BROWN & ROOT, INC. CPSES JOB 35-1195	NUMBER	REVISION	ISSUE DATE	PAGE
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TITLE:

INSTALLATION INSPECTIONS OF ASME CLASS 1, 2, and 3 SNUBBERS

ORIGINATOR: [signature] DATE 10-29-82

REVIEWED BY: [signature] DATE 10-29-82

APPROVED BY: [signature] Site QA Manager DATE 10/29/82

1.0 REFERENCES

1-A ASME Boiler & Pressure Vessel Code Section III, 1974 Edition, with Addenda through Winter 1974

1-B QI-QAP-2.1-5, "Training and Certification of Mechanical Inspection Personnel"

1-C CP-QAP-16.1, "Control of Nonconforming Items"

1-D QI-QAP-11.1-30, "Spherical Bearing Restaking Inspection"

1-E QI-QAP-16.1-2, "Documenting Base Metal Repairs, Minimum Wall Violations and Arc Strike Repairs"

1-F QI-QAP-11.1-32, "Inspection of Safety Wired Fasteners"

2.0 GENERAL

2.1 PURPOSE AND SCOPE

This instruction delineates the criteria and inspection requirements to be used when performing fabrication and installation of ASME Class 1, 2, and 3 snubber assemblies (Reference 1-A).

2.2 SNUBBER

These are supplied by both ITT Grinnell and NPSI in seven sizes, 1/4 through 100. All seven sizes are available in two configurations. One configuration is the fixed length type (ITT Grinnell - figure 306, NPSI - SMF). This type bracket attached directly to the snubber housing (see Attachments 1 and 2). The other configuration is the variable length type (ITT Grinnell figure 307, NPSI - SMA). The variable length snubber is supplied with a transition kit which consists of an adapter that mounts directly to the snubber, a pipe extension piece with an internally threaded end coupling welded on one end, and an eyerod which threads into the end coupling. (See Attachments 1 and 2).

2.3 RESPONSIBILITY

The Completions/Start-Up QC Superintendent shall be responsible for the implimentation of this procedure.

2.4 PERSONNEL QUALIFICATIONS

All B&R inspectors shall be trained, qualified and certified in accordance with the requirements of Reference 1-B.

3.0 INSTRUCTIONS

3.1 MATERIALS

3.1.1 Verification and Transfer of Material Traceability

The QC Inspector shall verify material acceptability per the Material Requisition (MR) (signed by QC Receiving) on the QC Checklist. Prior to material separation QCI shall verify that material ID marking (heat number, heat code, etc.) has been transferred. This will be documented in the comment section of the QC Checklist (Attachment 16) or Vendor Supplied Component Modification Record (Attachment 3) as applicable.

NOTE: Inspection personnel performing inspections shall monitor general workmanship conditions in all phases of snubber modification and installation. Observations shall include, but are not limited to:

a. Handling /rigging

b. Housekeeping/storage maintenance

c. In-process modification and installation

d. Physical damage

Observations which are adverse to quality and existing site procedures shall be documented in accordance with Reference 1-C.

4.0 WELDING

4.1 WELDING INSPECTION REQUIREMENTS (GENERAL)

Visual welding inspection shall be in accordance with the requirements of this instruction.

QC shall verify that the welder(s) is qualified to perform the work in accordance with the WPS by checking the Welding Matrix, and shall verify that the WPS and filler material listed on the WFML are the same as those listed on the WDC.

4.1.1 Cleanliness (when required)

Cleanliness before fit-up shall be as follows:

a. Before welding, the weld joint shall be free of moisture, dirt, oil, grease and other deleterious foreign materials for an area two inches (2") each side of the joint.

b. The base material shall be mechanically cleaned at least 1/2" inch each side of the weld joint.

4.1.2 Fit-Up (when required)

a. Transition kits with socket couplings shall have end cap fitup with an end gap approximately 1/16" prior to welding as illustrated in Attachment 4.

b. Solid type couplings on snubber transition kits shall be welded in place while maintaining a tolerance of approximately 1/16" variation from the pipe centerline.

c. Welding of the solid end coupling nut to the extension pipe alignment must be maintained within 1/2°.

4.2 WELD SIZES

4.2.1 Forward Bracket Modification (NPSI)

In those cases where the forward bracket is modified to obtain the proper C-C dimension, the weld size for attaching lug and plate for snubber sizes 1/4 thru 10 is shown below:

Snubber Size	Weld Size	Weld Length
1/4	3/16"	3/4" Lg.
1/2	3/16"	3/4" Lg.
1	3/16"	All Around
3	1/4"	All Around
10	5/16"	All Around

In addition the QC Inspector will verify that the lug, when cut, meets the dimensional requirements as shown in Attachment 5.

4.2.2 Transition Kit Modification

In those cases where the mounting plate is furnished as a bulk item and requires attachment by welding to the extension pipe the minimum weld size will be equal to the wall thickness of the pipe.

In those cases where it is necessary to reweld the solid end coupling nut to the extension pipe for ITT Grinnell snubber transition kits, the following minimum weld sizes shall apply:

Snubber Size	Fillet Weld Size (Min)*
¼, ½	1/8"
1	3/16"
3	3/16"
10	1/4"
35	1/2"
100	3/4"

* The weld size need not be larger than the thickness of the coupling.

In those cases where it is necessary to reweld the solid end coupling nut for NPSI snubbers the following fillet weld size shall apply:

Snubber Size	Fillet Weld Size (Min)*
¼, ½	3/16"
1	3/16"
3	3/16"
10	1/4"
35	3/8"
100	5/8"

* The weld size shall not be larger than the thickness of the coupling.

4.2.3 Final Weld Inspection

Fillet weld sizes specified in Paragraph 4.2.1 and 4.2.2, shall be the minimum size required along the full length of the weld joint. Oversize fillet welds shall be acceptable providing they do not exceed twice the leg size specified. Excessive distortion where oversize fillet welds are used should be avoided.

The final surface of welds shall be free from defects such as sharp surface irregularities, slag and cracks. Undercut shall be limited as noted for the following items.

a. Pipe - 1/32 inch provided it does not exceed 12½% of the nominal wall thickness.

b. Plate - 1/32 inch provided it does not exceed 7% of the plate thickness.

NOTE: Only indications with major dimensions greater than 1/16 of an inch shall be considered relevant.

4.3 WELD REPAIRS

Weld repairs shall meet the visual acceptance criteria applicable for the original weld.

4.4 FINAL WELD DOCUMENTATION

Actual weld sizes will be recorded on the QC Checklist.

Welding Operations shall be documented on the VSCMR Attachment 3.

5.0 SNUBBER INSTALLATION AND MODIFICATIONS

5.1 MODIFICATON OF SPC CLAMPS USED WITH A FIXED SNUBBER AT MINIMUM C-C

When interference exists between SPC clamps and SMF snubbers, the clamps may be modified within the allowable minimum and maximum edge distances as per Attachment 6.

NOTE: The pin shall be removed prior to modifying the clamp.

5.2 SNUBBER BOLTING MINIMUM ENGAGEMENT

In those cases where the bolts which attach the snubber forward bracket or transition kit to the snubber do not protrude completely through the tapped hole in the snubber flange, the inspection criteria shown in Attachment 7 shall be used to determine if sufficient thread engagement has been obtained.

5.3 PIPE CLAMP AND REAR BRACKET MATERIAL IDENTIFICATION

QCI shall record the pipe clamp and rear bracket material identification number, if visible on the QC Checklist. In cases where the material ID is not visible, then the QCI shall annotate Quality Engineering Systems (QES) in the space provided. Upon final review of the snubber installation documetation, QES shall verify material identification from previous hanger installation documentation.

5.4 MODIFICATION OF NPSI REAR BRACKETS

When the snubber interferes with the rear bracket, the rear brackets for 35 and 100 snubbers may be modified in accordance with Attachment 8. Modification may be by thermal means or machining. If thermal cutting is used, the cut edges shall be smoothened by machining. In either case, the pin shall be removed prior to the modification.

5.5 MODIFICATION OF FORWARD BRACKETS FOR SNUBBER SIZES 35 AND 100

Modification of forward brackets for 35 and 100 snubbers shall be done in accordance with Attachment #17.

5.6 MODIFICATION OF SNUBBER TRANSITION KITS (GENERAL)

Shortening or lengthening of snubber transition kits to a length that will render snubber pin to pin dimensions outside minimum or maximum lengths specified in Attachment 9 must be approved in writing by Engineering on a case by case basis.

NOTE: If the threaded portion of the eyerod bottoms out in the transition kit before the desired adjustment is acheived, the eyerod may be shortened to achieve the necessary adjustment. However, enough threads shall remain to allow full thread engagement in the coupling nut.

NOTE: For identification of snubber parts/hardware discussed in this section, see Attachments 1 and 2.

a. For both NPSI and ITT Grinnell snubbers the required transition kit length shall be detemined by measuring the pin to pin (C-C) distance in the field. Then subtract the actual cold setting (AC dimension shown on the design drawing) from the existing pin to pin dimension. The difference between these two dimensions is the transition kit length required to maintain the proper cold setting.

b. Measurements shall be taken to ensure that the snubber can be installed with the proper "C-C" dimension while maintaining the cold setting specified on the design drawing. Deviation of more than ±1/8" from the specified cold setting (AC dimension shown on the design drawing) is not permitted unless prior approval is obtained in writing from Engineering.

c. If adjustment of an ITT-Fig. 307 or NPSI-SMA snubber is required for installation, the threaded eye rod in the transition kit has an adjustment capability of ±1 3/4". Any further adjustment necessary may be made only by modification of the transition kits on snubber sizes 1/4 to 10.

d. In order to lengthen the transition kit, remove the end coupling by grinding or cutting. Snubber sizes 1/4 through 10 have a transition kit mounting plate which must also be removed.

e. If the mounting plate is damaged during removal, a new one shall be fabricated from SA-36 or SA 515 Grade 65 steel.

f. Replace the pipe portion of the transition kit with a size and grade of pipe selected in accordance with Attachment 9 and cut to length necessary to acheive the required pin to pin dimension.

g. The length of ITT Fig. 306 snubbers can be adjusted only by the use of shim plates placed behind the rear bracket. NPSI-SMF snubbers can be adjusted either by placing shim plates behind the rear bracket, or by trimming the forward bracket in accordance with Paragraph 4.2.1.

h. In those cases where interference problems exist when installing snubbers, they may be mounted 180° (end to end) from the configuration shown on the design drawing.

5.7 INSPECTION CRITERIA

The following are inspection requirements when inspecting snubbers:

a. Verify special flat washers are installed between the spherical bearing and each clamp half.

NOTE 1: The spacers may not fit when assembling the rear bracket due to the tolerances. At this time, one or more of the spacers may be deleted provided the resulting gap is less than the thickness of one spacer.

NOTE 2: Spherical bearing misaligned shall not exceed ±5° with respect to the snubber assembly at any position of the total stroke.

NOTE 3: Minor adjustments of the pipe clamp may be required to facilitate snubber installation.

b. Verify pinned connections have fully opened cotter pins or split snap rings installed.

c. Verify spherical bearings are tightly staked in the attachment ends.

5.7.1 Snubber Alignment Due to Field Conditions

Due to field conditions, it may be necessary to adjust the alignment between the snubber end cap and the mounting hardware (rear bracket or pipe clamp) in order to allow a full ±5° misalignment tolerance. All adjustments of this type shall be performed in accordance with the following instructions and witnessed by the QCI.

Snubber Sizes 1/4 through 10 - See Attachment 10.

1. Remove attachments from the snubber.

2. Place the snubber in a vertical position on a table setting on the snubber housing.

3. While keeping a slight downward hand pressure, on the top to avoid linear movement, use retaining ring pliers to free retaining ring.

4. While maintaining a slight downward hand pressure, slowly turn end cap by hand only to desired rotational position. Do not use wrench or other mechanical means.

5. While maintaining hand pressure, replace retaining ring. Expand and contract arrestor slowly through full stroke to determine that repositioning has not damaged internal components.

Snubber sizes 35 & 100 - See Attachment 11.

6. With the assembly cradled in a bench, remove the three indicator tube mounting screws. Extend the snubber sufficiently to expose the telescoping tube.

7. While the telescoping tube is restrained from rotating, loosen the left hand threaded nut (ring). (Nut has been torqued to 150 ± 20 ft. lbs.) Rotate the end cap to the desired position.

CAUTION: Under no circumstances shall the end cap be rotated more than one complete turn from the bottomed out position.

8. Re-torque the left hand threaded nut to 150 ± 20 ft. lbs.

9. Replace the indicator tube and screws.

10. For snubber sizes 35 & 100, screw the transition kit or forward bracket into the internal threads at the base of the snubber until it bottoms against the internal dust cover. This operation should be completed by hand. If more force is required, remove part and clean all internal and external threads. If after cleaning, tightening is difficult, a strap wrench or other non-marring tool may be used to assist in the tightening operation. However, the parts shall not be forced. After bottoming the forward bracket may be unscrewed up to a maximum of 1/2 turn to achieve correct orientation of the lugs and pins on each end of the snubber per the pipe support sketch.

CAUTION: Do not unscrew more than 1/2 turn.

5.7.2 Snubber Operation

The snubber operation shall be checked to verify the distance of travel to ensure the snubber is in proper working condition.

Snubber Size	¼	½	1	3	10	35	100
Stroke/Length Inches	4	2½	4	5	6	6	6

NOTE: Snubbers with "L" suffix will have an extended stroke length of twice the stroke length shown above.

5.7.3 Reinstallation/Staking of Spherical Bearings

Reinstallation or staking of spherical bearings shall be accomplished in accordance with Reference 1-D.

6.0 GENERAL REQUIREMENTS

a. Never interchange NPSI and ITT Grinnel parts.

b. It is extremely important that the clamp halves are parallel (see illustration on Attachment 12). Excessive gap at the upper end of the clamp can allow enough space for the spherical bearing to be dislodged from the eye rod end.

c. At no time shall installed snubbers be used as steps or hand-holds.

NOTE: Pipe clamp assembly information - see Attachment 12-15.

4. When arc welding, do not attach ground to snubber or any part of the snubber which will cause arcing current to pass through snubbers.

5. Do not sandblast snubbers. Snubbers are pre-finished with acceptable corrosion protection.

6. If sandblasting is to be performed on adjacent parts such as unfinished pipe or structure, snubber and bearings on attaching parts must be masked for protection.

7. Use care to align snubber as closely as possible to avoid forces tending to rotate the pipe clamps or induce bending.

8. If a snubber is accidentally dropped, check the function by extending and retracting through the full stroke. If there is no evidence of sticking or binding, it may be assumed that no internal damage has occurred. If there is evidence of a malfunction, it shall be documented in accordance with Reference 1-C.

9. To avoid driving spherical bearings free or damaging bearings, use care in inserting pins. Pins should be snug but not tight. Light tapping is allowable.

10. Under no circumstances should the snubber housing be twisted relative to the position indicator tube. This may result in a jammed snubber.

7.0 BASE METAL REPAIR

Base metal defects shall be documented in accordance with Reference 1-E.

8.0 TORQUE REQUIREMENTS

Torquing shall be witnessed by QC and documented by signature and date on the QC Checklist.

Mounting bolts for transition kits or forward brackets shall be torqued as follows:

Snubber Size	¼&½	1	3	10
Torque Value (IN/LB)	22	45	120	440

While torquing these bolts on sized ¼ through 10 snubbers, hold the snubber assembly by the transition kit extension piece, or by the forward bracket. When holding by the forward bracket, care shall be taken not to damage the spherical bearing.

While holding the snubber assembly by the transition kit extention piece, the eye rod jam nut shall be torqued as follows:

Snubber Size	¼&½	1	3	10	35	100
Torque Value (FT/LB)	40	40	80	100	150	220

9.0 SAFETY WIRING

On NPSI snubbers, sizes ¼ through 10, the transition kit or forward bracket mounting bolts shall be safety wired in accordance with Reference 1-F.

NOTE: In those cases, where attachment bolts between forward bracket assembly and snubber assembly are safety wired by the vendor, QCI shall verify that the following conditions exist:

a. Bolts are tight.

b. Lockwire is not damaged.

c. Lockwire is crimped.

If any of the above conditions are unsatisfactory, the bolts shall be retorqued and the new lockwire shall be installed per Reference 1-F.

10.0 FINAL SNUBBER INSPECTION

10.1 Snubber Installation

When the snubber installation is complete and ready for final inspection, Construction shall notify Quality Control and present to the inspector the snubber installation information, for review and final inspection .

10.2 DOCUMENTATION

The results of the snubber inspections shall be documented on the QC Checklist (Attachment 16). After completion, the checklist will be transmitted to QES for review.

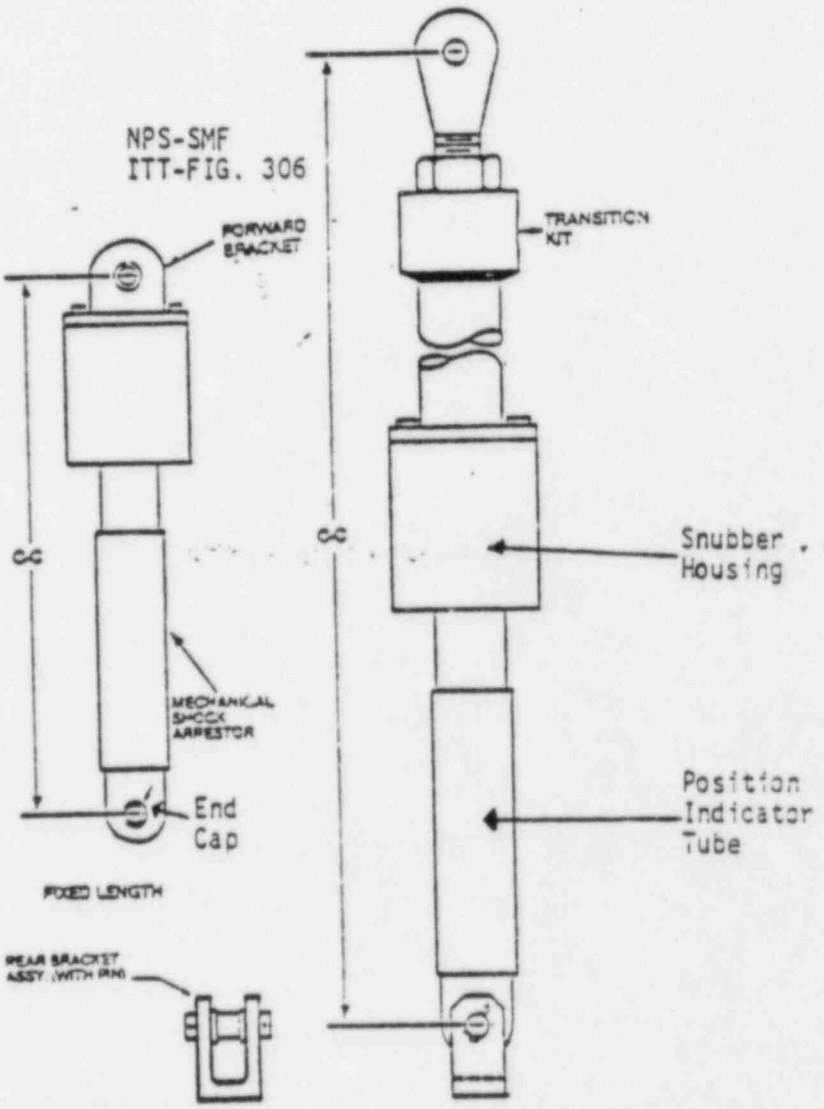
10.3 NONCONFORMING CONDITIONS

After the snubber is presented to QC for inspection by Construction, any conditions that do not conform to the inspection requirements shall be documented on a Nonconformance Report (Reference 1-C).

NOTE: Final inspected items requiring reinspections as a result of the issuance of an Inspected Item Removal Notice (IRN) shall be processed as required by CP-CPM-6.10-1 and inspected in accordance with the applicable requirements of this procedure.

ATTACHMENT 1

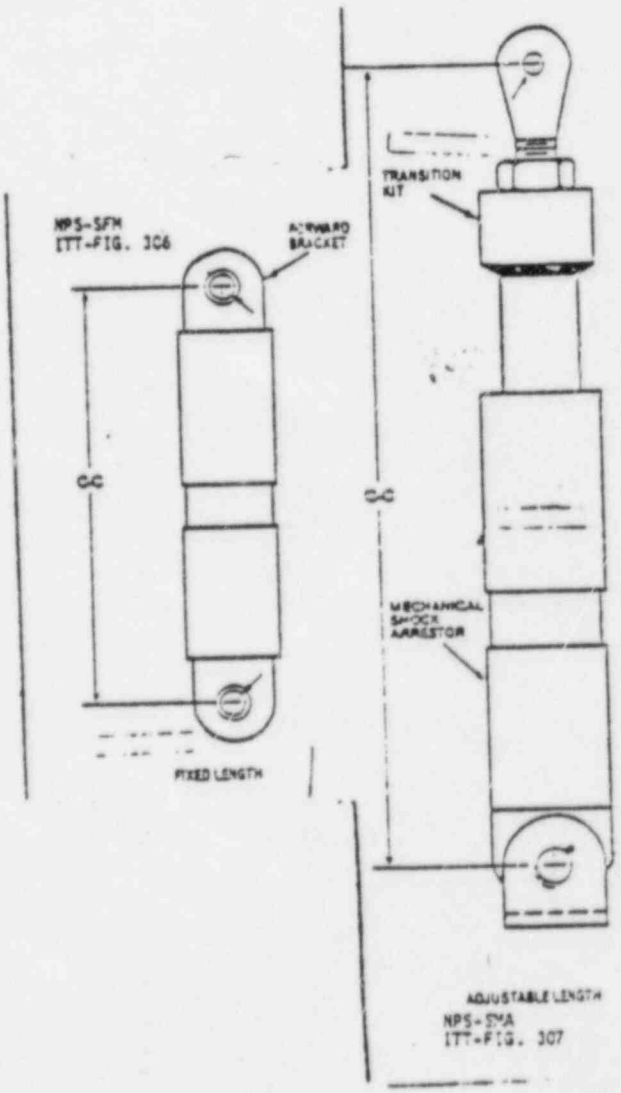
1/4 THROUGH 10



NPS-SMA
ITT-FIG. 307

ATTACHMENT 2

SNUBBER SIZE 35 & 100



ATTACHMENT 3 (Front)

VENDOR SUPPLIED COMPONENT
MODIFICATION RECORD

Card Serial # _____

Component Serial # _____

Original Hanger # _____

Designated Hanger # _____

Vendor Supplied Component Modification Record

ITEM NO.	PART NO.	REV.	ITEM	MATERIAL	DESCRIPTION	P NO.	FAB CODE & CLASS/ASME III CODE STD.

NOTES: 1. APPLICABLE WELDING PROCESS SHALL BE SPECIFIED BY ENGINEER.
2. ANI INSPECTION POINTS INDICATED BY (X).
3. DENOTE SATISFACTORY INSPECTIONS BY ANI "S"; UNSATISFACTORY INSPECTIONS BY A "U".

OPERATION #	OPERATIONS
1	Material Controlled by Mill
2	Marking Transfer
3	Fitup
4	Final Dimension
5	Final VT
6	Final PT

DATE: _____ INSPECTOR'S INITIALS: _____

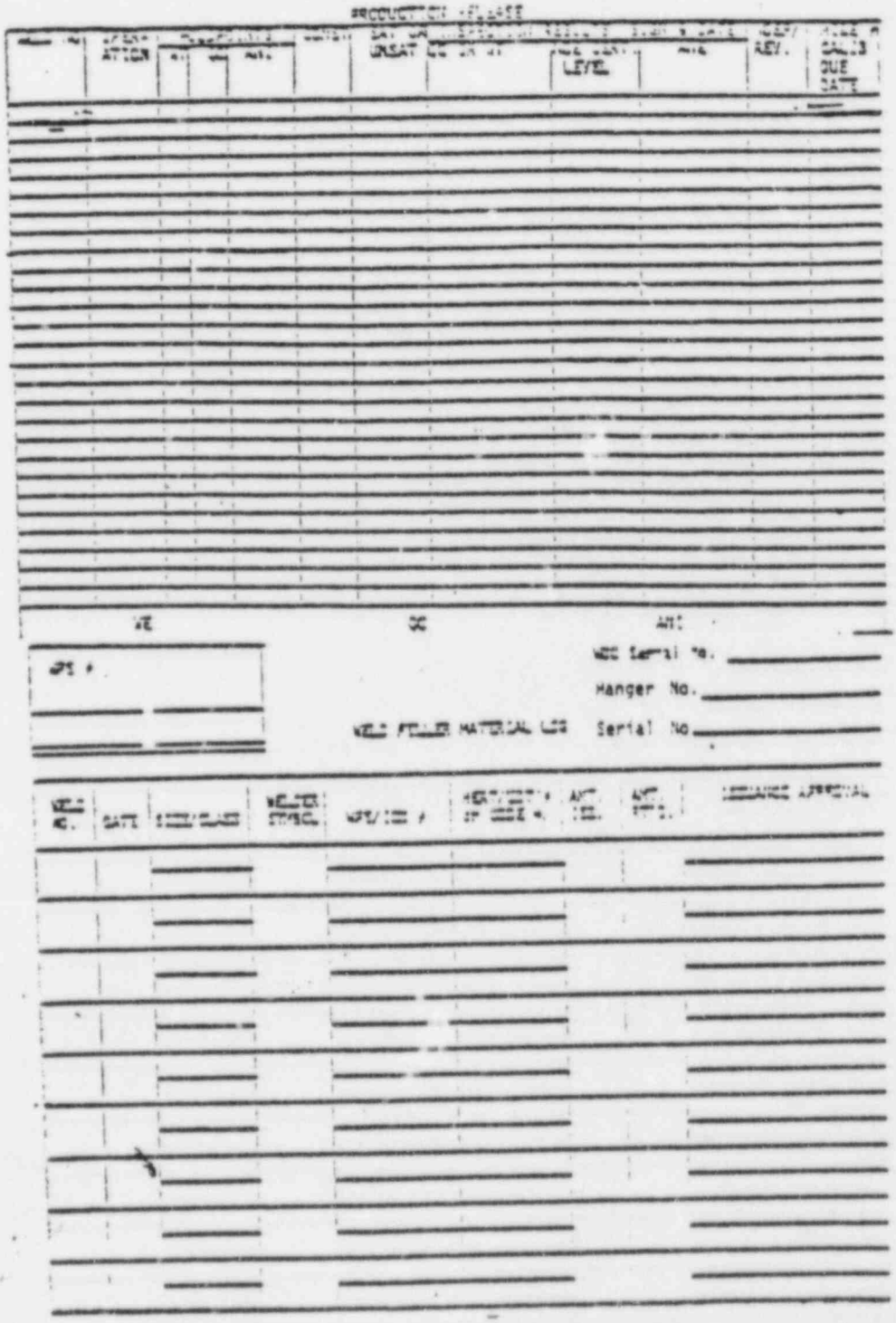
ITEM NO.	OPERATION	WELD POINTS AT	WELD POINTS VT	WELD POINTS ANI	WELDER	WELDER STAMP	WELDER VT	WELDER PT	WELDER ANI LEVEL	WELDER ANI	WELD REV.	ITEM # CALLED OUT ON DWG

AT: _____ VT: _____ ANI: _____

APPROVAL SIGNATURES SHALL BE AFFIXED IN THE LINE IMMEDIATELY BELOW THE LAST ITEM IN EACH SECTION.

ATTACHMENT 3 (Back)

VENDOR SUPPLIED COMPONENT
MODIFICATION RECORD

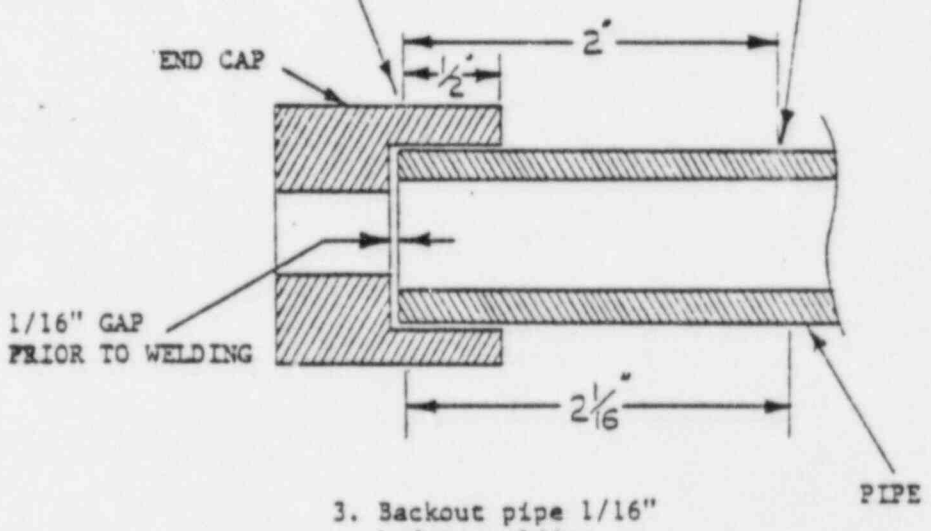


ATTACHMENT 4

NPSI SOCKET TYPE COUPLING END CAP FITUP

1. Scribe line 1/2" from face of coupling.

2. Scribe line 2" with pipe fully inserted.

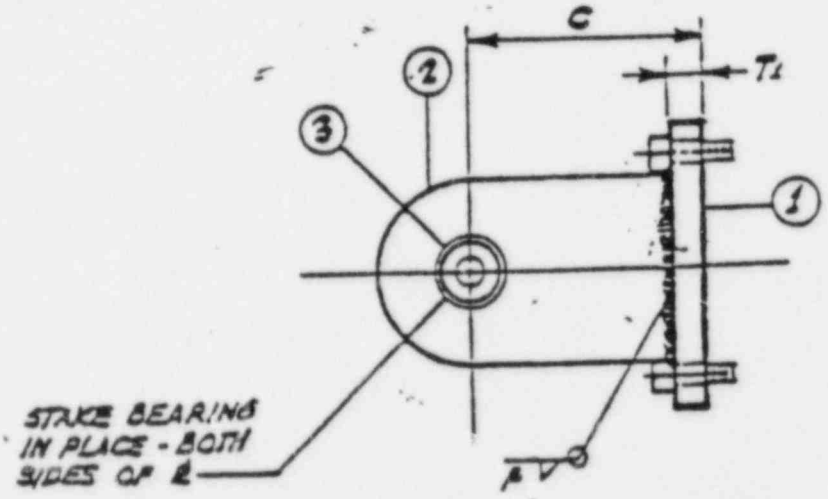


3. Backout pipe 1/16" before welding.

4. Measure 2 1/16" from scribe mark on end cap to scribe mark on pipe in order to achieve 1/16" end gap.

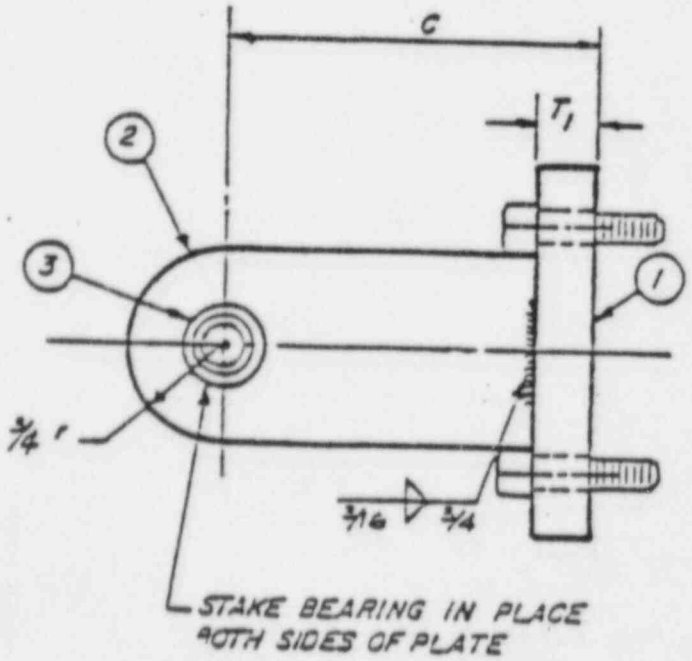
ATTACHMENT 5

Snubber sizes 1, 3, and 10



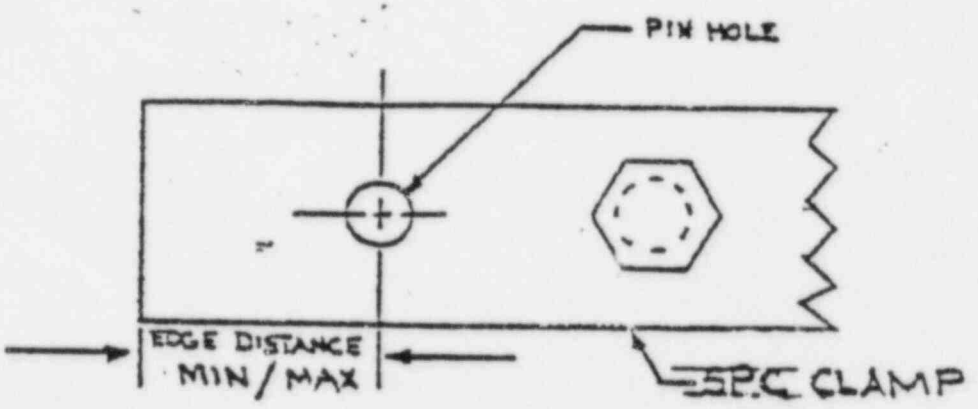
C		SIZE
MIN.	MAX.	
1 5/8	9 11/16	1
2	11 13/16	3
2 7/8	14 1/16	10

Snubber sizes ¼ and ½



C	
MIN	MAX
1 1/8	8 7/16

ATTACHMENT 6



SPC SIZE	SMF SIZE	MIN EDGE DISTANCE	MAX EDGE DISTANCE
06	¼, ½	½"	5/8"
08	1	3/4"	1"
10	3	15/16"	1¼"
14	10	1¼"	1 9/16"
24	35	2"	2 3/8"
36	100	4"	4 9/16"

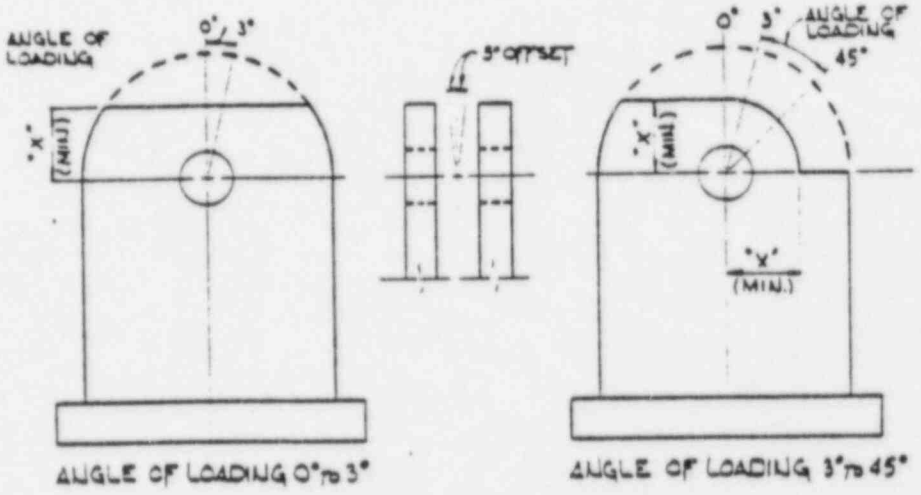
NOTE: REMOVE PIN PRIOR TO MODIFYING SPC CLAMP

ATTACHMENT 7

Snubber Size SMS	Minimum Thread Engagement
1/4 - 1/2	3/16"
1	5/16"
3	5/16"
10	9/16"
35	Not Applicable
100	Not Applicable

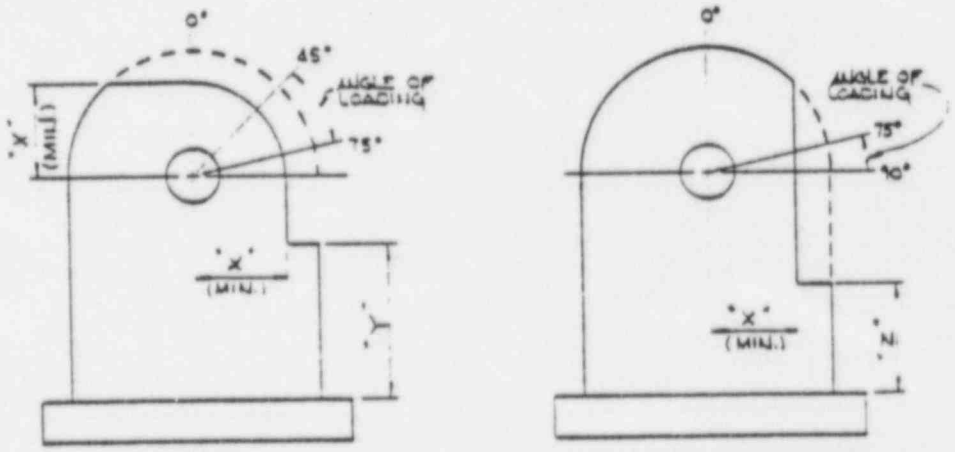
ATTACHMENT 8

FIELD MODIFICATION OF SIZE 35 AND 100
SNUBBER REAR BRACKETS



ANGLE OF LOADING 0° to 3°

ANGLE OF LOADING 3° to 45°



ANGLE OF LOADING 45° to 75°

ANGLE OF LOADING 75° to 90°

SNUBBER SIZE	X (MIN)	Y	Z
35	2 1/16	2 1/4	3/8
100	5 1/8	5 1/4	1

NOTE:
1. REMOVE PIN PRIOR TO MODIFYING REAR BRACKET.
2. ALL TUE DETAILS SHOWN ABOVE INCLUDE 3° OFFSET.

ATTACHMENT 9

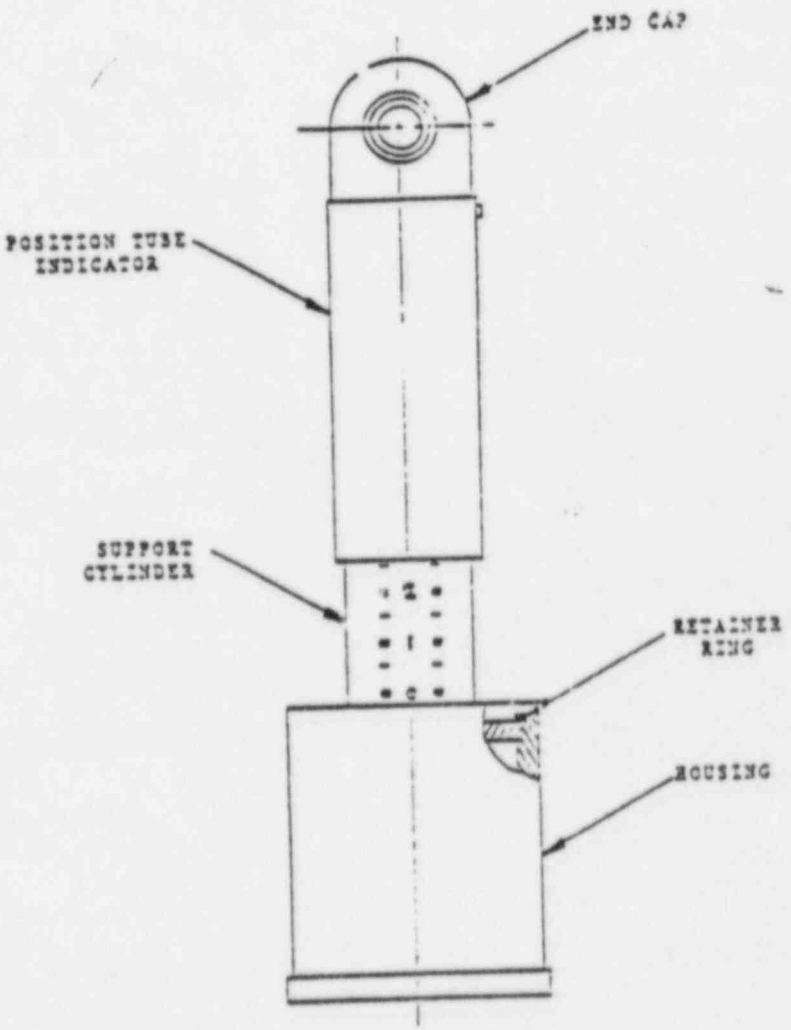
TRANSITION KIT PIPE SIZING GUIDE

Snubber Size	Transition Kit Length Min.	Max.	Pipe Size
¼	8 3/8"	45"	1" Sch. 40
½	8 3/8"	48"	1" Sch. 40
1	10"	67"	1¼" Sch. 40
3	11 3/4"	78"	1½" Sch. 40
10	14"	99"	2" Sch. 80
35	21 3/8"	220"	4" Sch. 80
100	29 1/4"	225"	6" Sch. 120

Pipe material shall be SA-106, Grade B, unless otherwise specified by design.

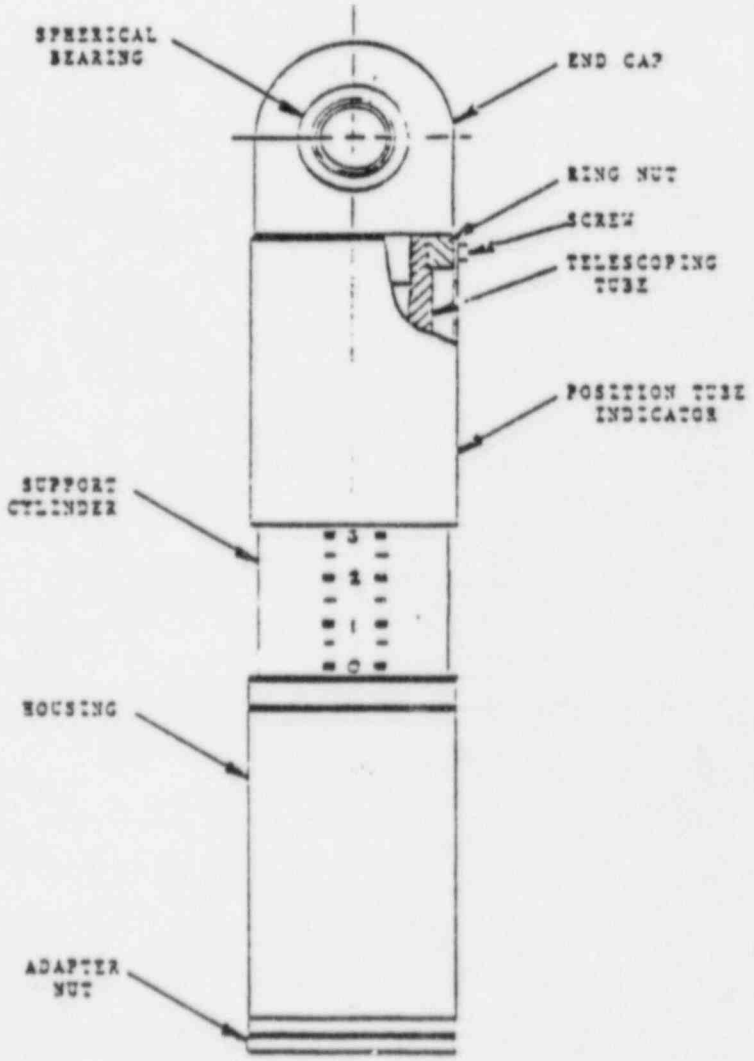
ATTACHMENT 10

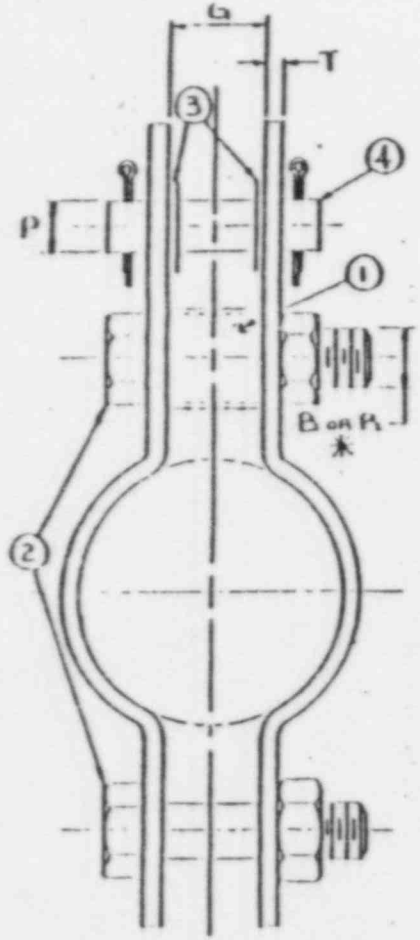
MECHANICAL SHOCK ARRESTOR



ATTACHMENT 11

MECHANICAL SHOCK ARRESTOR





① CLAMP SPACER

CLAMP SIZE	SPACER LENGTH G **	SPACER LENGTH G ***	BOLT SIZE & SPACER SIZE 3/4"φ	1"φ	1 1/4"φ	1 1/2"φ	1 3/4"φ	2"φ	2 1/2"φ	3"φ
SPC-06-XXX	11/16"	1"	006 TO 040	050 TO 080	100 TO 180	200 TO 360				
08	11/16"	1"	006 TO 040	060 TO 080	100 TO 180	200 TO 360				
10	1"	1 1/2"		020 TO 035	040 TO 100	120 TO 260	280 TO 360			
12	1 1/4"	1 3/4"			020 TO 050	060 TO 100	120 TO 180	200 TO 360		
14	1 1/4"	1 3/4"			020 TO 050	060 TO 100	120 TO 180	200 TO 360		
20	1 7/8"	2 1/4"			030 TO 050	060 TO 160	180 TO 240	260 TO 360		
24	2"								080 TO 220	240 TO 360
36	3 1/8"								120 TO 220	240 TO 360
MATERIAL:			1"φ S/40	1 1/4"φ S/40	1 1/2"φ S/40		2"φ S/40		3"φ	S/40

* B = BOLT DIA 3/4"φ THRU 1 1/4"φ (STUDS MAY BE SUBSTITUTED)
* R = STUD DIA 1 1/2"φ THRU 3"φ

** NPSI PRESENT DESIGN
*** NPSI DESIGN FOR CLAMP SHIPPED PRIOR TO 5'79

ATTACHMENT 12 - NPSI CLAMP SPACER SIZE

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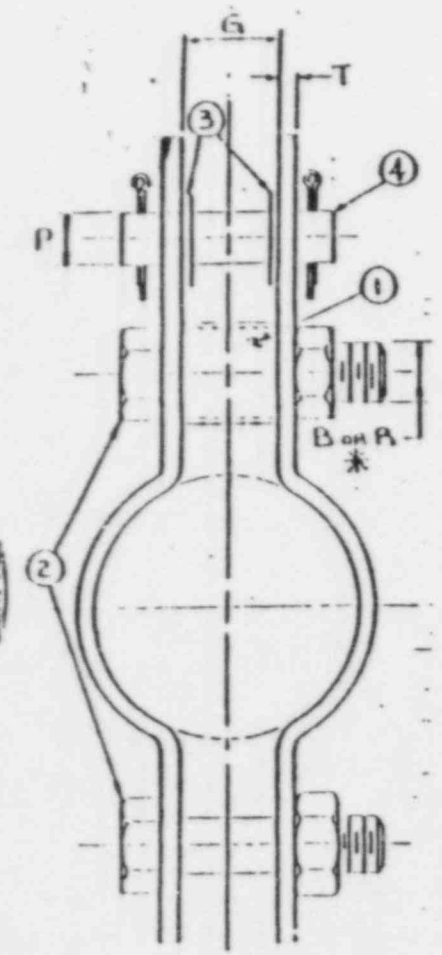

② CLAMP BOLTS & STUDS

CLAMP SIZE		APPROX. LENGTH & BOLT SIZE							
		3/4"ϕ	1"ϕ	1¼"ϕ	1½"ϕ	1¾"ϕ	2"ϕ	2½"ϕ	3"ϕ
SPC-06-XXX	KJ XXX	.006-.040 3" 3¼"	.040-.110 3¾" 4"	.100-.180 4½" 4¾"	.200-.360 5¼" 5½"	STUDS			
SPC-08-XXX	KK XXX	.006-.040 3" 3¼"	.050-.090 3¾" 4"	.100-.180 4½" 4¾"	.200-.360 5¼" 5½"				
SPC-10-XXX	KL XXX		.020-.035 4" 4½"	.040-.100 4¾" 5¼"	.120-.260 5½" 6"	.280-.360 11" 11½"			
SPC-12-XXX	KM XXX			.020-.050 5" 5½"	.060-.100 5½" 6"	.120-.180 9¾" 10"	.200-.360 11¼" 11½"		
SPC-16-XXX	KN XXX			.020-.050 5" 5½"	.060-.100 5½" 6"	.120-.180 9¾" 10"	.200-.360 11¼" 11½"		
SPC-20-XXX	KP XXX			.050-.090 6" 6¼"	.060-.160 7" 7¼"	.180-.240 11½" 11¾"	.240-.360 13" 13¼"		
SPC-24-XXX	KR XXX							.080-.220 15"	.240-.360 17"
SPC-36-XXX	KT XXX							.120-.220 16"	.240-.360 18"

B = BOLT DIA ¾"ϕ THRU 1¼"ϕ (STUDS MAY BE SUBSTITUTED)
* R = STUD DIA 1½"ϕ THRU 3"ϕ

** NPSI PRESENT DESIGN
*** NPSI DESIGN FOR CLAMP SHIPPED PRIOR TO 5'79

ATTACHMENT 13 - NPSI CLAMP BOLTS & STUDS SIZE

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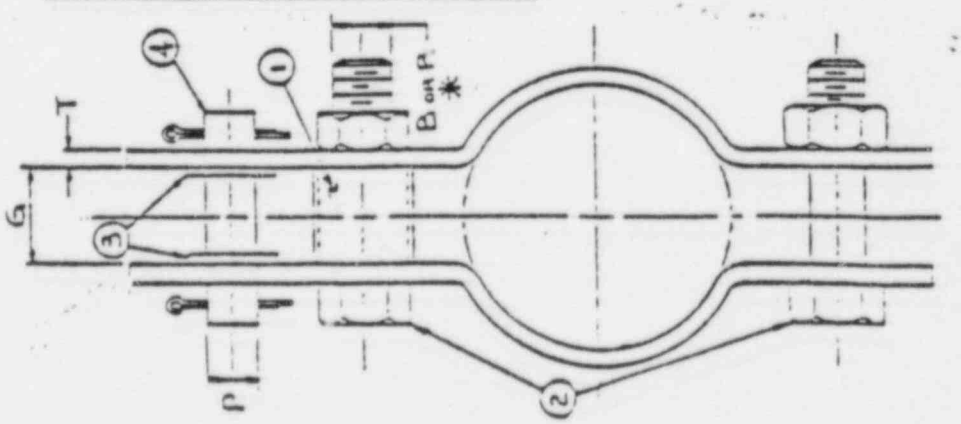
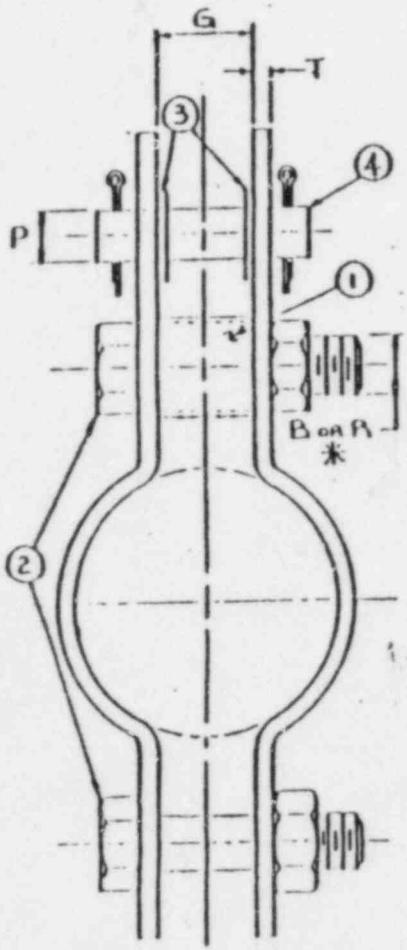
ATTACHMENT 14 - NPSI BEARING SPACER SIZE

③ BEARING SPACER/WASHER			
CLAMP SIZE SPC-06-XXX	SPACER ** (NOM)	LENGTH *** (NOM)	SPACER SIZE 5/10 PIPE
08	3/16"	3/8"	3/8"ϕ
10		7/16"	1/2"ϕ
12			3/4"ϕ
14			1"ϕ
20	7/16"	5/8"	1"ϕ
24			1 1/4"ϕ
36			1 1/2"ϕ
			3"ϕ



** NPSI PRESENT DESIGN
*** NPSI DESIGN FOR CLAMP SHIPPED PRIOR TO 5'79

ATTACHMENT 15 - NPSI CLAMP PIN SIZE



④ CLAMP PINS			
CLAMP SIZE	PIN SIZE "P"	"L" PIN LENGTH	
		**	***
SPC-06-XXX	3/8" ϕ	3¼" (min)	3½" (min)
08	1/2" ϕ	↓	↓
10	3/4" ϕ	4"	4½"
12	1" ϕ	4¼"	4¾"
14	1¼" ϕ	↓	↓
20	1¼" ϕ	5⅛"	6¼"
24	1½" ϕ	6"	
36	3" ϕ	7"	

** NPSI PRESENT DESIGN
*** NPSI DESIGN FOR CLAMP SHIPPED PRIOR TO 5'79

ATTACHMENT 16

Page___of___

QC CHECKLIST FOR SNUBBER INSTALLATION

QI-QAP 11.1-28A REV_____

PARA.	OP. NO.	OPERATION	QCI/DATE	SAT/UNSAT
N/A	1.	Hanger #_____		
N/A	2.	Snubber Serial #_____		
5.7.2	3.	Snubber Operation: a. Snubber Size_____ b. Stroke Length_____		
8.0	4.	Torque of Transition Kit or Forward Bracket: MT&E_____Value_____		
8.0	5.	Torque of Adjustable Eye Rod End Jam Nut MT&E_____		
5.7.1	5A.	Torque of Ring Nut (35 & 100 only) MT&E_____Value_____		
5.7.1	6A.	Relative Angle Adjustment (If required)		
5.7.2	6B.	Reverify Snubber Operation: a. Stroke Length_____		
3.1.1	7A.	Material I.D. (As applicable) a. Forward Bracket_____ b. (Bulk) Base Plate_____ (Bulk) Forward Bracket Eye_____ c. Transition Kit_____ d. Adapter Plate_____ e. Eye Rod_____ f. Coupling Nut_____ g. Barrel_____ h. (100 only) Spherical Bearing Pins_____		

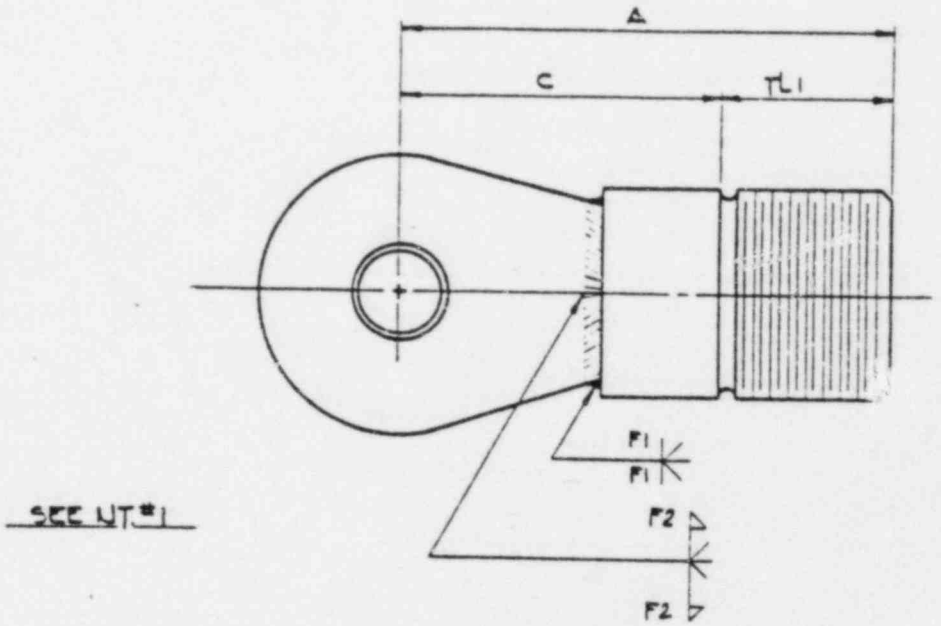
ATTACHMENT 16 (Continued)

Page ___ of ___

QC CHECKLIST FOR SNUBBER INSTALLATION (Cont'd)

PARA.	OP. NO.	OPERATION	QCI/DATE	SAT/UNSAT
		i. (35 & 100 only) Eye Rod Jam Nut _____ _____		
		j. (If Visible) Pipe Clamp _____		
		k. (If Visible) Rear Bracket _____		
5.6	7B.	Verification of Full Thread Engagement of Eye Rod in Coupling Nut		
5.6	8.	C-C Dimension per DWG		
5.6	9.	A-C Dimension per DWG		
4.4	10.	Actual Weld Sizes (Modifications only)		
		a. Transition Kit _____		
		b. Forward Bracket _____		
N/A	11.	Installation Complete		
N/A	12.	QC Supervision Review		
		NCR _____		
		Comments _____		
		_____		
		_____		
		_____		

ATTACHMENT 17



A MIN.	A MAX.	C MIN.	C MAX.	TL1	F1	F2	SIZE
4 1/4	22 5/16	3 1/8	21 3/16	1 1/8	3/16	3/8	55
7 7/16	31 3/8	5 1/4	29 11/16	1 1/4	5/16	1/2 X 1 3/8	100
TOLERANCES	MIN.	MAX.	MIN.	MAX.			

NOTES: 1. STAKE BEARING IN PLACE, BOTH SIDES.
2. A = C + TL1
3. MATERIAL OF FORWARD BRACKET EYE AND THREADED ADAPTER IS SA-36.