

TENNESSEE VALLEY AUTHORITY

DESIGN SPECIFICATION

BNP-DS-1940-4809-R0

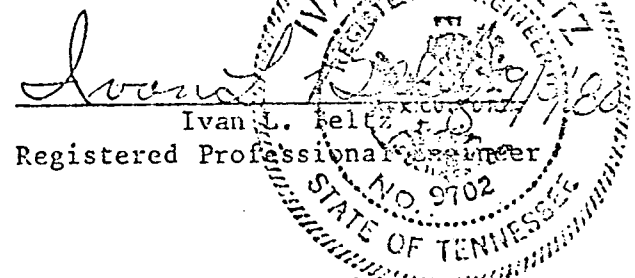
BELLEFONTE NUCLEAR PLANT

FLEXIBLE METAL INSTRUMENTATION HOSES

FOR INSTRUMENTATION AND CONTROL SYSTEM

I certify that this design specification is correct and complete and is in compliance with Paragraph NCA-3252 of the ASME Boiler and Pressure Vessel Code, Section III, Nuclear Power Plant Components. This design specification consists of the following:

	Revision No. or Date
1. Item 1	R0
2. Attachment C, Quality Assurance Requirements for ASME Section III Components (Excluding Pumps, Valves, and Automatic Backwash Filters), Component Supports, and Piping Subassemblies	8-20-80
3. Attachment M, Marking and Certification Requirements for Pipe, Fittings, Flanges, and Bolting for Use in ASME Section III Nuclear Class 2 or 3 Systems	9-20-79
4. Attachment Q, Pipe, Fittings, Tubing, and Miscellaneous Components Austenitic Stainless Steel Heat Treatment Welding Materials, Packaging, and Marking	3-25-80



Ivan L. Beltz
Registered Professional Engineer

Prepared	Date	Correlated	Date	Submitted	Date	Approved	Date
T.R. Witmer	9-3-80	L.W. Johnson	9-3-80	E. C. [Signature]	9-3-80	C.A. Chandler	9-3-80

8305100369 830504
PDR ADOCK 05000438
PDR
A

TENNESSEE VALLEY AUTHORITY

ASME SECTION III

CLASS 2 FLEXIBLE HOSE ASSEMBLIES

DESIGN SPECIFICATION CRITERIA LOCATOR

INFORMATION REQUIRED BY NCA-3252 AND ITS LOCATION IN THIS SPECIFICATION

- | | |
|--|--------------------|
| 1. Function of the component including any dimensions upon which the functional performance depends. | Schedule of prices |
| 2. The design requirements, i.e., the mechanical and operational loadings. | Schedule of prices |
| 3. The environmental conditions, including radiation. | Schedule of prices |
| 4. The code classification of the component. | Schedule of prices |
| 5. The definition of the component. | Schedule of prices |
| 6. Material requirements. | Schedule of prices |
| 7. Certification of the design specification. | Cover sheet |
| 8. Operability requirements. | Schedule of prices |

Schedule of Prices

No. 828398
Page No. 1

ITEM NO.	ARTICLES OR SERVICES (GIVE DESCRIPTION OR CATALOG NO.)	QUANTITY	UNIT	UNIT PRICE (Quote unit price and compute extension)	AMOUNT
	<p>Flexible instrumentation hose - The flexible hose shall be a straight section of hose with end connections. Flexible hose shall be NPT stamped and meet the requirements of ASME B&PV Code Case N-192.</p> <p>The flexible hose is to have annular convolutions and be covered with braid. The pressure containing boundary consists of single-ply, welded or seamless tubing of inconel 625, ASME SB-443 (Material to meet the requirements of SB-444 as modified by ASME Code Case N-188. Pressure test may be performed at top assembly, reference ND-6114.), or SB-444.</p> <p>The braided wire covering the convoluted metal bellows shall be stainless and heat resisting steel wire in accordance with ASTM A 580-75 of material types listed in Tables I-7.0 and I-8.0 of ASME SA-479. All wire strands shall be welded to the welding collars and visually examined.</p> <p>The end connections shall be square cut 3/8" od tube with a wall thickness of 0.065", material of ASME SA-213, TP304. The end connections shall be of sufficient length to adapt to a standard compression fitting.</p> <p>Metal Bellows Corporation nuclear instrumentation hose assembly, or equal.</p> <p>The boundaries of the hose assemblies are the ends of the end connections.</p> <p>The complete flexible hose assembly requires NPT stamp.</p>				

Schedule of Prices

No. 828398
Page No. 2

ITEM NO.	ARTICLES OR SERVICES (GIVE DESCRIPTION OR CATALOG NO.)	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<u>Design Requirements</u> <u>Function</u> The hose assemblies will transport essential air from the systems essential air headers to the instrument air sources at various locations and elevations in the auxiliary building and the secondary containment of the reactor building. <u>Internal Conditions</u> Design pressure = $150 \text{ lb/in}^2 \text{ g}$ Operating pressure = $100 \text{ lb/in}^2 \text{ g}$ Design temperature = 150° F Operating temperature = 100° F Pneumatic test pressure = $187\text{--}1/2 \text{ lb/in}^2 \text{ g}$ Pneumatic test temperature = Ambient <u>Auxiliary Building</u> <u>Environment Conditions</u> Nominal: Temperature = 50° F to 120° F Pressure = 14.3 to 16.0 Humidity = 30% to 80% Radiation = Up to 1×10^8 rads 40 years accumulated design Upset: Temperature = 50° F to 120° F Pressure = 14.3 to 16.0 Humidity = 10% to 98% Radiation = Up to 1×10^8 rads 40 years accumulated design Accident: Temperature = 400° F Pressure = $30 \text{ lb/in}^2 \text{ g}$ Humidity = 100% Radiation = Up to 1×10^8 rads 40 years accumulated design			(Quote unit price and compute extension)	

No. 828398
Page No. 3

No. 828398
Page No. 3

ITEM No.	ARTICLES OR SERVICES (GIVE DESCRIPTION OR CATALOG NO.)	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<p><u>Cyclic Life Requirements</u></p> <p><u>General</u></p> <p>The hose assemblies shall be designed for a total lifetime of 40 years while undergoing the conditions specified below. Each hose assembly shall be identical. Cyclic life design shall be based on analytical and test results. A certified design report shall be submitted for permanent retention by TVA. Satisfaction of the requirements of applicable ASME Code criteria shall be documented.</p> <p><u>Model Description</u></p> <p>The hose assemblies will be installed per Contractor's recommendations as delineated in an instruction manual to be submitted for permanent retention by TVA. Displacements are applied to one end connection along three orthogonal axes simultaneously. The assembly is filled with fluid and pressurized to the operating pressure. Flexible instrumentation hoses and material shall be manufactured in accordance with Section III of the ASME Boiler and Pressure Vessel Code, Division 1, latest edition and addenda in effect on contract date.</p> <p><u>Installation</u></p> <p>A nominal offset misalignment of $\pm 1/2"$ in the X, Y, and Z directions shall be assumed in the design calculations as a result of installation. Installation temperature is assumed to be 70° F.</p> <p><u>Displacement Due to Thermal Expansion</u></p> <p>The hose assemblies shall be capable of the following thermal expansion movements for 5000 cycles:</p> <div style="margin-left: 40px;"> X axis =)) Y axis =) Vectorial sum = 5.0") Z axis =) </div> <p><u>Mechanically Induced Vibration</u></p> <p>Sine wave input corresponding to 0.5 g acceleration in each direction at frequencies of 10, 15, 30, and 60 Hz. Evaluate for input at most critical frequency for 40 years of continuous service.</p>			(Quote unit price and compute extension)	

Schedule of Prices:

No. 828398
Page No. 4

ITEM No.	ARTICLES OR SERVICES (GIVE DESCRIPTION OR CATALOG NO.)	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<p><u>Pressure Fluctuations</u></p> <p>Internal pressure from zero to operating pressure for 5000 cycles.</p> <p><u>Seismic Criteria</u></p> <p>Seismic test criteria shall be as delineated in Metal Bellows Corporation's qualification test procedure QTP73989, paragraph 4.6.</p> <p><u>Protection from Damage</u></p> <p>Contractor shall furnish data with respect to the susceptibility of the flexible instrumentation hose assemblies to damage by inadvertent mishandling (e.g., crushing and kinking) and also provide any special handling instruction/protection methods he feels are required to prevent such damage.</p> <p>Flexible instrumentation hoses and material shall be manufactured in accordance with Section III of the ASME Boiler and Pressure Vessel Code, Division 1, latest edition and addenda in effect on contract date.</p> <p>For additional requirements see attachments C, M, and Q and contract document requirements list.</p> <p>ASME Section III, Class 2</p> <p style="text-align: right;"><u>Mark No.</u></p>			(Quote unit price and compute extension)	
1	<p>3/8" od tube size 5GM0900-642</p> <p>Brand name & figure No. _____</p> <p>Manufacturer _____</p> <p>Point of manufacture _____</p> <p>Drawing submittal after award, days _____</p>	200	EA		

Schedule of Prices

No. 828398
Page No. 5

ITEM NO.	ARTICLES OR SERVICES (GIVE DESCRIPTION OR CATALOG NO.)	QUANTITY	UNIT	UNIT PRICE	AMOUNT
	<p>Has the supplier's, manufacturer's or bidder's Quality System Certificate or Quality Assurance Program been approved on a previous TVA contract? Yes <u> </u> No <u> </u></p> <p>If not, please refer to attachment C and ensure that your bid complies with the submittal requirements therein.</p> <p>If yes, identify in the following space the previous TVA contract number on which approval was obtained:</p> <p>_____</p> <p>Noncompliance with the above may result in your bid being ruled nonresponsive.</p> <p><u>Shipping Data.</u> Bidder must state:</p> <p>Number of calendar days after award for delivery, days <u> </u></p> <p>Point of origin of shipment <u> </u></p> <p>Method of shipment from origin and name of first carrier <u> </u></p> <p>_____</p> <p>Method of delivery at destination <u> </u></p> <p>Shipping weight <u> </u></p> <p>_____</p>			(Quote unit price and compute extension)	