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Installation Instructions for Anvil EPS Sway Struts





ASC
Engineered Solutions

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INSTALLATION INSTRUCTIONS FOR SWAY STRUTS

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I. SCOPE

- 1.1 This procedure details field installation instructions for Anvil Sway Struts. It is intended for use at Power Stations constructed to the rules of the ASME Boiler and Pressure Vessel Code (Section III, Subsection NF), ASME B31.1 Power Piping, USAS B31.7 Nuclear Power Piping, and any other applicable codes.
- 1.2 This procedure applies to Fig. 210(N) Replacement Struts, Fig. 211(N) Sway Struts, Fig. 222(N) Mini Sway Struts, and Fig. 640(N) Field Welded Sway Struts.
- 1.3 See Section 5 for field alteration of Fig. 640(N) Sway Struts, purchased as bulk material at maximum lengths.

2. INSTALLATION OF FIG. 210(N), 211(N), and 640(N) SWAY STRUTS

- 2.1 Dimensions and data relative to the Fig. 210N, 211N, and 640N, Sway Struts may be found in ASC Pipe Hangers-Nuclear Qualified DRS/LCD Package. Dimensions and data relative to the Fig. 210, 211, and 640, sway struts may be found in ASC's Pipe Hanger Catalog.
- 2.2 **Installing the Fig. 210(N), Fig 211(N), and 640(N) Sway Struts**
 - 2.2.1 Refer to the hanger assembly drawing for piping and structural attachment locations, general arrangements, etc.
 - 2.2.2 Attach the rear bracket(s) **insuring that the spacers provided with the assembly are properly installed.** There must be one spacer on each side of the rod end assembly to insure that the ball bushing will remain centered on the load pin so that the full +/- 5° swing can be obtained.

CAUTION

The fit between the pivot pin and the structural attachment and Sway Strut is a close tolerance slip fit. Before installing the pin, make sure the pin, structural attachment holes and Sway Strut Ball Bushing are clean and free from nicks, burrs, etc. Do not hammer the pin into place. Install the ring clips into the grooves provided after installation.

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2.2.3 Rear Bracket Material Specifications:

SA-36
SA-216 GR WCB
SA-515 GR 65 or 70 (.3 Carbon Max.)
SA-516 GR 65 OR 70 (.3 Carbon Max.)

2.2.4 Loosen the locknuts on the ends of the Sway Strut. (non-nuclear safety related struts have right hand locknut only)

2.2.5 Connect the other end to the pipe attachment as follows: Holding the free end of the Sway Strut stationary, turn the center portion of the Sway Strut (it functions identically to the turnbuckle) until the free end aligns with the pipe attachment. Install the pin.

CAUTION

The fit between the pin and the Sway Strut free end and pipe or other attachment is a close tolerance slip fit. Insure that all parts are clean and free of burrs, nicks, etc. Do not hammer the pin into place. Install the ring clips after installation.

2.2.6 Insure that at least one full thread appears in the sight holes provided in the strut center section.

2.2.7 Tighten the locknuts per Section 4.6.

3. INSTALLING THE FIGURE 222(N) MINI SWAY STRUT

- 3.1 Refer to the hanger assembly drawing for piping and structural attachment locations, general arrangements, etc.
- 3.2 Attach the rear bracket(s) **insuring that the spacers provided with the assembly are properly installed.** There must be one spacer on each side of the pivot lug assembly to insure that the ball bushing will remain centered on the load pin so that the full $\pm 5^\circ$ swing can be obtained.

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CAUTION

The fit between the pivot pin and the structural attachment and Sway Strut is a close tolerance slip fit. Before installing the pin, make sure the pin, structural attachment holes and Sway Strut ball bushing are clean and free from nicks, burrs, etc. Do not hammer the pin into place. Install the ring clips into the grooves provided after installation.

- 3.3 See 2.2.3 for Rear Bracket Material Specifications.
- 3.4 Connect the other end to the pipe attachment as follows: Holding the free end of the mini strut (the rod end) turn this rod end until it aligns with the pipe attachment. Install the pin.

CAUTION

The fit between the pin and the mini strut rod end and pipe or other attachment is a close tolerance slip fit. Insure that all parts are clean and free of burrs, nicks, etc. Do not hammer the pin into place. Install the ring clips after installation.

- 3.5 Insure that at least one full thread appears in the sight hole provided in the strut center section.

4. INSTALLING SWAY STRUT CLAMPS

- 4.1 The Pipe Clamps provided with the Sway Struts are formed to special dimensions. These have close tolerance load stud holes, and require special installation practices.
- 4.2 Place the pipe clamp around the pipe and install the upper clamp bolt(s) or stud(s) loosely with the spacer in place.
- 4.3 Install the load stud through the clamp, sway strut end bearing and spacers. **One spacer must be installed between the bearing and each clamp ear** to ensure that the bearing will remain centered in the load stud allowing for the $\pm 5^\circ$ of swing. Tighten the nuts on the load stud, insuring that an equal amount of thread projects from each nut and the S-dimension is within 1/16" of specification.
- 4.4 Tighten the upper clamp bolt(s) or stud(s) until there is no side play in the spacer.



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- 4.5 Install the lower clamp bolt(s) or stud(s) and tighten until there is contact between the pipe and the pipe clamp.

Note that due to pipe/clamp manufacturing tolerances, two or four area contact can be expected.

- 4.6 Locknuts shall be installed for nuclear safety related applications. In order for the locknuts to perform, they should be installed hand tight and then wrench tightened at least 1/8 turn. For coarse threads, where this requirement would be excessive, wrench tight is sufficient. The security of the locknut should be verified after hydrostatic testing.

5. FIG. 640(N) ALTERATION PROCEDURE

- 5.1 This procedure does not allow lengthening of sway struts.
- 5.2 Appropriate Welding and Examination Procedures must be used for accomplishment of this alteration. Fixtures and machining methods as detailed in this procedure must be used for accomplishment of this alteration.
- 5.3 All welding including tack welds must be performed by qualified welders using appropriate qualified Welding Procedures. See Para. 5.4 for applicable Material Specifications to determine proper procedures.
- 5.4 Material Specifications:
- Adjuster: SA-36
SA-105 (.30 Carbon Max.)
- Extension Piece Pipe: SA-106 Gr B
SA-53 Gr B
- 5.5 Any deviation from this procedure may affect the integrity of the sway strut.
- 5.6 Determine the actual center to center (C-C) dimension required. Calculate $W = (C-C) - 2F$. Insure that the minimum "W" dimension requirement is not violated. See Figures 1 and 2 for dimensions.

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- 5.7 Remove the rod ends, rear bracket, and pipe clamp as applicable from the strut.
- 5.8 Using appropriate equipment to insure perpendicularity, cut the excess length from the end of the extension piece pipe and discard.
- 5.9 Clamp the extension piece pipe in the fixture leaving approximately one sixteenth (1/16) of an inch exposed. (See Figure 4 for fixture dimensions). The clamp should be as close to the end as possible without interfering with the welding process (See Figure 5).
- 5.10 Place the adjuster over the pipe end so that it is firmly seated against the machined end of the fixture.
- 5.11 Welding of Adjuster.
 - 5.11.1 Preheat and Post Weld Heat Treatment shall be in accordance with the applicable Welding Procedure.
 - 5.11.2 Place a tack weld in the cut out provided in the fixture. (While the tack is cooling, it may be necessary to tap the face of the adjuster with a plastic faced hammer to reseal it against the face of the fixture).
 - 5.11.3 Place a second tack weld 180° opposite the first weld and allow it to cool before removing the extension piece from the fixture.
 - 5.11.4 Re-fixture the extension piece by rotating it 90° in the fixture and re-clamping it. Place a third and fourth tack weld so that all four welds are spaced 90° apart.

CAUTION

Frequent cleaning of the fixture is required. The presence of weld spatter between the adjuster and fixture edge will result in misalignment of the threads and pipe centerline. Any method that will not affect the integrity of the fixture is acceptable.

- 5.11.5 Complete the welding of the adjuster and drill a new site hole as shown in Figure 3.



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5.11.6 All welding shall be performed using E70XX Electrodes.

5.12 Weld Examination

5.12.1 Weld examination methods and acceptance criteria shall comply with the requirements of the applicable Code, Class, Year and Addenda of ASME III, Subsection NF, ASME B31.1 Power Piping, USAS B31.7 Nuclear Power Piping, or any other applicable codes.

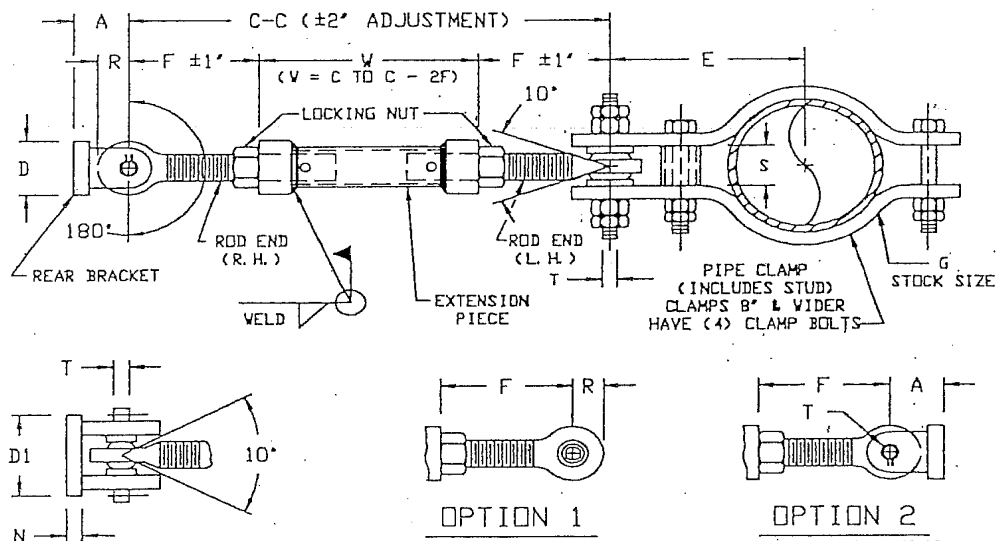
5.13 Reinstall the rod ends in preparation for installation.

6. MAINTENANCE

6.1 Each hanger should be inspected annually to verify the integrity of the hanger.

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Figure 1
Fig 640(N) Alteration



DIMENSIONS (INCHES)

SIZE	VELD	ROD END	EXT. PIECE PIPE SIZE	A	C-C		V		F	D	D1	N	R	S	T
					MIN	MAX	MIN	MAX							
A	3/16	3/4	1	1	12	60	6 5/8	54 5/8	2 11/16	2 7/8	1 1/4	1/4	5/8	5/8	.374 .376
B	3/16	1	1 1/2	2 1/8	14 1/2	96	7 1/8	88 5/8	3 11/16	5	3 5/8	1/2	1 3/8	1 3/8	.743 .747
C	3/16	1	2	2 1/8	14 1/2	96	7 1/8	88 5/8	3 11/16	5	3 5/8	1/2	1 3/8	1 3/8	.743 .747
1	5/16	1 1/4	2	2 1/2	16 5/8	96	8 3/8	87 3/4	4 1/8	4 1/2	3	3/4	1 1/2	1 3/8	.993 .997
2	5/16	1 1/2	2 1/2	2 1/2	16 7/8	96	8 3/8	87 1/2	4 1/4	4 1/2	3	3/4	1 1/2	1 3/8	.993 .997
3	5/16	1 3/4	2 1/2	3 1/4	18 3/8	96	8 3/8	86	5	5 3/8	3 9/16	1	2	1 11/16	1.249 1.247
4	3/8	2	3	3 1/4	20 1/2	96	10	85 1/2	5 1/4	5 3/8	3 9/16	1	2	1 11/16	1.249 1.247
5	3/8	2 1/4	3	4	22	96	10	84	6	6 1/8	4 1/4	1 1/4	2 1/2	2	1.493 1.497
6	3/8	2 1/2	4	5	23 3/4	96	10	82 1/4	6 7/8	7 7/8	5 3/8	1 3/4	3	2 3/8	1.743 1.747
7	5/8	3	4	5 3/4	28	96	12	80	8	9 1/8	6 1/4	2	3 1/2	3	1.993 1.997
8	3/4	4	6	7 1/4	34 3/4	96	14 1/4	75 1/2	10 1/4	14	8 3/4	2 1/4	4 3/4	3 1/2	2.493 2.497

- For non-nuclear safety related applications:
A = 2½ for sizes B & C; A = 3 for sizes 3 & 4

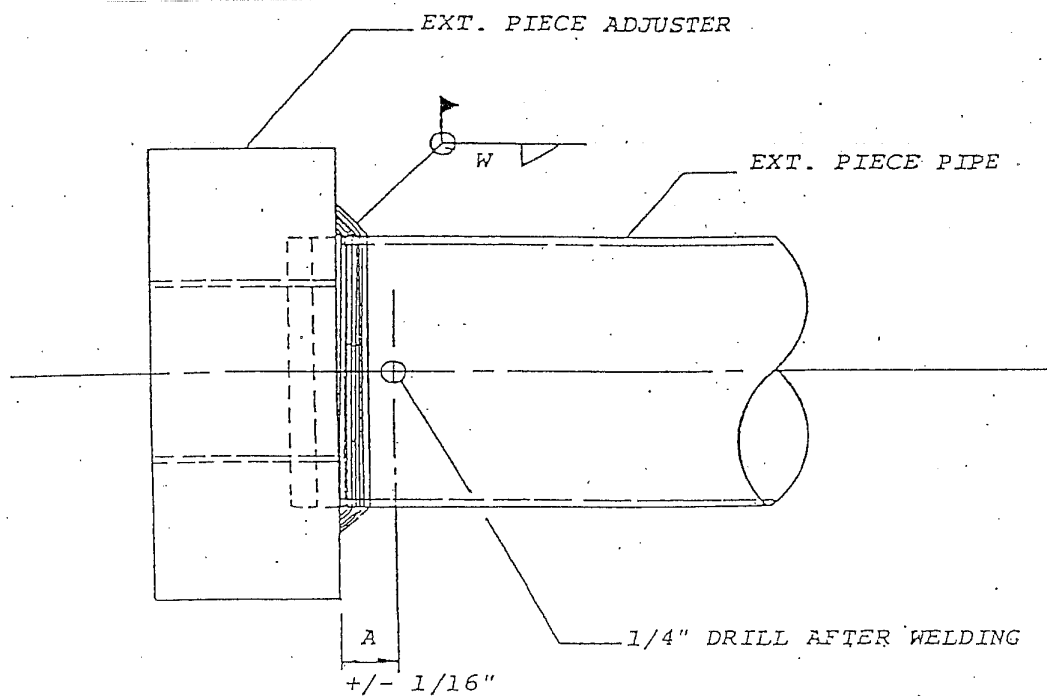
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Figure 2
Fig 640(N)

PIPE SIZE	E - TAKE OUT							
	SWAY STRUT SIZE							
	A	B C	D E	F G	H	I	J	K
3/4	2 7/16							
1	2 9/16							
1 1/4	2 11/16							
1 1/2	4 1/8							
2	5 1/8	6 3/8	6 3/8					
2 1/2	5 3/8	7	7	8 1/8				
3	5 15/16	7	7	8 1/8				
3 1/2	6 3/16	7	7	8 1/8				
4	6 1/2	7 1/4	7 1/4	8 3/8				
5	7 3/4	7 3/4	7 3/4	9 1/8				
6	8 3/8	8 3/8	8 3/8	10	10	11 7/8		
8	9 3/8	9 3/8	9 3/8	11 1/4	11 1/4	12 5/8		
10	10 1/2	10 1/2	10 1/2	12 3/4	12 3/4	14 1/4	14 1/4	16 1/4
12		11 7/8	11 7/8	13 7/8	13 7/8	15 3/8	15 3/8	17 1/4
14		12 5/8	12 5/8	14 1/2	14 1/2	16	16 1/4	18
16		13 5/8	13 5/8	15 1/4	15 1/4	17 1/8	17 1/2	19
18		14 5/8	14 5/8	16 3/8	16 3/8	18 1/4	18 1/2	20 1/4
20		15 3/4	15 3/4	17 3/4	17 3/4	19 1/4	19 3/4	21 1/2
24		18 1/8	18 1/8	19 7/8	19 7/8	21 3/4	21 3/4	24
30		21 1/4	21 1/4	23	23	25	25	28
36		24	24	26 1/2	26 1/2	28 1/8	28 1/8	31 1/4

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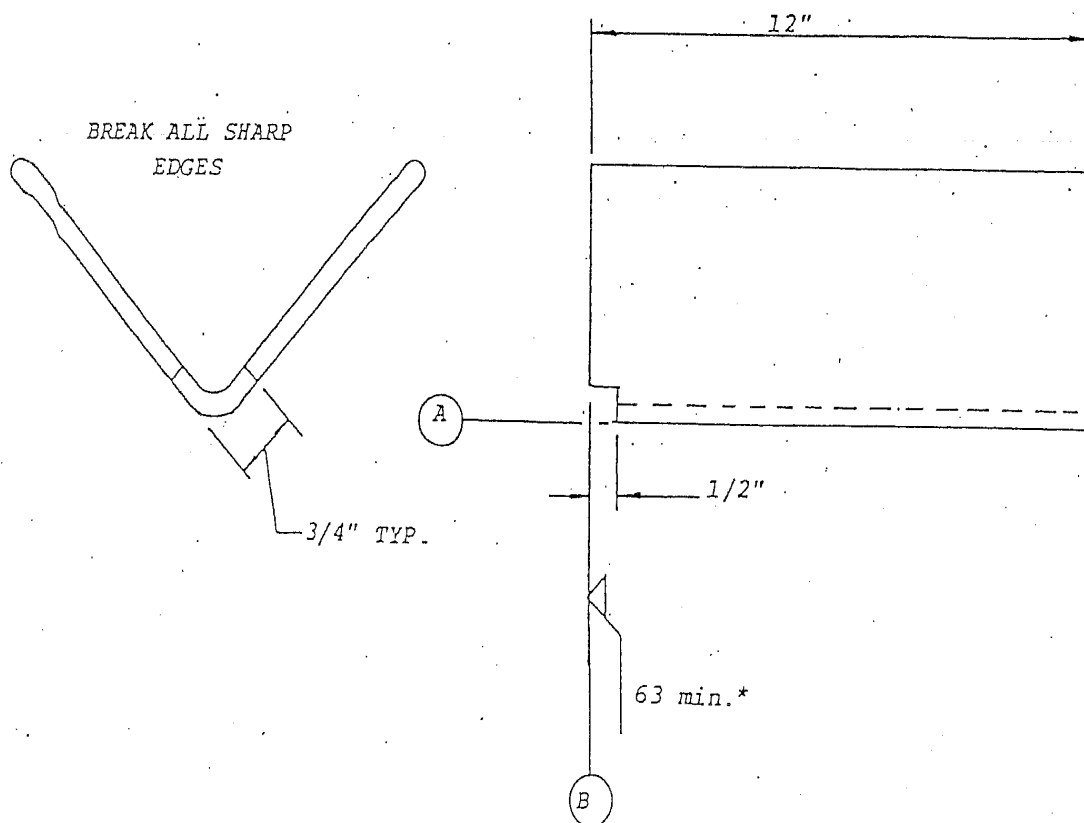
Figure 3
Fig 640(N)



<u>Size</u>	<u>A</u>	<u>W</u>
A	.44"	3/16"
B	.44"	3/16"
C	.44"	3/16"
1	.56"	5/16"
2	.56"	5/16"
3	.56"	5/16"
4	.63"	3/8"
5	.63"	3/8"
6	.63"	3/8"
7	.88"	5/8"
8	1.00"	3/4"

INSTALLATION INSTRUCTIONS FOR SWAY STRUTS

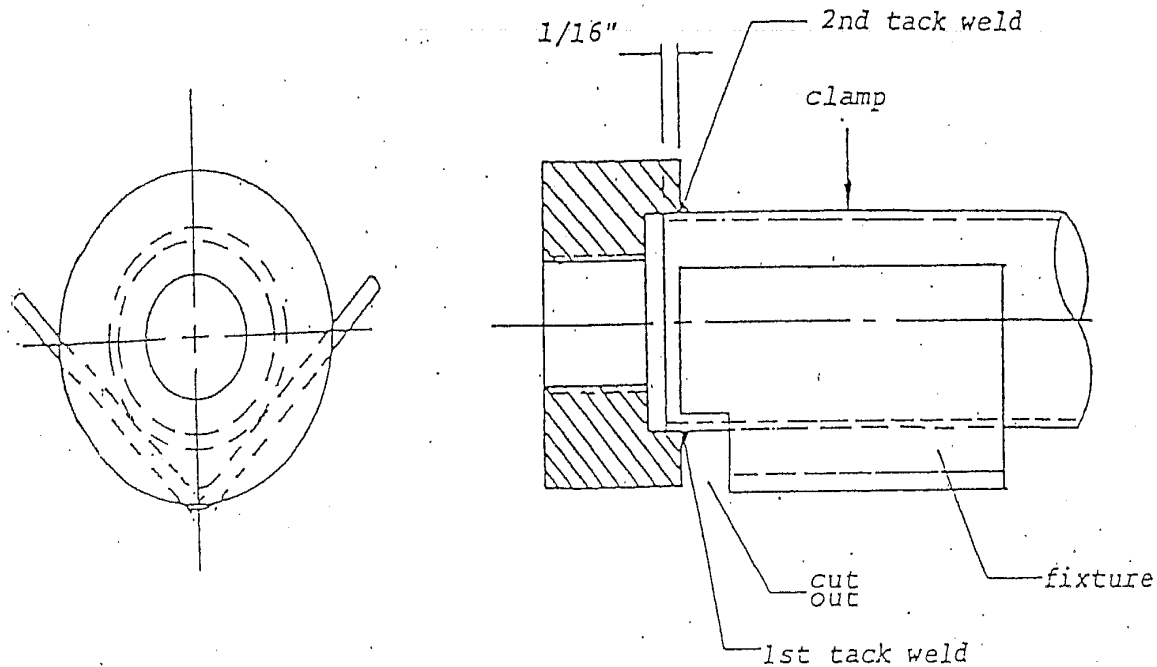
Figure 4
(Fig 640(N))



- NOTES:
1. Surface A to be perpendicular to surface B within 0.1 degrees.
 2. * Surface B is a mill finish.
 3. Material: 3 X 3 X 1/4 angle (SA-36 or equal).

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Figure 5
Fig 640(N)



Rev 6: Updated to reflect company name change from
Anvil International to ASC Engineered Solutions.

About ASC Engineered Solutions

ASC Engineered Solutions is defined by quality—in its products, services and support. With nearly 2,000 employees, the company's portfolio of precision-engineered piping support, valves and connections provides products to more than 4,000 customers across industries, such as mechanical, industrial, fire protection, oil and gas, and commercial and residential construction. Its portfolio of leading brands includes ABZ Valve®, AFCON®, Anvil®, Anvil EPS, Anvil Services, Basic-PSA, Beck®, Catawissa, Cooplet®, FlexHead®, FPPI®, Gruvlok®, J.B. Smith, Merit®, North Alabama Pipe, Quadrant®, SCI®, Sharpe®, SlideLOK®, SPF®, SprinkFLEX®, Trenton Pipe and VEP. With headquarters in Oak Brook, IL, ASC also has ISO 9001:2015 certified production facilities in PA, TN, IL, TX, AL, LA, KS, and RI.



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