SECTION 230516 - VIBRATION ABSORBERS, EXPANSION COMPENSATORS AND EXPANSION JOINTS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.2 SUBMITTALS

A. Submit product data on items provided for each piece of equipment.

B. Submit detailed fabrication drawings for all field fabricated anchors.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Vibration Isolation for Piping: Section 230548 - Vibration Isolation of Mechanical Systems.

B. Anchors and Guides: Section 232010 - Piping Systems and Accessories.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATION FOR PIPING

A. Pipe runs connected to mechanical equipment should be mounted on steel spring and/or elastomer isolators as called for in "Vibration Isolation" Section.

2.2 VIBRATION ABSORBERS

A. Metal Bellows Type: Manufactured of stainless steel convoluted metal bellows with 150# ASA drilled carbon steel flanges. The bellows are to be filled with silicone rubber and the integral gaskets shall be vulcanized to the flanges surface. Absorbers shall be pressure tested at 225 psi and suitable for 300° operating temperature.

B. Design Equipment: Thermo Tech, Inc.

C. Make: Hyspan, Flexhose, Thermo Tech Inc.,

2.3 EXPANSION COMPENSATORS - TWO-PLY BRONZE BELLOWS

A. 3/4 in. through 3 in. installed in copper lines, 1-1/2 in. compression stroke, 1/2 in. extension stroke. 300 psi working pressure at 600°F. Metal enclosure over bellows with anti-torque device, bronze construction, threaded or solder ends.

B. Design Equipment: Keflex Model 7Q or 7QT.

C. Make: Flexonics, Hyspan, Keflex, Metraflex, Flexhose

2.4 EXPANSION COMPENSATORS - TWO-PLY STAINLESS STEEL

A. 3/4 in. through 3 in. installed in steel lines, two-ply stainless steel bellows, 1-1/2 in. compression stroke, 1/2 in. extension stroke. 300 psi working pressure at 600°F. Metal enclosure over bellows with anti-torque device, steel construction, threaded or flanged ends.

B. Design Equipment: Keflex Model 7Q-MPT or 7QFL.

C. Make: Flexonics, Hyspan, Keflex, Metraflex, Flexhose

2.5 RADIATION GUIDES AND ANCHORS

A. For use with expansion compensators (see above) within fin radiation enclosures.

B. Two piece full circumference nylon guide, bolted to "L" bracket. Keflex Model CTG, Tri-State Industries A-Series or equal.

C. Two piece, bolted copper tube anchor and "L" bracket. Keflex Model CTA, Tri-State Industries C-Series or equal.

2.6 EXTERNALLY PRESSURIZED EXPANSION JOINTS

A. Expansion joints shall be of the pack-less type, leak proof, maintenance-free, all welded construction with multi-ply bellows and a full protection shroud capable of withstanding the full design pressure.

B. The system pressure shall be external to the bellows element.

C. The expansion joint shall have internal/external guides to prevent the bellows from being subjected to movement for which it is not designed to accommodate.

D. All expansion joints shall have an integral internal liner.

E. End fittings shall be welded end suitable for mating pipe.

F. The outer liner shall have a drain port.

G. The bellows element shall be corrugated from multi-ply laminated tubes of Type 300 Series stainless steel suitable for the application.

H. The internal liner and external shroud shall be carbon steel pipe of thickness capable of withstanding full design pressure.

I. Design Equipment: Keflex Model EPEJ.

J. Make: Flexonics, Metraflex, Flexhose, Keflex.

2.7 FLEXIBLE EXPANSION LOOPS

A. Provide flexible expansion loops of size and type as shown on the drawings, which will provide a flexible pipe loop that will absorb and compensate multi-plane movements simultaneously as well as reduce piping stress.

B. Materials of construction and end fittings type shall be consistent with pipe material and equipment/pipe connection fittings.

C. Flexible loops shall consist of two (2) flexible sections of hose and braid, two (2) 90° elbows and a 180° return assembled in such a way that the piping does not change direction, but maintains its course along a single axis. Flexible loops shall have a factory supplied, center support nut located a t the bottom of the 180° return, and a drain/air release plug.

D. Flexible loops shall impart no thrust loads to system support anchors or building structure. Loops shall be installed in a neutral, pre-compressed or pre-extended condition as required for the application.

E. Provide nested construction loops when installed in multiples. For steam service, loops must be installed with flexible legs horizontal to prevent condensate build up.

F. Provide guides and anchors as specified.

G. Loops shall be at 0 in. deflection at time of installation based upon 50°F ambient temperature. If the installation temperature is to be below 50°F, it is the Contractor's responsibility to review the installation with the Engineer before proceeding.

H. Make: Metraflex Co., or equal.

2.8 FLEXIBLE EXPANSION LOOPS

A. Provide flexible expansion loops of size and type as shown on the drawings, which will provide a flexible pipe loop that will absorb and compensate multi-plane movements simultaneously as well as reduce piping stress.

B. Materials of construction and end fittings type shall be consistent with pipe material and equipment/pipe connection fittings.

C. Construction to be 3 equal length sections of annular corrugated 321 stainless steel (or bronze) close-pitch hose with stainless steel (or bronze) overbraid that will absorb or compensate for pipe movements in all 6 degrees of freedom (3 coordinate axes, plus rotation above those axes) simultaneously.

D. The corrugated metal hose, braid(s) and a stainless steel ring-ferrule/band (material gauge not less than .048 in.) must be integrally seal welded using a 100% circumferential, full penetration TIG welds. End fittings shall be selected per application. Fittings must be attached using 100% circumferential TIG weld or oxyacetylene process with phos-copper filler.

E. Pre-manufactured flexible loops shall have UL 536 listing when handling flammable and combustible gases and liquids at pressures not exceeding 175 psi at ambient temperature.

F. Braided stainless steel Tri-Flex Loops must be suitable for operating temperatures up to 850°F (455°C). Braided bronze Tri-Flex Loops must be suitable for operating temperatures up to 400°F (204°C).

G. Tri-Flex Loop must be designed for pressure testing to 1.5 times their maximum rated working pressure and a minimum 4:1 (burst to working) safety factor.

H. Each braided Tri-Flex Loop shall be individually leak tested by the manufacturer using air-under-water or hydrostatic pressure.

I. Tri-Flex Loops shall be prepared for shipment using a cut-to-length metal shipping bar, tacked securely between the elbows of the two parallel legs, to maintain the manufactured length during shipping. Shipping bar must be removed prior to system start-up.

J. The pre-manufactured flexible loop shall be installed following the manufacturer's printed installation instructions, unless otherwise noted.

K. A hanger assembly kit shall be provided with each loop. Kit shall include two (2) UL listed seismic wire cables (13 ft. long), two (2) universal restraint clips, and four (4) zinc plated copper oval sleeves. Wire cable shall conform to the requirement of ASCE guidelines (pre-stretched and permanent end fittings maintained a breakstrength safety factory of two). A Felco Model C7 cable cutter and #1-3SBHS crimping tool shall also be included for proper assembly of hanging kit components.

L. Warranty:

1. Tri-Flex Loop must have a three (3) year full replacement warranty when installed in accordance with all specifications and installation instructions as described in the Flex-Hose Tri-Flex Loop Installation and Maintenance Instructions.

M. Make:

1. Tri-Flex Loop as manufactured by Flexhose or equivalent.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. Equipment installed in accordance with the manufacturer's installation instructions.

B. Piping shall be properly anchored to control the direction of expansion and guided at the entrance to expansion devices.

C. Expansion compensators and joints are sized based upon an ambient temperature of 50°F at the time of installation. If the installation temperature is to be below 50°F, it is the Contractor's responsibility to review the installation with the Engineer before proceeding.

D. Provide piping system anchors and guides as shown on the plans. Where an anchor is shown at a change in piping direction, it shall fully control movement in both directions. In lieu of a single anchor fabricated for two directional control, two (2) individual anchors may be provided.

END OF SECTION