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PRODUCTION PROCEDURE COVER SHEET

#256-3

Procedure No.	Dated	Revision No.
SP-505	May 13, 1983	- 2 -

TITLE: BISCO FLEXIBLE BOOTS

SUBJECT: INSTALLATION OF BISCO FLEXIBLE PRESSURE, FIRE AND RADIATION SEALS

SCOPE OF CURRENT REVISION:

COMPLETE REVISION.

BISCO APPROVAL SIGNATURES							
	Original Issue	Rev. 1	Rev. 2	Rev. 3	Rev. 4	Rev. 5	Rev. 6
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PRODUCTION PROCEDURE

TITLE: BISCO FLEXIBLE BOOTS	SP-505

1.0 PURPOSE

To establish installation methods for BISCO Flexible Boot Penetration Seals where the criteria of pressure (Hydrostatic /Air), fire, radiation or any combination thereof exists.

2.0 SCOPE

To provide the standard installation method for BISCO flexible boot seals capable of withstanding the design criteria.

3.0 GENERAL

3.1 Flexible boots designed to provide a specified criteria may be installed directly to penetrants having a maximum operating temperature of 400°F.

3.2 Penetrants equipped with insulation and requiring a flexible boot should be sealed for air infiltration through the insulation prior to boot installation.

3.3 Insulation seals on Stainless Steel piping shall be provided by a Biscoseal replacement ring or by Booting directly to the pipe.

3.4 Where a fire criteria is indicated, the flexible boot should be installed on the non-hazardous side of the barrier. In the event a potential fire hazard exists for both sides, or the hazard side cannot be determined, a flexible boot should be installed on both sides.

3.5 Fire configurations with stainless steel pipe penetrants must be sealed with Ceramic Fiber (Blanket Strips/ Bulk) which is certified for compliance with NRC Reg. Guide 1.36.

3.6 A flexible boot designed for use as a pressure seal (hydrostatic/air) should be installed on the negative side of the barrier for maximum resistance.

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4.0 RESPONSIBILITY

4.1 The BISCO Project Manager is responsible for identifying and scheduling the work.

4.2 The BISCO Supervisor, or other individual designated by the Project Manager, is responsible for the orderly progression and proper construction of the work.

4.3 The BISCO Technician (s) or other designated craft personnel are responsible for the installation of the work.

4.4 The Quality Control Inspectors are responsible for performing the various inspections of the work, in accordance with applicable Quality Control Procedures.

5.0 ASSEMBLY MATERIALS

5.1 Product Name	Supplier - Product Description
BISCO SGR-600	Keene Corp. (56493F031)- A Flame retardant glass fabric coated with silicone rubber on both sides.
5.2 Boot Clamps	Murray Corp. - A reinforcing compression strap (hose-clamp), of stainless steel, used to secure each end of boot.
5.3 Bolt-on-Flange	As supplied by BISCO/client- An angle ring intended to provide a sealing surface where sleeve extensions do not exist or cannot be installed.

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5.4	Sheet Metal Sleeves (Sleeve Extension)	As supplied by BISCO/client- An 18 ga.or heavier galvanized steel sleeve, intended to provide additional sealing surface for existing sleeves or a form in reducing the annular gap for radiation seals.
5.5	Hi-Temp Cement	Thermon T-63- A high temperature cement used to restrict air through insulation for low pressure and non-hydrostatic insulation seals.
5.5	BISCOSEAL	BISCO - A trowelable or pourable material used as an insulation replacement for a high pressure insulation seal (air/hydrostatic) or as an adhesive for the installation of galvanized sleeve extensions.
5.7	732 Silicone Sealant	Dow Corning 732 - A RTV silicone sealant used to bond longitudinal boot seams and boot fabric to all metal except copper.
5.8	790 Silicone Sealant	Dow Corning 790 - A RTV silicone sealant used to bond concrete to metal and Boot Fabric to metal, including copper.
5.9	Ceramic Fiber	B&W Kaowool Bulk Fiber/ Blanket, J. M. Cerafiber/ Cerablanket - A refractory material intended to provide a fire barrier.

5.10 BISCO SF-150NH.....BISCO - A high density elastomeric material used as a radiation barrier for annular gap between inner and outer sleeve.

5.11 BISCO Split Shielding Collars .....BISCO - A high density elastomeric or metallic material used as a radiation seal to compensate for the gap between the inner sleeve and the penetrating item.

5.12 Solvent .....Ashland WS6962 - Cleaner used to wipe down the boot fabric, sleeve and pipe.

6.0 BOOT PRE-INSTALLATION

6.1 Boot can be mounted on existing sleeves or flanges to existing penetrant, providing:

6.1.1 Sharp edges of metal sleeve or flange are sanded, filed, or ground smooth.

6.1.2 All sealing surfaces (approximately 2-3 inches on pipe and sleeve) are clean and free of dust and dirt. Sealing surfaces must be wiped with solvent and dried prior to installation.

6.2 Where a sleeve does not exist or does not provide sufficient sealing surface, one must be provided.

6.2.1 A bolt-on-flange may be utilized to provide an adequate sealing surface in accordance with BISCO Production Procedure SP-505-A.

6.2.2 A sheet metal sleeve may be installed in order to provide adequate sealing surface pursuant to BISCO Production Procedure SP-805-1.

6.3 Insulated pipes shall be sealed to limit air infiltration through the insulation, prior to the installation of the flexible boot.

6.3.1 Where the insulation seal is designed for high pressure, hydrostatic conditions, and a maximum 350°F operating temperature, BISCOSEAL (pourable/trowelable) shall be provided as a replacement in the clamping area.

6.3.1.1 Jacket insulated pipes shall have the shortest practical length of jacketing removed over the clamping area.

6.3.1.2 A minimum of three inches of insulation shall be removed in the clamping area (as close to sleeve end as possible) and replaced with BISCOSEAL to the equivalent diameter of the insulated pipe with jacketing. (NOTE: See Paragraph 6.1.2)

6.3.1.3 The BISCOSEAL in liquid/paste form shall be allowed to cure for approximately 24 hours before proceeding.

6.3.1.4 Jacketing shall be re-installed up to, but not covering the BISCOSEAL.

6.3.2 Where an insulation seal is designed for low pressure, non-hydrostatic condition and a maximum 1250°F operating temperature, hi-temp cement must be applied to the existing insulation in the clamping area. (NOTE: See Paragrpah 3.3)

6.3.2.1 Jacket insulated pipes shall have the shortest practical length of jacketing removed over the clamping area.

6.3.2.2 A minimum of three inches of insulation shall be removed (intact). The removed sections shall be re-applied after a coating of Hi-Temp cement is applied to the exposed pipe surface and all insulation surfaces.

6.3.2.3 Jacketing having a flat surface shall be re-installed utilizing 732 silicone sealant between the jacketing and the coated pipe insulation.

6.4 Penetrations designed as a fire barrier shall have ceramic fiber (bulk or blanket strips) installed in the gap between the penetrant and sleeve, to a minimum depth of nine inches.

6.4.1 For annular gaps of one-half inch or more, ceramic blanket strips shall be utilized. The blanket strips shall be wrapped around the penetrant in a continuous circular fashion and slid into the opening, flush with the barrier surface.

6.4.1.1 Ceramic Blanket strips shall be installed in three segmented raps. Each segment shall consist of one wrap of one inch blanket for each inch of annular space, Plus additional wrap (s) or portion s thereof to provide approximately twenty-five percent pre-load compression.

6.4.2 Where the annular gap is less than one-half inch, ceramic bulk fiber shall be installed flush with the barrier surface.

6.5 Penetrations designed as a radiation barrier shall be equipped with an internal ring of BISCO SF-150NH high density elastomer installed within the annular gap, with BISCO split shielding collars flanking the penetration opening.

6.5.1 Installation of the inner sleeve.

6.5.1.1 The inner sleeve shall be of a sufficient length to accommodate the specified depth of BISCO SF-150NH or equal to the barrier.

6.5.1.2 The annular gap between the penetrating object (s) and the inner sleeve shall be as specified on the approved Penetration Seal Design Document.

6.5.1.3 The annular gap shall be maintained by installing temporary blunt non-metallic shims, such as wooden wedges, dowels, or Ethafoam, secured in place.

6.5.2 Installation of the damming media for BISCO SF-150NH shall be in accordance with established BISCO Procedure SP-103.

6.5.3 Formulation of BISCO SF-150NH shall be in accordance with established BISCO Procedure SP-304NH.

6.5.4 Installation of BISCO SF-150NH shall be in accordance with established BISCO Procedure SP-205.

6.5.5 When pipe insulation is necessary within the penetrating opening and does not exist, the installation shall be in accordance with client procedures, utilizing client approved materials.

6.5.6 The BISCO Split Shielding Collars shall be to sizes as required.

6.5.6.1 The BISCO Split Shielding Collars shall be mounted on the pipe using the appropriate fastener method, based on weight and size.

6.5.5.2 The split collars shall be positioned as close to the end of the boot as allowed by the clamping area location or other existing obstructions.

6.5.5.3 If a collar cannot be positioned on both sides of a penetration due to elbows, hangers, or other obstructions on the penetrating object, then both collars shall be mounted end to end on the other side.

7.0 BOOT INSTALLATION

7.1 All intended sealing surfaces of the boot material (the overlapping axial seam calculated from Production Procedure SP-504 and clamping area of Pipe and Sleeve) shall be roughened with sandpaper a mimumum of three inches from the edge and wiped clean with solvent.

7.2 The pre-cut BISCO Boot shall be positioned on the sleeve and/or pipe to allow the sealing of the overlap seam.

7.2.1 The sealing area and overlap seam of the boot seal should be free of wrinkling.

7.2.2 A bead of BISCO 732 RTV Sealant is applied to the overlap seam and spread to an approximate width, calculated from Production Procedure SP-504. The seam is then closed, with all excess sealant being forced out and removed.

7.2.3 Duct tape may be used to hold the seam together until cured, at which time it shall be removed.

7.2.4 The sealant shall be allowed to cure a minimum of sixteen hours before disturbing the boot for further processing.

7.3 Position the boot on the pipe and sleeve for final processing until the required length of boot is obtained.

7.4 Required boot clamps for the pipe and sleeve shall be determined utilizing Boot Clamp Chart, FB-2 (attached).

7.4.1 Using Flexible Boot Worksheet Form FB-1, found in Production Procedure SP-504, determine the circumference of the pipe and sleeve to be clamped.

7.4.2 Find the corresponding closest circumference on Boot Clamp Chart FB-2, then determine required clamp part number in the far left column and the quantity in the top column. Where the pipe/sleeve circumference does not appear on Form FB-2, pick the next larger value on the chart. In addition, whenever possible use the lessor multiple of clamps needed to band pipe/sleeve.

EXAMPLE: (1) Pipe Diameter = 6"
Pipe Circumference = 20.81"
Closest Chart Circumference = 21.5"
Clamps to be used #104 (1)

EXAMPLE: (2) Pipe Diameter 22.77"
Pipe Circumference 71.5"
Closest Chart Circumference 72"
Clamps to be used 73" - #88 (4)

7.4.3 Before being installed, clamp(s) must be opened and the end of the band at the clamp head should be bent up.

7.4.4 When attaching any series of clamps together, they should be threaded thru approximately one-half inch into the adjoining clamp.

7.5 Apply 732 silicone sealant on both the pipe and sleeve for sealing surface (1" minimum width). Fold the boot ends over the sealant and position the clamp(s) on the boot fabric, and tighten.

7.5.1 Where multiple clamps are utilized, the position of the clamp heads should be approximately equally spaced around the pipe/sleeve.

7.5.2 When installing a Boot on a insulated penetrant, the clamp (s) position shall be centered on the insulation seal.

7.6 Where necessary, trim off excess material and remove excess sealant.

8.0 HOUSECLEANING

8.1 All excess and scrap material shall be removed and properly stored, relocated, or disposed of, into proper scrap containers.

*** Attachment - Boot Clamp Chart Form FB-2 ***

END OF PROCEDURE.

BOOT CLAMP CHART

CLAMP NO.	REQUIRED CLAMP(s) FOR PIPE CIRCUMFERENCE									
	1	2	3	4	5	6	7	8	9	10
6	2.5									
8	3.5									
12	3.75									
16	4.5									
24	6									
28	7									
36	8.25									
40	9	18								
44	9.75	19.5	29.25							
48	10.25	20.5	30.75	41						
52	11.25	22.5	33.75	45	56.25					
56	12	24	36	48	60	72				
60	13	26	39	52	65	78	91			
64	13.5	27	40.5	54	67.5	81	94.5	108		
72	15.25	30.5	45.75	61	76.25	91.5	106.75	102	137.25	
80	16.75	33.5	50.25	67	83.75	100.5	117.05	134	150.75	167.5
88	18.25	36.5	54.75	73	91.75	109.5	127.75	146	164.25	182.5
96	19.75	39.5	59.25	79	98.75	118.5	138.25	158	177.75	197.5
104	21.5	43	64.5	86	107.5	129	150.5	172	193.5	215
116	23.75	47.5	71.25	92.5	116.25	140	166.25	190	213.75	237.5