINEERING,
SAFETY, AND LICENSING

TELEPHONE
(213) 572-1401

November 15, 1982

Director, Office of Nuclear Reactor Regulation
Attention: D. M. Crutchfield, Chief
Operating Reactors Branch No. 5
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Subject: Docket No. 50-206
Piping Data for Review of SEP Topic III-6
Seismic Design Considerations
San Onofre Nuclear Generating Station
Unit 1

By letter dated October 29, 1982 we provided design information regarding various piping and equipment to permit independent seismic analyses of these items. Provided as an attachment to this letter is similar information for lines 2081-2-2501R, 2080-2-2501R, 5011-3-2501R, 5011-4-2501R and 5023-3-2501R. These lines are associated with the charging and pressurizer spray systems.

If you have any questions on this information, please let me know.

Very truly yours,

M. O. Medford for KPB

Enclosure

cc: T. Bridges (EG&G)

A028

ATTACHMENT 1

PIPING SYSTEM ENGINEERING DATA

FOR

PIPING SYSTEMS:

- Pressurizer Spray
  Line Numbers: 5011-3-2501R, 5011-4-2501R, 5025-3-2501R

- Pressurizer Auxiliary Spray
  Line Number: 2080-2-2501R

- Charging Line
  Line Number: 2081-2-2501R

TABLE OF CONTENTS

INTRODUCTION

This report will describe the information required for a Dynamic Seismic Analysis, as well as other types of analyses such as Deadweight and Thermal for the Charging Line (Calc No. 101), Pressurizer Auxiliary Spray (Calc No. 100), and Pressurizer Spray (Calc No. 102). The order in which the data are presented is the same as that outlined in the "Piping System Engineering Data" sheet, Attachment "A".

1. Design and operating temperature-pressure are listed in Attachment "B".

2. The system is analyzed for pressure, deadweight, thermal and dynamic seismic loading conditions for a faulted condition using service level D stress allowable as guidelines, and stress allowables per the established criteria.

3. The detailed piping isometrics with all necessary dimensions and support locations are shown in Attachment "C".

4. Information on nominal pipe sizes, schedules weights and insulation are provided in Attachment "B".

5. The support type (showing support direction) and location is shown on the isometric drawings in Attachment C. The stiffness values are minimum rigid, per the established criteria.

6. Attachment "D" contains the valve data used for this analysis, including copies of the valve drawings used to prepare the valve data. This attachment contains information for all valves shown in Attachment "C".

7. Anchor thermal movements at equipment pertaining to this analysis can be obtained from equipment drawings provided in Attachment "E". The translation and rotational stiffness of anchors used in this analysis are (10^6) lb/in and (10^8) in-lb/rad. Thermal displacements at attachments of the identified piping system to the loop piping are provided in Attachment "E".

8. The drawings for the pressurizer C-2, and the regenerative heat exchanger are provided in Attachment "E".

9. N/A

10. The response spectra to perform dynamic analysis is per seismic response spectra established for the plant and defined in the established criteria.

11. N/A

12. N/A

ATTACHMENT "A"

DATA LIST

PIPING SYSTEM ENGINEERING DATA

For Class 1 piping analyses and reviews, the following engineering data are required.

1. List of design and operating temperatures and pressures.
2. List of load cases, their associated operating conditions, and appropriate Service Level (example: the ECC system will be analyzed for a plant faulted condition using Service Level B stress allowables). The list should also include significant transients and their associated cycles necessary for the fatigue analyses.
3. Detailed piping drawings and/or isometrics indicating the geometry of the piping system along with all necessary dimensions and weld locations.
4. List of nominal pipe sizes, schedules, weights, and materials.
5. List of pipe support types, locations, stiffnesses, and preloads or the applicable support drawings.
6. List of valve locations, weights, lengths, and eccentricities (center of gravity locations).
7. List of any anchor movements (thermal, seismic, etc.), rotations, and applicable stiffness values.
8. Applicable data (length, weight, center of gravity, insulation thickness, etc.) for any attached equipment (eg. pumps, small tanks, etc.).
9. Detailed thermal gradient information.
10. Response spectra, static acceleration levels, or time varying acceleration for dynamic analyses.
11. Description of any special fittings or components present in the piping system.
12. If applicable, any imposed forces and moments due to relief valve discharge, connected lines and components, etc.
13. The design specification. It is recognized that the design specification would include some of the above data.

Unless otherwise directed, the following assumptions will be made.

1. All components are butt welded (flush and [illegible] welds). Weld specifications would be needed if verification of this assumption is required.
2. All components meet applicable ANSI standards as listed in table NB-3132-1 of the ASME Code.
3. The requirements of ASME Code, Section III, Subsubarticle NB-3600 are satisfied.

This list is not necessarily all inclusive; thus, variations may result due to special requirements made by certain projects or programs.

ATTACHMENT "B"

PIPE DATA

WESTINGHOUSE NUCLEAR TECHNOLOGY DIVISION

TITLE PIPING SYSTEM ENGINEERING DATA LINE NOS. 2080, 2081, 5011, & 5025				PAGE OF
PROJECT SCE	AUTHOR DATE Richard Jaworski 10/29/82	CHK'D. BY DATE [illegible] 11/1/82	CHK'D. BY DATE ~	
S.O.	CALC. NO. ~	FILE NO.	GROUP PSA-1	

PIPE DATA

SYSTEM	RC	RC	RC	RC	RC
LINE NO.	2080-2"-2501R	2081-2"-2501R	5011-3"-2501R	5011-4"-2501R	5025-3"-2501R
DESIGN TEMP °F	500	500	570	570	570
OPER. TEMP °F (MAX)	500	500	570	570	570
DESIGN PRESS PSIG	2500	2500	2500	2500	2500
OPER. PRESS. PSIG (MAX)	2500	2500	2500	2500	2500
MATERIAL CLASS	2501R	2501R	2501R	2501R	2501R
MATERIAL	A312 TP316	A312 TP316	A312 TP316	A312 TP316	A312 TP316
SCHEDULE	160	160	160	160	160
O.D., INCH.	2.375	2.375	3.5	4.5	3.5
t., INCH.	.343	.343	.437	.531	.437
INSUL THK (IN)	1 1/2	1 1/2	1 1/2	2	1 1/2
LBS/FT PIPE	7.444	7.444	14.32	22.51	14.32
LBS/FT WATER	.971	.971	2.348	4.02	2.348
LBS/FT INSUL.	2.352	2.352	3.32	4.8	3.32
TOTAL LBS/FT	10.767	10.767	19.988	31.33	19.988
COEFF. THERM. X IN/IN/F	.0591	.0591	.0587	.0587	.0587
E_c PSI	28.3×10^6	28.3×10^6	28.3×10^6	28.3×10^6	28.3×10^6
S_c	18800	18800	18800	18800	18800
S_H	18000	18000	17300	17300	17300

REV. NO.	REV. DATE	AUTHOR DATE	CHK'D. BY DATE	CHK'D. BY DATE

WESTINGHOUSE FORM 55213D

2D. PIPING SPECIFICATION
CLASS 2501

Design Conditions

Pressure	2500 psig
Maximum Temperature	650°F

Material: Stainless Steel, The ASTM Specification is listed below for each item.

Pipe

Size	1/2" to 12"
Construction	Seamless
ASTM Spec*	*A 312 Type 316
Schedule	160

Fittings

Size	2" and smaller	2-1/2" to 12"
Type	Forged	Seamless
Joint	Socket welded	Butt welded
ASTM Spec	A 182 F 316	A 403 WP 316
Rating	4000#	Schedule 160

Flanges

Size	2" and smaller	2-1/2" to 12"
Type	Forged	Forged
Joint	Socket welded	Welding neck
ASTM Spec	A 182 F 316	A 182 F 316
Rating	1500# RTJ	1500# RTJ
Bored to	Schedule 160	Schedule 160

*Require supplementary requirement S7 in accordance with A 376 in sizes 3" and larger.

Location SAN ONOFRE - UNIT 1

Southern California Edison

M-18668
PIPING DESIGN AND MATERIAL SPECIFICATION

Class 2501

No.	Revisions	Date	J.O. No.	Made	Ck'd.	O.K.	O.K.	Approved
0	INITIAL ISSUE/WESTINGHOUSE/		1940		WLD			

FORM NO. ENG. 87 K-E

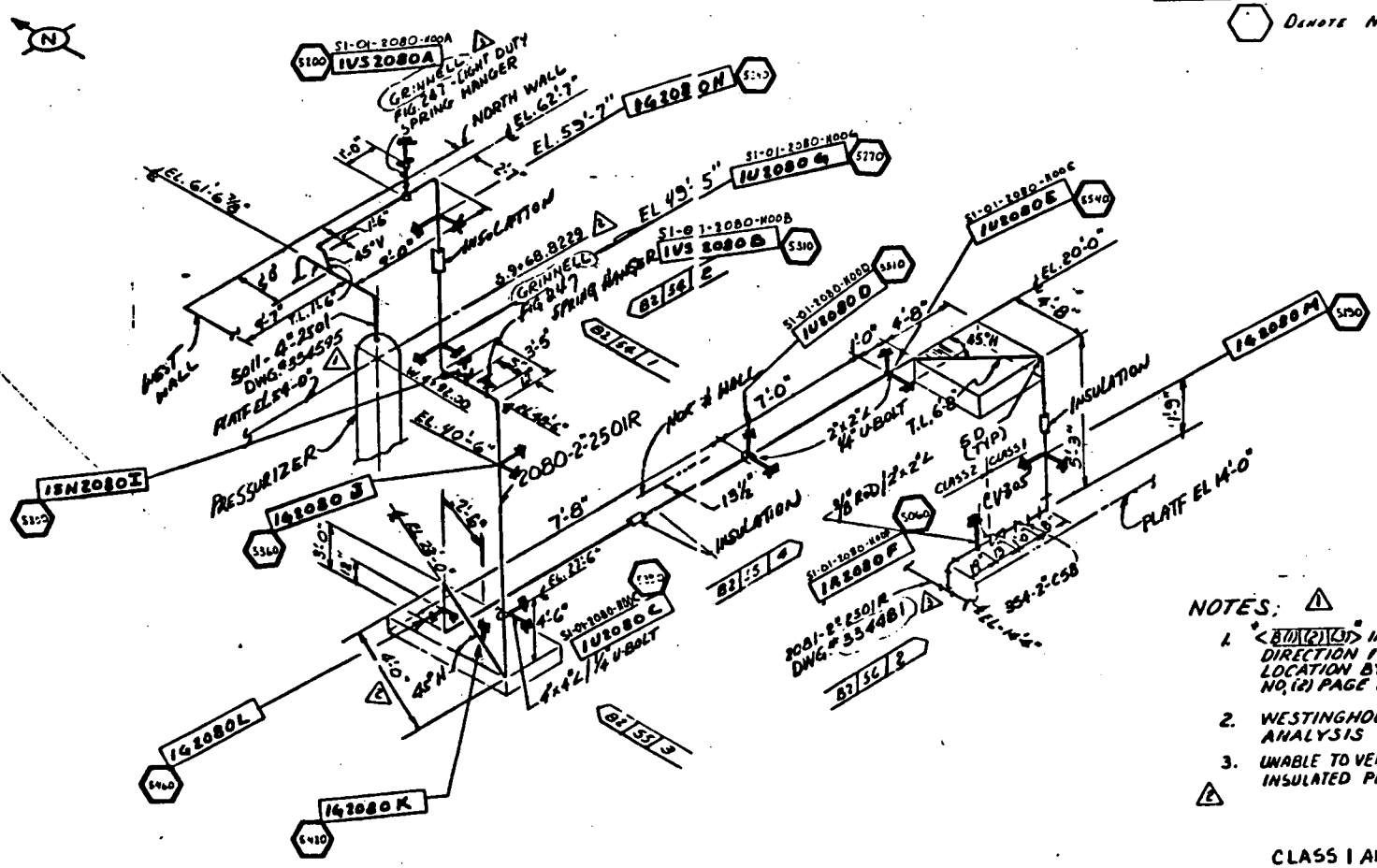
ATTACHMENT "C"

PIPING ISOMETRICS

Line No.	Isometric Drawing Number
2081-2"-2501R	334480-3
2080-2"-2501R	334481-2 334482-3
5011-3"-2501R 5011-4"-2501R	334595-2
5025-3"-2501R	334597-2

CALC. N° 100

⬡ DENOTE NODE N°



NOTES:

1. ⟨B/P/I⟩ INDICATES VIEWING DIRECTION & PHOTOGRAPH LOCATION BY (1) PHOTO BOOK NO, (2) PAGE NO, (3) PHOTO NO
2. WESTINGHOUSE SCOPE OF ANALYSIS
3. UNABLE TO VERIFY FITTINGS ON INSULATED PIPING.

CLASS 1 AND 2 PIPING
SAFETY RELATED

BOP-SEISMIC REEVALUATION ANALYSIS BOUNDARY-ISOMETRIC

UNIT 1

CERTIFIED AS BUILT

NO	REVISIONS	DATE	DR.	CHK.	E.G.S.	CNF. E.	P.E.	Q.A.E.
3	INCORPORATED CCN # 2	12-29-78	J.C.E.	DSM	MAW	N/A		
2	INCORPORATED CCN #1 (NEW DWG. NO.)	9-6-78	J.C.E.	R.D.K.	MAW	N/A		
1	INCORP DCN #1, 263 (554481) 3-30-77	4-6-77	E.G.J.			N/A		
0	AS BUILT	9-9-77	SMY	JWL		N/A		

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
1206-001		

J.O. NO.

FILE

SAN ONOFRE NUCLEAR GENERATING STATION

ISOMETRIC-LN N°2080-2"-2501R FROM LN N° 2081-2" TO PR AUX SPRAY

SOUTHERN CALIFORNIA EDISON COMPANY
LOS ANGELES, CALIF.

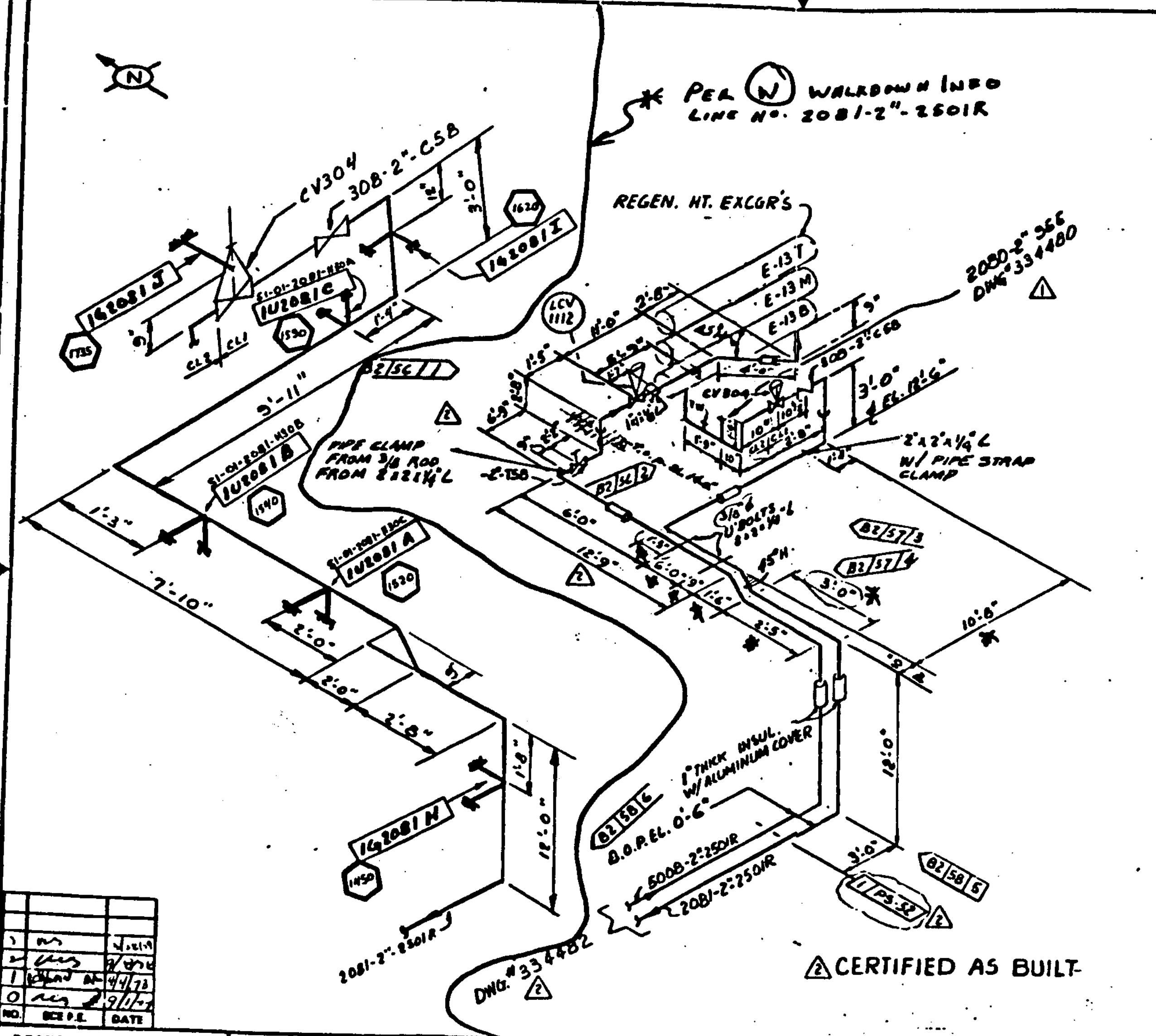
SCALE NONE

334480-3

334480-3

CALC N° 101

⬡ DENOTES NODE N^OS.



NOTES

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2. WESTINGHOUSE SCOPE OF ANALYSIS
3. FOR PIPE SUPPORT AND HANGER DETAIL SEE M-31736
4. UNABLE TO VERIFY FITTINGS ON INSULATED PIPING.

CLASS 1 AND 2 PIPING
SAFETY RELATED

BOP-SEISMIC REEVALUATION ANALYSIS BOUNDARY-ISOMETRIC

UNIT 1

NO.	REVISIONS	DATE						
3	INCORPORATED CCN#2	3-30-79	J.C.Z.					
2	INCORPORATED CCN#1 (NEW DWG. NO.)	9-6-78	J.C.Z.	B.D.		N/A		
1	INCORPORATED DCN#1,2&3	4-6-78				N/A		
0	AS BUILT	3-9-77	RWM	JL				

NO.	BCE P.E.	DATE
3		
2		
1		4/4/78
0		9/1/77

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
1286-001		

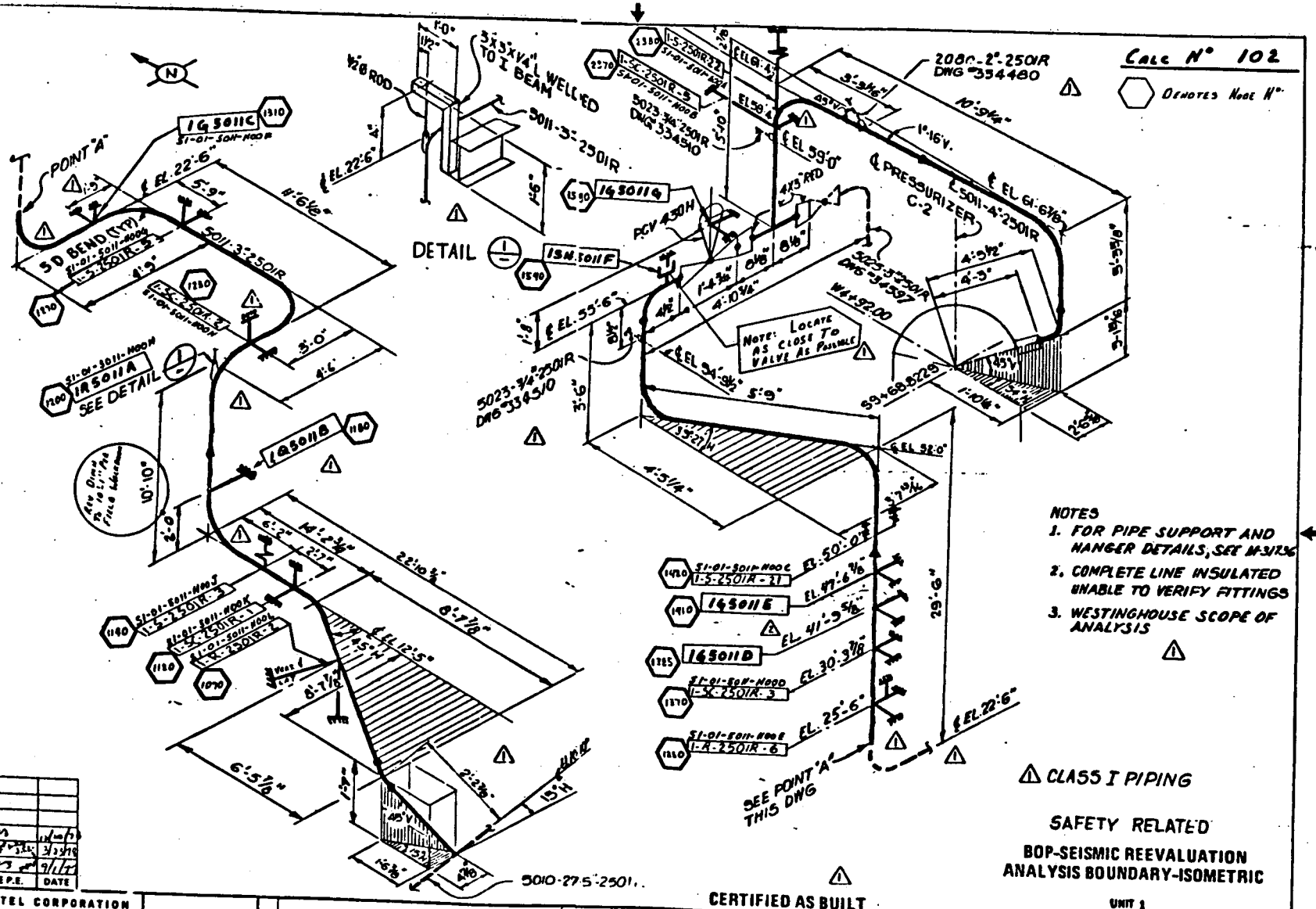
J.O. NO.
FILE

SAN ONOFRE NUCLEAR GENERATING STATION

ISOMETRIC - LINE 5008-2"-2501R; 2081-2"-2501R: REG. HT EXCHANGER TO LOOP "A"

SOUTHERN CALIFORNIA EDISON COMPANY

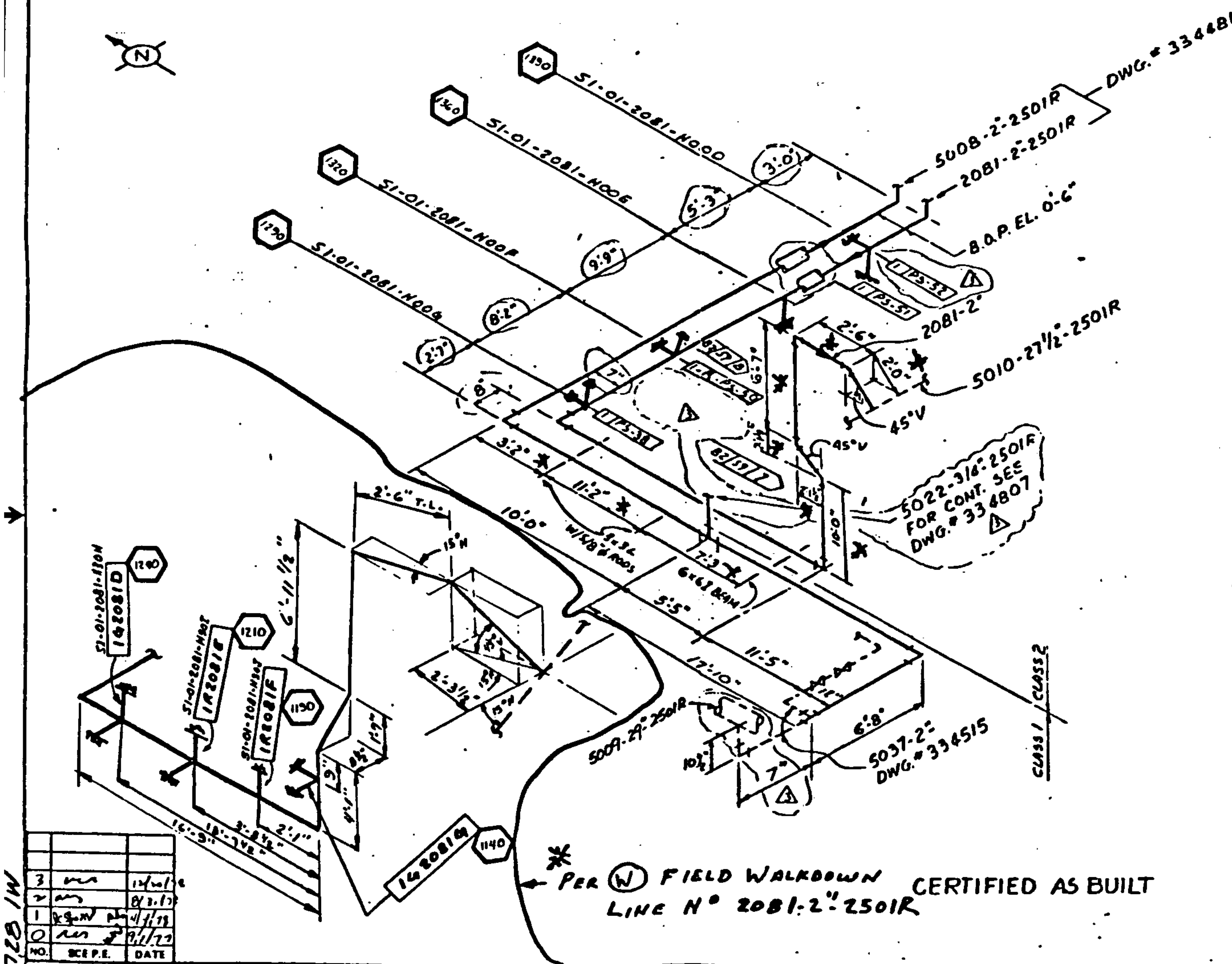
334481-2



334595-2

334595-2

CALC N° , 101



* PER (W) FIELD WALKDOWN
LINE N° 2081-2"-2501R

CERTIFIED AS BUILT

NOTES

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2. WESTINGHOUSE SCOPE OF ANALYSIS
3. FOR PIPE SUPPORT AND HANGER DETAILS SEE M-31736
4. BOTH LINES INSULATED - △ UNABLE TO VERIFY FITTINGS.

CLASS 1 & 2 PIPING
SAFETY RELATED

BOP-SEISMIC REEVALUATION ANALYSIS BOUNDARY-ISOMETRIC

UNIT 1

334482-3

NO.	SCE P.E.	DATE
3		12/20/78
2		8/3/78
1		4/1/78
0		9/1/77

2728 IW

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
12186-001		

NO.	REVISIONS	DATE	DR.	CHK.	EGS.	CHF.E.	P.E.	Q.A.E.
3	INCORPORATED CCN #2	12-2-78	J.C.Z.			N/A		
2	INCORPORATED CCN #1 (NEW DWG. NO.)	9-5-78	J.C.Z.	B.D.		N/A		
1	INCORP DCN #1,2 & 3 (DWG. #454422 SH.2)	9-6-78	E.E.Z.			N/A		
0	AS BUILT	9-4-77	RWM	F.L.		N/A		

J.O. NO.

FILE

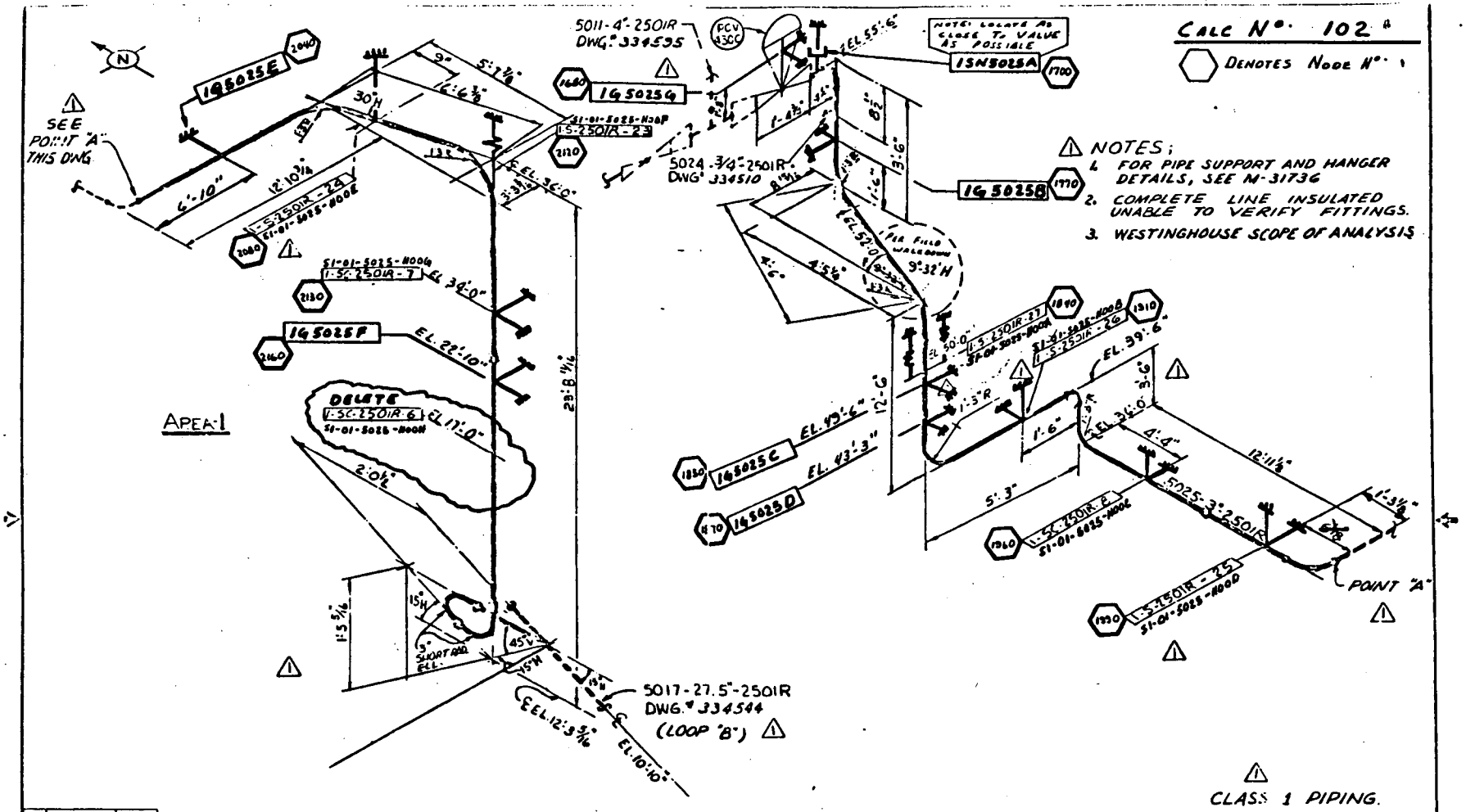
SAN ONOFRE NUCLEAR GENERATING STATION

ISOMETRIC-LN N°s 5008-2"-2501R; 2081-2"-2501R; REGEN HEAT EXCHANGER TO LOOP "A"

SOUTHERN CALIFORNIA EDISON COMPANY
LOS ANGELES, CALIF.

SCALE NONE

334482-3



NO	SCE P.E.	DATE
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1		7/1/77
0		1/1/77

BECHTEL CORPORATION
ENGINEERS & CONSTRUCTORS
LOS ANGELES, CALIF.

JOB NO.	DATE	APPROVED
12186.001		

NO	REVISIONS	DATE	DR.	CHK	ENGR.	CHK'R	P.E.	DATE
2	INCORPORATED CCN#1	12/9	SS	J.C.Z.		N/A		
1	INCORPORATED DCN#1 & 2. 6-19	[illegible]	SA	ZB		N/A		
0	AS BUILT	1/1/77	SA	ZB		N/A		

J.O. NO. FILE

SAN ONOFRE NUCLEAR GENERATING STATION

ISOMETRIC-LINE N° 5025-3"-2501R FROM LOOP "B" TO 5011-4"

SOUTHERN CALIFORNIA EDISON COMPANY
SCALE NONE LOS ANGELES, CALIF.

334597-2

334597-2

ATTACHMENT "D"

VALVE DATA

VALVE DATA

1) Line No. 2080-2"-2501R

a) Valve - 354-2"-C58 — ID = 2C58
Weight = 29# — Vendor = Rockwell
Length (Body) = 8 1/2" — Drawing C-61462 (Not available)
C. G. = x = 1 1/16", y = 1 1/4" *
Valve data estimated from Rockwell Drawing ACD-31605533

b) Valve - CV-305 — ID = 2IA58R
Weight = 475# — Vendor = BSB Safety
Length (Body) = 10" — Drawing 95216-20 (Not Available)
C. G. = 22 5/8"
Valve data estimated from Copes Vulcan Drawing D-189777

2) Line No. 2081-2"-2501R

a) Valve 308-2"-C58 — ID = 2C58
Weight = 29# — Vendor = Rockwell
Length (Body) = 8 1/2" — Drawing C-61462 (Not Available)
C. G. = x = 1 1/16", y = 1 1/4" *
Valve data estimated from Rockwell Drawing ACD-31605533

b) Valve CV-304 — ID = 2IA58R
Weight = 475# — Vendor = BSB Safety
Length (Body) = 10" — Drawing 95215-20 (Not Available)
C.G. = 22 5/8"
Valve data estimated from Copes Vulcan Drawing D-189777

3) Line No. 5011-3"-2501R

a) Valve - PCV-430H — ID = 3RA58RGA
Weight = 500# — Vendor = BSB Safety
Length (Body) = 16 3/4" — Drawing (Not Available)
C. G. = 20"
Valve data estimated from the following two Copes-Vulcan Drawings D-166035 and D-166833.

4) Line No. 5025-3" - 2501R

a) Valve - PCV-430C — ID = 3RA58RGA
Weight = 500# — Vendor = BSB Safety
Length (Body) - 16 3/4" — Drawing (Not Available)
C.G. = 20"
Valve data estimated from the following two Copes-Vulcan Drawings D-166035 and D-166833.

*x = Distance from center of valve body to CG location, measured along the axis of the valve body in the direction of flow.

y = Distance from the centerline of the valve body to CG location. measured perpendicular to the axis of the valve body.

ACD-3IG05533

— WESTINGHOUSE ELECTRIC CORPORATION

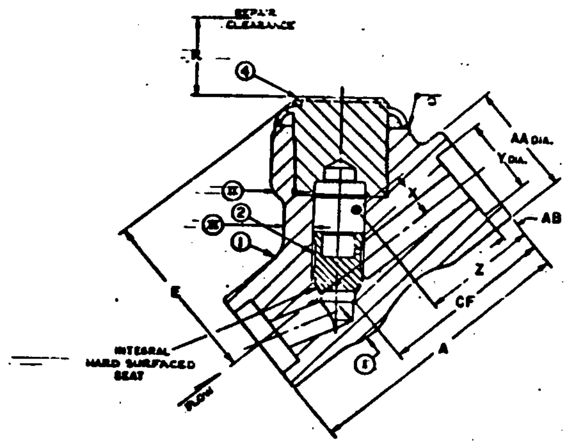
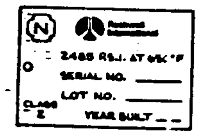


FIGURE 3674 Z



CLASS 1500			FORGED CHROMIUM NICKEL MOLYBDENUM STEEL F 316	3600 P.S.I. AT 100°F 2240 P.S.I. AT 800°F
FIG.	SIZES	ENDS	ENGLISH DIMENSIONS	2
3674	2"	SOCKET WELDING	A - END TO END	8.50
			AA - END HUB DIAMETER	3.50
			AB - DEPTH OF SOCKET	.62
			CF - CENTER TO END	5.44
			E - CENTER TO TOP	5.25
			Y - SOCKET DIAMETER	2.406
			X	1.12
			Z	3.75
			R - REPAIR CLEARANCE	3.12
			Cv - FLOW COEFFICIENT ●	54
			WEIGHT, LBS. ±10%	25

CLASS 1500			FORGED CHROMIUM NICKEL MOLYBDENUM STL. F 316	248 BAR AT 38°C 171 BAR AT 343°C
FIG.	SIZE	ENDS	METRIC DIMENSIONS	2
3674	2	SOCKET WELDING	A - END TO END	216
			AA - END HUB DIAMETER	89
			AB - DEPTH OF SOCKET	16
			CF - CENTER TO END	138
			E - CENTER TO TOP	133
			Y - SOCKET DIAMETER	64
			X -	29
			Z -	95
			R - REPAIR CLEARANCE	79
			Cv - FLOW COEFFICIENT ●	54
			WEIGHT, KILOGRAMS ±10%	11

● DENOTES CENTER OF GRAVITY (SYMMETRICAL TO ℄)

● Cv IS ONLY GOOD WHEN VALVE IS IN FULL OPEN POSITION

♦ SPARE PARTS

LIST OF MATERIALS

QUANTITIES ARE FOR ONE VALVE

WHERE A.S.T.M. OR A.S.M.E. SPECS ARE INDICATED THE LATEST REVISION APPLIES

NO.	NAME	NO. REQ'D	MATERIAL	SPECIFICATIONS	RMC NO.
1	BODY	1	FORGED STAINLESS STEEL	SA182 F316	72012
2	DISK	1	COBALT BASE ALLOY	A967 6R1	C1030
4	COVER	1	FORGED STAINLESS STEEL	SA479 T316	72012

NOTE:

1. DIMENSIONS SHOWN ARE NOMINAL PROVIDED FOR GENERAL INFORMATION AND AS SUCH ARE SHOWN WITHOUT TOLERANCE.
2. DIMENSIONS IN INCHES & MM
3. VALVE(S) MEETS ALL APPLICABLE REQUIREMENTS OF A.S.M.E. B.&P.V. CODE, SECTION III, CLASS 2.

•2C78A

TAG

PATENT NO. 2,903,564

Flow Control Division
Rockwell International

ROCKWELL EDWARD
FORGED STEEL CHECK UNIVALVE®

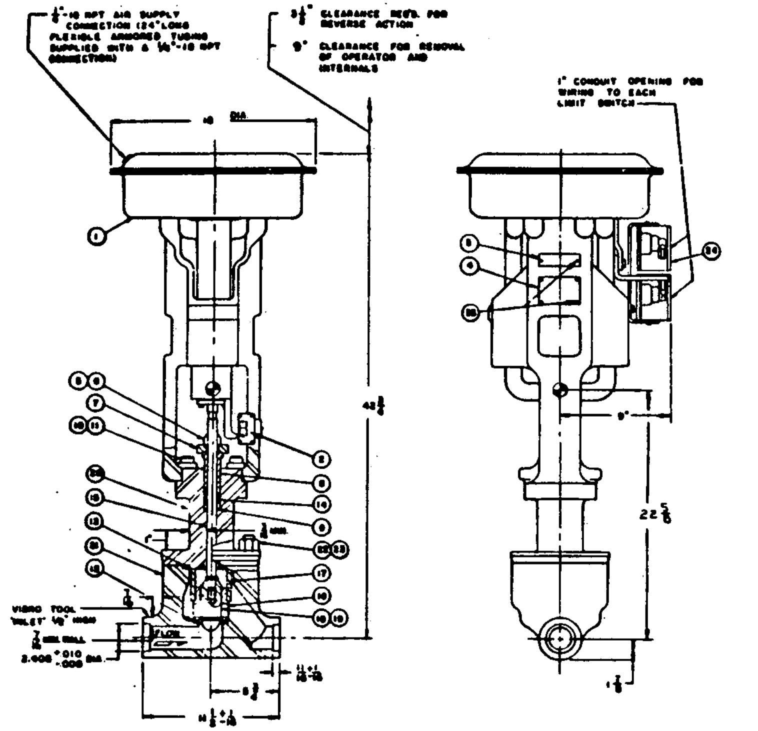
DATE 4-30-80

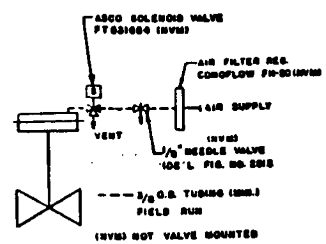
TN | JLC | 5/6/80 | ACD-3IG05533

MINIMUM CODE REQUIREMENTS FOR WALL THICKNESS

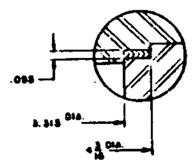
	ENGLISH	METRIC

224

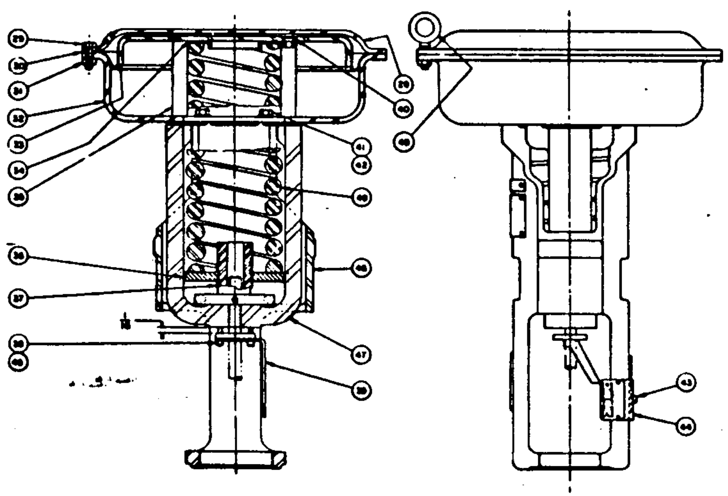


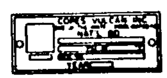


INSTALLATION SCHEMATIC

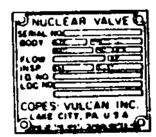


BONNET GASKET DETAIL





'N' STAMP PLATE



IDENTIFICATION PLATE

LIST OF MATERIALS

ITEM NO	NO REQ	PART NO	PART CODE	DESCRIPTION	MAT'L	MATERIAL SPECIFICATION	REMARKS
1	1	136419-2	L	OPERATOR(D100-160)(R)			
2	1	79628	S	INDICATOR PLATE	BRASS	ASTM-B36	
3	1	147006-G	M	'N' STAMP PLATE	CRES	COM'L TYPE 302	
4	1	147007	M	IDENTIFICATION PL	CRES	COM'L TYPE 302	
5	2	148112	S	STUD	CRES	ASTM-A479,TP 410	
6	2	148114		HEX NUT	CRES	ASTM-A194,CL 6	5/8-11 UNC-2B
7	1	143237	M	GLAND FOLLOWER	CRES	ASTM-A351,GR CF8	
8	1	148110	S	PACKING GLAND	CRES	ASTM-A479,TP 410	
9	1	169162	S	GUIDE BUSHING	CRES	ASTM-A564 GR 630	COND H-900
10	1	148113	S	HOLD DOWN CLAMP	CRES	COM'L TYPE 304	
11	4	145238		SOC HD CAP SCREW	CRES	ASTM-A193,GR B8	3/8-16 UNC × 1-1/8 LG.
12	1	131312		GASKET	430 SST	COM'L	2-3/8 OD × 2-1/8 ID × 1/8 THK
13	1	80849		GASKET	430 SST	COM'L	4-1/8 OD × 3-3/8 ID × 1/8 THK
14	1	137308		PACKING RETAINING RING	430	COM'L	CRANE 2CR, OL-1/4 × 1/2 RING
15	1	157017	M	STEM 1" DIA.	CRES	ASTM-A276,TP 316	COND B
16	1	166208	M	CAGE	CRES	ASME-SA564 GR 630	COND H-900
17	1	149090	S	CAGE SPACER	CRES	ASTM-A312,TP 304	
18	1	166210	M	PLUG	CRES	ASME-SA564,GR 630	COND H-1100
19	1	148124		ROLL PIN	CRES	ASTM-A479,TP 302	SP-801
20	1	183330-PV	L	BONNET		SEE NOTE-11	
21	1	170000-PV	L	VALVE BODY	CRES	ASME SA182,GR F316	
22	8	148241	S	STUD		SEE NOTE-4	7/8-9 UN × 5 LG.
23	8	148184	M	NUT		SEE NOTE-4	7/8-9 UN
24	1	147980	S	LIMIT SWITCH ACC KIT			NAMCO EA170-11302
25	8	64341		DRIVE SCREW	STEEL	COM'L	4 × 3/16 LG CAD PLATED
26							
27							
28	1	80812	M	COVER	C STEEL	AISI 1008-1010	
29	10	4377		HEX HD CAP SCREW	STEEL	COM'L	3/8-16 UNC × 1-1/4" LG
30	1	80815	L	DIAPHRAGM	RUBBER	COM'L BUNA N	
31	12	41390		HEX NUT	STEEL	COM'L	3/8-16 UNC
32	1	80813	M	BASE	C STEEL	AISI 1008-1010	
33	1	137290	L	DIAPHRAGM PLATE	C STEEL	AISI 1008-1010	
34	1	80940	S	SPRING GUIDE	C STEEL	AISI 1008-1010	
35	4	80847	S	SPACER	C STEEL	ASTM A-120	1/2" SCH 40 PIPE
36	1	137610-2	M	SPRING ADJUST NUT	C. IRON	ASTM 48, CL 30	
37	1	137611	M	SPRING ADJUST SCR	D IRON	COM'L GRADE	
38	1	137581	S	STEM LOCK BAR	STEEL	SAE 4140	3/8 THK PLATE, MAKE AS EQ
39	1	133432	M	INDICATOR ARM	C STEEL	COM'L	
40	4	81678		SOC FLAT HD CAP SCR	STEEL	COM'L	1/2-13 UNC × 3-3/4 LG
41	4	4373		HEX HD CAP SCR	STEEL	COM'L	1/2-13 UNC × 1" LG
42	4	1896		LOCKWASHER	STEEL	COM'L	1/2" SPRING TYPE
43	2	60378		ROUND HD MACH SCR	STEEL	COM'L	5/16-18 UNC × 1/2 LG
44	1	77843	M	INDICATOR PL BRKT	C STEEL	COM'L	
45	2	3571		SOC HD CAP SCR	STEEL	COM'L	3/8-16 UNC × 1-3/4 LG
46	1	129209-B	E	FRAME	CAST STL	ASTM A216, GR WCB	
47	1	137608-B	E	YOKE	CAST STL	ASTM A216, GR WCB	
48	2	139380		EYE BOLT	STEEL	COM'L	
49	1	131047	S	SPRING	STEEL	AISI 6150	CAD PLATED [illegible]

NOTES:

1. FOR MINIMUM Cv OF 33 , SET VALVE AT 1" INCHES.
2. MAXIMUM TEMPERATURE 650 °F
3. AIR PRESSURE IN THE DIAPHRAGM CHAMBER MUST NOT EXCEED 100 PSIG TO PREVENT COMPONENT DAMAGE.
4. STUD MAT'L -CRES, ASME-SA453, GR 660
   NUT MAT'L -CRES, ASME-SA193/194, GR B-6
5. RECOMMENDED SPARE PARTS ARE MARKED WITH AN ASTERISK(*) ON THE BILL OF MATERIAL.
6. REQUIRED AIR PRESSURE INPUT TO BEGIN LIFT OF PLUG FROM MAIN SEAT = 47 PSIG.
7. REQUIRED AIR PRESSURE INPUT TO SHUT OFF BACKSEAT = 66 PSIG.
8. MAXIMUM AIR TO OPERATE = 80 PSIG.
9. MINIMUM WALL 3/16 (ANSI-B16.5-1968)
10. ALL DIMENSIONS ARE IN INCHES AND ARE REFERENCE UNLESS OTHERWISE SPECIFIED BY TOLERANCE.
11. BONNET MATERIAL - CRES, ASME-SA182 GR.F-316
    BACKSEAT MAT'L. - STELLITE NO.6
12. ON REVERSE ACTING UNITS, DIAPHRAGM PLATE (ITEM 33) MUST BE ATTACHED TO FRAME (ITEM 46) WITH SCREWS (ITEM 40) AND SPACERS (ITEM 35). ON DIRECT ACTING UNITS, DIAPHRAGM PLATE IS ATTACHED TO YOKE (ITEM 47) BY THE SAME METHOD.
13. WHEN ASSEMBLING ITEMS 36 AND 37 USE CRANE COMPOUND 425A, CVI PART NO. 80423, ON THREADS.
14. TIGHTEN SCREWS, ITEM 40 TO 30 LBS. FT OF TORQUE.
15. EYE BOLTS TO BE 180° APART.

MICROFILMED FROM COMPANIES ORIGINAL

REVISIONS	
1	ADDED 310 % TO VALVE WEIGHT
2	CENTER OF GRAVITY WAS 21" & DRY WT. WAS 420 LBS.

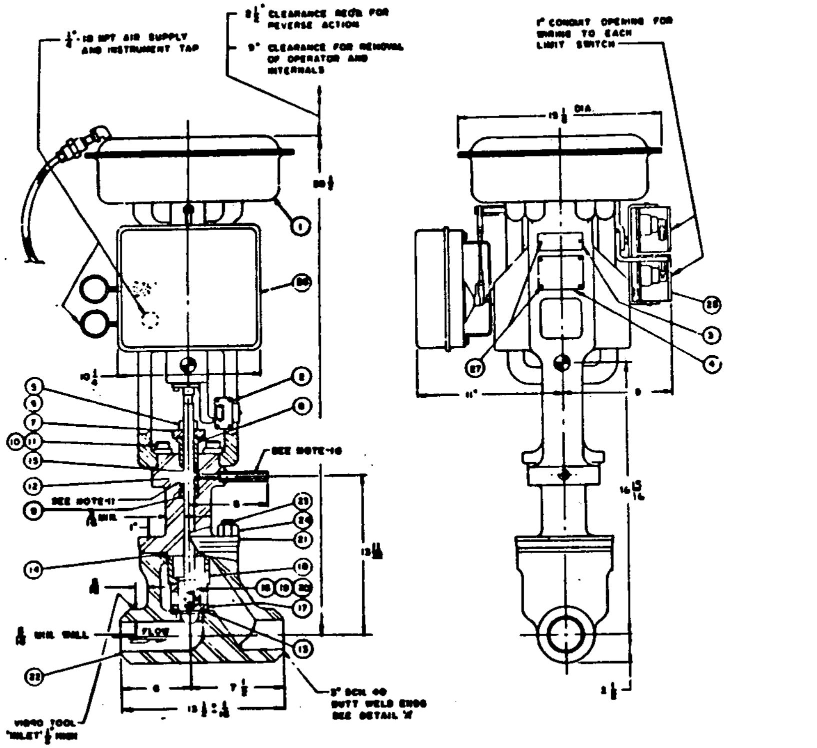
VALVE IDENT 2-1AT080
DRY WT 342 LBS ±10%
OPER MODE REVERSE ACTING

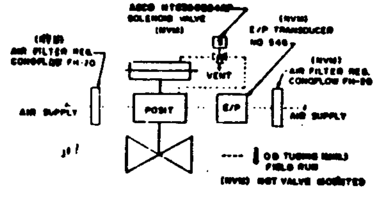
COPES-VULCAN, INC.

MODEL D-100-160 OPER.
2"-1500 LB ASME STD.
VALVE ASSEMBLY
ASME CODE CLASS-2

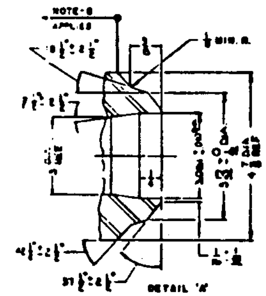
SCALE NTS
DWG NO. D-189777
REV 2

299

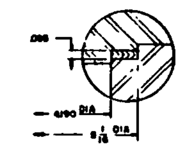




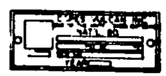
INSTALLATION SCHEMATIC



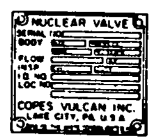
DETAIL 'A'



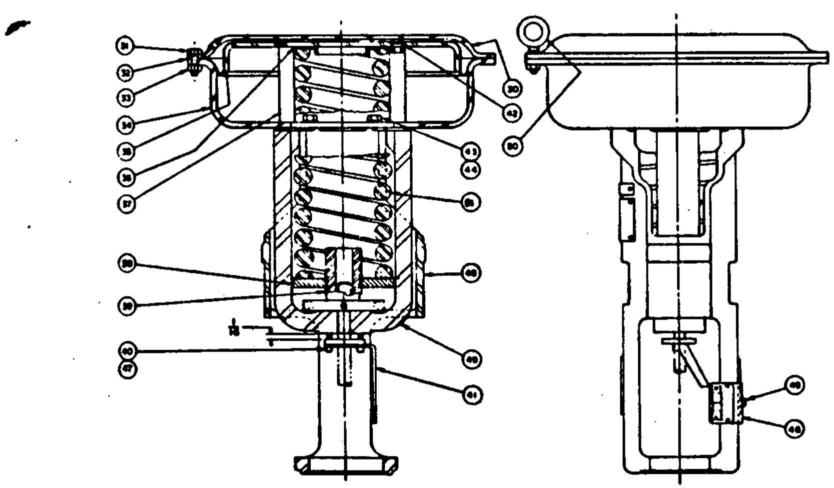
BONNET GASKET DETAIL



'N' STAMP PLATE



IDENTIFICATION PLATE



LIST OF MATERIALS

ITEM NO	NO REQ	PART NO.	CODE	DESCRIPTION	MAT'L	MATERIAL SPECIFICATIONS	REMARKS
1	1	136417-1	L	OPERATOR (100 [illegible])			
2	1	78888	S	INDICATOR PLATE	BRASS	ASTM-B36	
3	1	147988	M	N STAMP PLATE	CRES	COML. TYPE 302	
4	1	147987	M	IDENTIFICATION PL.	CRES	COML. TYPE 302	
5	8	149113	S	STUD	CRES	ASTM A479 TP 410	
6	8	149114		HEX NUT	CRES	ASTM A194 CL 6	[illegible] UNC-2B
7	1	143237	M	GLAND FOLLOWER	CRES	ASTM A351 GR CF8	
8	1	149115	S	PACKING GLAND	CRES	ASTM A479 TP 410	
9	1	149116	S	GUIDE BUSHING	CRES	ASTM A564 [illegible]	COND H-900
10	2	149117	S	HOLD DOWN CLAMP	CRES	COML. TYPE 304	
11	4	143238		SOC HD CAP SCREW	CRES	ASTM A193 GR B6	[illegible] UNC [illegible] LG
12	1	149117	S	LANTERN RING	CRES	ASTM A479 [illegible] 304	
13	1	134338		GASKET	ASB-SST	COML	[illegible]
14	1	81069		GASKET	ASB-SST	COML	[illegible]
15	1	137598		PACKING SET (NOTE-11)	ASB	COML	[illegible]
16	1	137708	M	STEM [illegible]	CRES	ASTM A479 TP 316	COND B
17	1	193996	M	CAGE	CRES	ASME SA 564 GR 630	COND H-1100
18	1	149032	S	CAGE SPACER	CRES	ASTM A312 TP 304	
19	1	180083	M	PLUG	CRES	ASME SA564 GR 630	COND H-1100
20	1	149124		ROLL PIN	CRES	ASTM A479 TP 302	SPIROL
21	1	168195-P4	L	BONNET		SEE NOTE-10	
22	1	170170-P4	L	VALVE BODY	CRES	ASME-SA[illegible]	
23	8	147551	S	STUD		SEE NOTE-4	3/4-10 UNC [illegible] LG
24	8	148368	M	NUT		SEE NOTE-4	3/4-10 UNC
25	1	147988	S	LIMIT SWITCH ASS. KIT		[illegible]	NAMCO EA170-11302
26	1	147989	L	POSIT. ACC. KIT			BAILEY [illegible] 532-010-14
27	8	84841		DRIVE SCREW	STEEL	COML	[illegible] CAD PLATED
28							
29							
30	1	80808	M	COVER	C STEEL	AISI 1008-1010	
31	3	4377		HEX HEAD CAP SCR	STEEL	COML	3/8-16 UNC X 1-1/4 LG
32	1	80811	M	DIAPHRAGM	RUBBER	COML BUNA 'N'	1/16" THICK WITH FABRIC
33	12	41990		HEX NUT	STEEL	COML	3/8-16 UNC
34	1	80809	M	BASE	C STEEL	AISI 1008-1010	
35	1	80810	M	DIAPHRAGM PLATE	C STEEL	AISI 1008-1010	
36	1	80849	M	SPRING GUIDE	C STEEL	AISI 1008-1010	
37	4	80848	S	SPACER	C STEEL	ASTM A-120	1/2" SCH 40 PIPE
38	1	137610-C	M	SPRING ADJUST NUT	[illegible] IRON	ASTM A48 CL 30	
39	1	137611	M	SPRING ADJUST SCR	IRON	COML	
40	1	133006	S	STEM LOCK BAR	STEEL	SAE 4140	
41	1	133492	M	INDICATOR ARM	C STEEL	COML	
42	4	84877		SOC FLAT HD CAP SCR	STEEL	COML	1/2"-13 UNC [illegible] LG
43	4	4373		HEX HD CAP SCR	STEEL	COML	1/2"-13 UNC X 1" LG
44	4	1898		LOCKWASHER	STEEL	COML	1/2" SPRING TYPE
45	2	60570		ROUND HD MACH SCR	STEEL	COML	5/16-18 UNC X 1/2" LG
46	1	77845	M	INDICATOR PL BRKT	C STEEL	COML	
47	2	3571		SOC HD CAP SCR	STEEL	COML	3/8-16 UNC X 1-1/4" LG
48	1	129453-R	E	FRAME	CAST STL	ASTM A216 GR WCB	
49	1	117607-B	E	YOKE	CAST STL	ASTM A216 GR WCB	
50	2	159591		EYE BOLT	STEEL	COML	
51	1	162412	S	SPRING	STEEL	AISI-[illegible]	CAD PLATED - [illegible] LB/IN

NOTES:

1. FOR MINIMUM Cv OF 50, SET VALVE AT 1" INCHES.
2. MAXIMUM TEMPERATURE 300°F
3. AIR PRESSURE IN THE DIAPHRAGM CHAMBER MUST NOT EXCEED 100 PSIG TO PREVENT COMPONENT DAMAGE.
4. STUD MAT'L - CRES, ASME-SA 453, GR 660
   NUT MAT'L - CRES, ASME-SA 193/194, GR B-8
5. [illegible] ARE [illegible] WITH AN [illegible] BILL OF MATERIAL
6. REQUIRED AIR PRESSURE INPUT TO BEGIN LIFT OF PLUG FROM MAIN SEAT = 30 PSIG
7. MAXIMUM AIR TO OPERATE = 60 PSIG
8. MINIMUM WALL [illegible] (ANSI B16.5-1968)
9. ALL DIMENSIONS ARE IN INCHES AND ARE REFERENCE UNLESS OTHERWISE SPECIFIED BY TOLERANCE.
10. BONNET MAT'L - CRES, ASME-SA182, GR F-316
    NIPPLE MAT'L 1/2" SCH 80 PIPE, CRES, ASME-SA312, TYPE TP-316
11. SIX (6) RINGS OF PACKING ARE TO BE UNDER THE LANTERN RING AND THREE (3) ABOVE.
12. ON REVERSE ACTING UNITS, DIAPHRAGM PLATE (ITEM 35) MUST BE ATTACHED TO FRAME (ITEM 48) WITH SCREWS (ITEM 43) AND SPACERS (ITEM 37). ON DIRECT ACTING UNITS, DIAPHRAGM PLATE IS ATTACHED TO YOKE (ITEM 49) BY THE SAME METHOD.
13. WHEN ASSEMBLING ITEMS 38 AND 39 USE CRANE COMPOUND 425A, CVI PART NO. [illegible], ON THREADS.
14. TIGHTEN SCREWS, ITEM 47 TO 30 LBS. FT. OF TORQUE.
15. EYE BOLTS TO BE 180° APART.

MICROFILMED FROM COMPANIES ORIGINAL

VALVE IDENT.:	3-[illegible]
DRY WT.:	346 LBS. APPROX.
POSIT. MODE:	DIRECT ACTING
OPER. MODE:	REVERSE ACTING

COPES-VULCAN, INC.

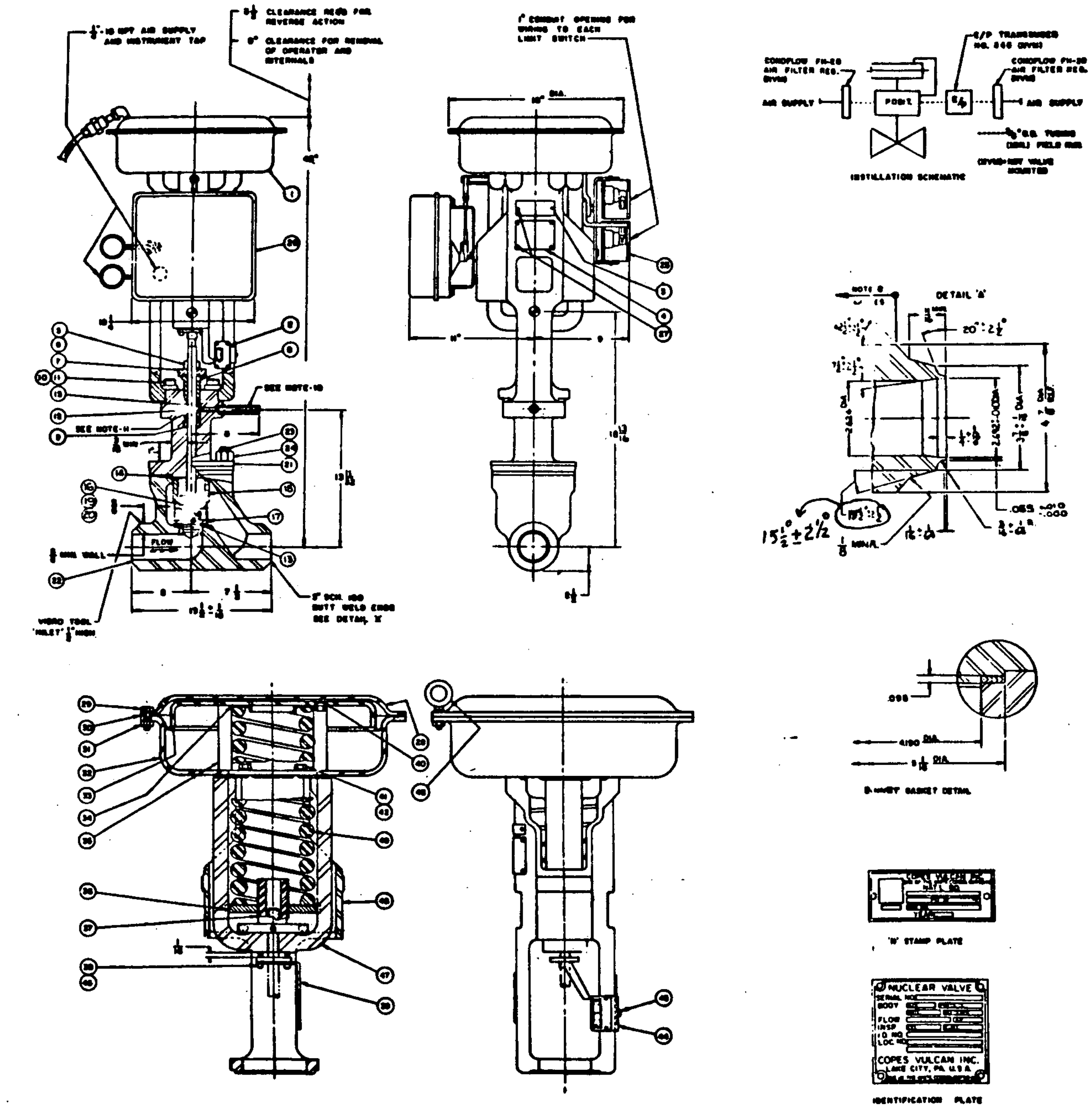
MODEL D-100-100 OPER.
3"-600 LB ASME STD
VALVE ASSEMBLY

ASME CODE CLASS-2

DWG. NO. D-166035

REVISIONS

NO	DATE	REVISIONS	BY	CHK
1	[illegible]	REVISED PER [illegible]	[illegible]	[illegible]
2	[illegible]	GENERAL REVISIONS AND DWG. SIZE WAS B	[illegible]	[illegible]
3	[illegible]	CORRECTED B/M	[illegible]	[illegible]
4	[illegible]	GENERAL REVISIONS	[illegible]	[illegible]
5	[illegible]	ADDED SA194 MAT'L TO NUT IN NOTE 4	[illegible]	[illegible]
6	[illegible]	REVISED ITEM 25 LIMIT SWITCH MODEL NO. EA170-11302 WAS [illegible]. UPDATED WELD PREP [illegible]	[illegible]	[illegible]
7	[illegible]	CENTER OF GRAVITY WAS [illegible]. DRY WT. WAS 320 LBS.	[illegible]	[illegible]



ITEM NO.	QTY	PART NO.	TYPE	DESCRIPTION	MAT'L	MATERIAL SPECIFICATIONS	REMARKS
1	1	130419-[illegible]	L	OPERATOR [illegible]			
2	1	78629	[illegible]	INDICATOR PLATE	BRASS	ASTM-B36	
3	1	147[illegible]	[illegible]	'N' STAMP PLATE	CRES	COM'L TYPE 304	
4	1	147[illegible]	[illegible]	IDENTIFICATION PL.	CRES	COM'L TYPE 304	
5	[illegible]	14[illegible]	[illegible]	STUD	CRES	ASTM-A[illegible]	
6	[illegible]	14[illegible]		HEX NUT	CRES	ASTM-A[illegible]	TYPE [illegible]
7	1	14[illegible]	[illegible]	GLAND FOLLOWER	CRES	ASTM-A[illegible]	
8	1	14[illegible]	[illegible]	PACKING GLAND	CRES	ASTM-A[illegible]	
9	1	[illegible]	[illegible]	[illegible]	CRES	ASTM-A[illegible]	[illegible]
10	[illegible]	14[illegible]	[illegible]	HOLD DOWN CLAMP	CRES	COM'L TYPE 304	
11	[illegible]	[illegible]		SOC HD CAP SCREW	CRES	ASTM-A[illegible]	[illegible]
12	1	14[illegible]	[illegible]	LANTERN RING	CRES	ASTM-A[illegible]	
13	1	[illegible]		GASKET	[illegible]	COM'L	[illegible]
14	1	80370		GASKET	[illegible]	COM'L	[illegible]
15	1	[illegible]		PACKING SET [illegible]	[illegible]	COM'L	[illegible]
16	1	[illegible]	[illegible]	STEM [illegible] DIA.	CRES	[illegible]	[illegible]
17	1	[illegible]	[illegible]	CAGE	CRES	[illegible]	[illegible]
18	1	[illegible]	[illegible]	CAGE SPACER	CRES	ASTM-A312, TP 304	
19	1	[illegible]	[illegible]	PLUG	CRES	[illegible]	[illegible]
20	1	[illegible]		ROLL PIN	CRES	ASTM-A[illegible]	[illegible]
21	1	170[illegible]	L	BONNET		SEE NOTE-10	
22	1	[illegible]	L	VALVE BODY	[illegible]	[illegible]	
23	[illegible]	147[illegible]	[illegible]	STUD		SEE NOTE-4	[illegible]
24	[illegible]	14[illegible]	[illegible]	NUT		SEE NOTE-4	[illegible]
25	1	147[illegible]	[illegible]	LIMIT SWITCH ASS'Y			[illegible]
26	1	147[illegible]	L	POSIT. ACC. KIT			[illegible]
27	[illegible]	[illegible]		DRIVE SCREW	STEEL	COM'L	[illegible] CAD PLATED
28	1	10018	[illegible]	[illegible]	C STEEL	[illegible]	
29	[illegible]	4377		HEX HD CAP SCREW	STEEL	COM'L	[illegible]
30	1	[illegible]	L	DIAPHRAGM	RUBBER	COM'L [illegible]	
31	[illegible]	41[illegible]		HEX NUT	STEEL	COM'L	[illegible]
32	1	[illegible]	[illegible]	BASE	C STEEL	AISI 1008-1010	
33	1	137[illegible]	L	DIAPHRAGM PLATE	C STEEL	AISI 1008-1010	
34	1	[illegible]	[illegible]	SPRING GUIDE	C STEEL	AISI 1008-1010	
35	[illegible]	[illegible]	[illegible]	SPACER	C STEEL	ASTM A-120	1/2" SCH 40 PIPE
36	1	137[illegible]-C	[illegible]	SPRING ADJUST NUT	[illegible]	ASTM-A48 CL. [illegible]	
37	1	137[illegible]	[illegible]	SPRING ADJUST SCR	[illegible]	COM'L GRADE	
38	1	137[illegible]	[illegible]	STEM LOCK BAR	STEEL	SAE 4140	[illegible]
39	[illegible]	133[illegible]	[illegible]	INDICATOR ARM	C STEEL	COM'L	
40	[illegible]	[illegible]		SOC FLAT HD CAP SCR	STEEL	COM'L	[illegible]
41	[illegible]	4373		HEX HD CAP SCR	STEEL	COM'L	[illegible]
42	[illegible]	[illegible]		LOCKWASHER	STEEL	COM'L	1/2" SPRING TYPE
43	[illegible]	[illegible]		ROUND HD MACH SCR	STEEL	COM'L	[illegible]
44	1	77[illegible]	[illegible]	INDICATOR PL [illegible]	C STEEL	COM'L	
45	[illegible]	[illegible]		SOC HD CAP SCR	STEEL	COM'L	[illegible]
46	1	129[illegible]	[illegible]	FRAME	CAST STL	ASTM-A216, GR WCB	
47	1	137[illegible]	[illegible]	YOKE	CAST STL	ASTM-A216, GR WCB	
48	[illegible]	[illegible]		EYE BOLT	STEEL	COM'L	
49	1	[illegible]	[illegible]	SPRING	STEEL	[illegible]	CAD PLATED - [illegible] LB/IN.

NOTES:

1. FOR [illegible] OF [illegible], SET VALVE AT 1 1/2 INCHES.
2. MAXIMUM TEMPERATURE 200°F
3. AIR PRESSURE IN THE DIAPHRAGM CHAMBER MUST NOT EXCEED [illegible] PSIG TO PREVENT COMPONENT DAMAGE.
4. STUD MAT'L - CRES, ASME-SA453, GR 660
   NUT MAT'L - CRES, ASME - SA193/194, GR. B-6
5. RECOMMENDED SPARE PARTS ARE MARKED WITH AN ASTERISK (*) ON BILL OF MATERIAL.
6. REQUIRED AIR PRESSURE INPUT TO SHUT OFF MAIN SEAT = [illegible] PSIG.
7. MAXIMUM AIR TO OPERATE = [illegible] PSIG
8. MINIMUM WALL [illegible]" (ANSI B16.5-[illegible])
9. ALL DIMENSIONS ARE IN INCHES AND ARE REFERENCE UNLESS OTHERWISE SPECIFIED BY TOLERANCE.
10. BONNET MAT'L - CRES, ASME-SA182, GR F-316
    NIPPLE MAT'L - 1/2" SCH. 80 PIPE, CRES, ASME-SA312, TYPE-TP316
11. [illegible] RINGS OF PACKING ARE TO BE UNDER THE LANTERN RING AND THREE (3) ABOVE.
12. ON REVERSE ACTING UNITS, DIAPHRAGM PLATE (ITEM [illegible]) MUST BE ATTACHED TO FRAME (ITEM 46) WITH SCREWS (ITEM [illegible]) AND SPACERS (ITEM [illegible]). ON DIRECT ACTING UNITS, DIAPHRAGM PLATE IS ATTACHED TO YOKE (ITEM 47) BY THE SAME METHOD.
13. WHEN ASSEMBLING ITEMS 36 AND 37 USE CRANE COMPOUND 425A, CVI PART NO. [illegible], ON THREADS.
14. TIGHTEN SCREWS, ITEM 45 TO 30 LBS. FT. OF TORQUE.
15. EYE BOLTS TO BE 180° APART.

MICROFILMED FROM COMPANIES ORIGINAL

VALVE IDENT.	[illegible]
DRY WT. 420 LBS. APPROX.	
POSIT. MODE	DIRECT ACTING
OPER. MODE	DIRECT ACTING

COPES-VULCAN, INC.

MODEL D-100-160 OPER.
3" 1500 LB ASME STD
VALVE ASSEMBLY

ASME CODE CLASS-2

DWG. NO. D-[illegible]

DATE	REVISIONS	BY	CHK	NO	DATE	REVISIONS	BY	CHK	NO	DATE	REVISIONS	BY	CHK
[illegible]	GENERAL REVISIONS AND DWG. SIZE WAS 'B'	[illegible]	[illegible]	5	[illegible]	LIMIT SWITCH MODEL NO. WAS D-[illegible]	[illegible]	[illegible]	9	[illegible]	TRIM WAS UNBALANCED BUSH TRIM. DELETED TRIM DETAIL	[illegible]	[illegible]
[illegible]	CORRECTED B/M	[illegible]	[illegible]	6	[illegible]	I.D. TOLERANCE WAS [illegible]	[illegible]	[illegible]					
[illegible]	GENERAL REVISIONS	[illegible]	[illegible]	7	[illegible]	CENTER OF GRAVITY WAS [illegible] DRY WT. WAS [illegible]	[illegible]	[illegible]					
[illegible]	ADDED SA194 MAT'L TO NUT IN NOTE #4.	[illegible]	[illegible]	8	[illegible]	TRIM WAS SINGLE SEAT CASCADE. ADDED VALVE TRIM [illegible]	[illegible]	[illegible]					

ATTACHMENT "E"

THERMAL DISPLACEMENTS AT LOOP CONNECTIONS

1 SHEET

EQUIPMENT DRAWINGS

1300 Cu. Ft. Pressurizer
Drawing No. 790D654

Regenerative Heat Exchanger
Drawing No. B-1-12240-6

THERMAL DISPLACEMENTS AT LOOP CONNECTIONS

1) Line No. 2081 - 2" - 2501R Attachment to Loop A Line 5010-27 1/2-2501R.
Reference: Isometric 334482-3
Displacement considered (inches and radians)

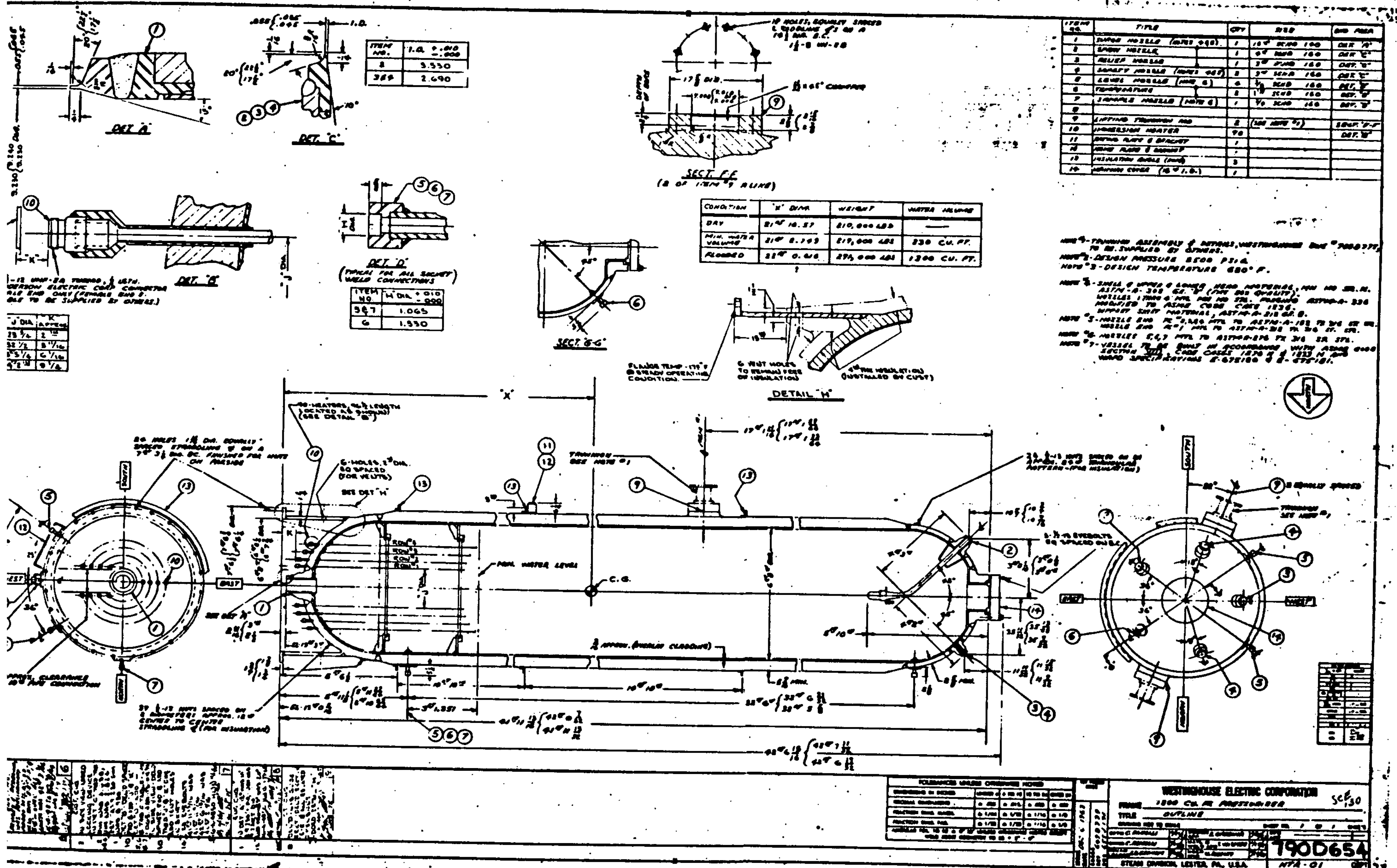
x = .0177	y = -.0615	z = 1.0154
Rx = .001029	Ry = .000175	Rz = -.001076

2) Line No. 5011-3" - 2501R Attachment to Loop A Line 5010-27 1/2"-2501R.
Reference: Isometric 334595-2
Displacement considered (inches and radians)

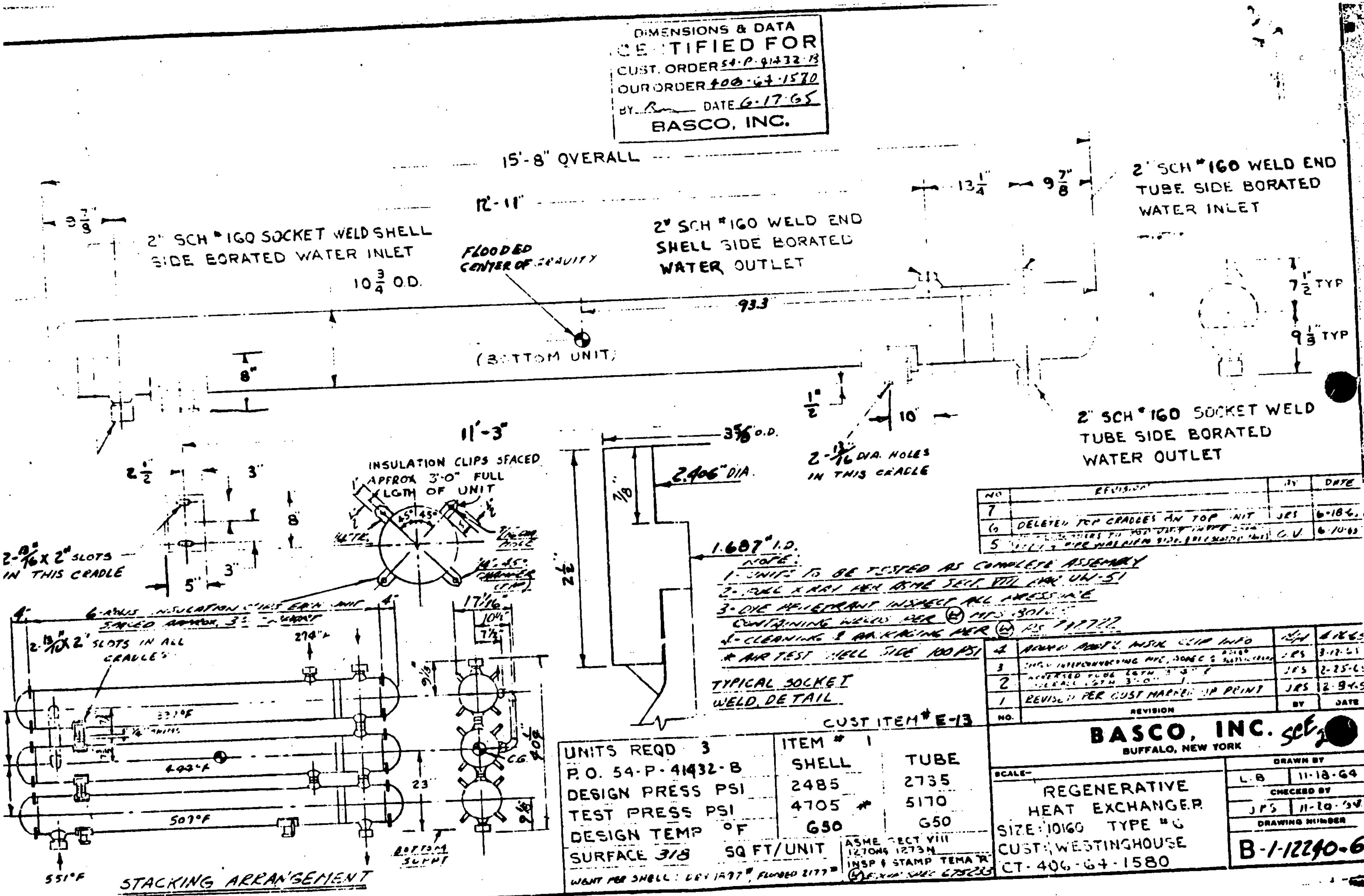
x = .0345	y = -.0696	z = 1.0863
Rx = .001029	Ry = .000175	Rz = -.001076

3) Line No. 5025-3"-2501R Attachment to Loop B Line 5017-27.5"-2501R
Reference: Isometric 334597-2
Displacement considered (inches and radians)

x = -.860	y = -.0582	z = -.484
Rx = .000417	Ry = .000175	Rz = .001429



DET. "A"
DET. "C"
DET. "B"
DET. "D"
(TYPICAL FOR ALL SOCKET WELD CONNECTIONS)
SECT. F-F
SECT. G-G
DETAIL "H"
ITEM NO. | TITLE | QTY | SIZE
CONDITION | "X" DIM. | WEIGHT | WATER VOLUME
DRY | 210,000 LBS | —
MIN. WATER VOLUME | 217,000 LBS | 230 CU. FT.
FLOODED | 1300 CU. FT.
NOTE 2 - DESIGN PRESSURE 2500 PSIA.
NOTE 3 - DESIGN TEMPERATURE 680° F.
C.G.
SOUTH
WESTINGHOUSE ELECTRIC CORPORATION
OUTLINE
STEAM DIVISION, LESTER, PA., U.S.A.
190D654



DIMENSIONS & DATA
CERTIFIED FOR
CUST. ORDER 54-P-41432-B
OUR ORDER 406-64-1580
DATE 6-17-65
BASCO, INC.
15'-8" OVERALL
12'-11"
9 7/8"
13 1/4
9 7/8
2" SCH #160 SOCKET WELD SHELL SIDE BORATED WATER INLET
10 3/4 O.D.
FLOODED CENTER OF GRAVITY
2" SCH #160 WELD END SHELL SIDE BORATED WATER OUTLET
2" SCH #160 WELD END TUBE SIDE BORATED WATER INLET
93.3
(BOTTOM UNIT)
8"
7 1/2" TYP
9 1/3" TYP
1/2"
10"
2" SCH #160 SOCKET WELD TUBE SIDE BORATED WATER OUTLET
11'-3"
3 5/8" O.D.
2.406" DIA.
2-13/16 DIA. HOLES IN THIS CRADLE
INSULATION CLIPS SPACED APPROX 3'-0" FULL LGTH OF UNIT
45° 45°
2 1/2"
3"
8
2-13/16 X 2" SLOTS IN THIS CRADLE
5"
3"
1.687" I.D.
1/16
2 1/2
TYPICAL SOCKET WELD DETAIL
274°F
2-13/16 X 2" SLOTS IN ALL CRADLES
17 11/16"
10 1/4"
7 1/2"
337°F
493°F
507°F
551°F
23
C.G.
BOTTOM SUPPT
STACKING ARRANGEMENT
NOTE:
1- UNITS TO BE TESTED AS COMPLETE ASSEMBLY
2- FULL X RAY PER ASME SECT. VIII PAR. UW-51
3- DYE PENETRANT INSPECT ALL PRESSURE CONTAINING WELDS PER (W) MPS
4- CLEANING & PACKAGING PER (W) PS
* AIR TEST SHELL SIDE 100 PSI
CUST ITEM # E-13
UNITS REQD 3
P.O. 54-P-41432-B
ITEM # 1
SHELL | TUBE
DESIGN PRESS PSI 2485 | 2735
TEST PRESS PSI 4705 * | 5170
DESIGN TEMP °F 650 | 650
SURFACE 318 SQ FT/UNIT
ASME SECT VIII
INSP & STAMP TEMA "R"
WGHT PER SHELL: DRY 1577#, FLOODED 2177#
NO. | REVISION | BY | DATE
7 | DELETED TOP CRADLES ON TOP UNIT | JRS | 6-18-65
6 | | G.V. | 6-10-65
5 | | |
4 | ADDED PART'L INSUL CLIP INFO | | 4-16-65
3 | | JRS | 3-12-65
2 | | JRS | 2-25-65
1 | REVISED PER CUST MARKED UP PRINT | JRS | 12-9-65
BASCO, INC.
BUFFALO, NEW YORK
SCALE-
REGENERATIVE HEAT EXCHANGER
SIZE 10160 TYPE "G"
CUST: WESTINGHOUSE
CT-406-64-1580
DRAWN BY L.B. 11-18-64
CHECKED BY JPS 11-20-64
DRAWING NUMBER B-1-12240-6