PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions Specification Sections, apply to this Section.

1.2 SUMMARY
A. This Section includes pipe expansion joints, guides, and anchors for mechanical piping systems.
B. ASME/ANSI Pressure Piping Code B31.9, Building Services Piping.
C. Related Sections:
   1. Section 15181 “Hydronic Piping”
   2. Section 15185 “Hydronic Pumps”

1.3 PERFORMANCE REQUIREMENTS
A. Provide expansion loops, flexible grooved couplings (where permitted), or expansion joints to accommodate expansion. In addition to expansion devices, make provisions in the piping and connections to eliminate stress on equipment connections.
B. Provide pipe anchors and pipe alignment guides as required for proper distribution of expansion forces. Anchors shall be attached to the structure with brackets fastened to piping.
C. Each expansion loop, or expansion joint shall be provided with pipe guides on each side of the loop, or joint. Swing arrangements in piping to equipment shall also be properly guided to control the force of expansion.
D. Fabricate and install expansion and anchor system capable of sustaining forces generated by gravity, thermal movement, and seismic events.
E. Design and obtain approval from authority with jurisdiction, seismic restraints for pipe expansion joints and pipe anchor system.

1.4 SUBMITTALS
A. General: Submit the following according to the Conditions of the Contract Specification Sections.
B. Product data for each type of pipe expansion joint and pipe alignment guide specified.
C. Pipe expansion joint schedule showing manufacturer's figure number, size, location, and features for each required expansion joint.
D. Assembly-type shop drawings for each type of pipe expansion joint, pipe alignment guide, and anchor, indicating dimensions, weights, required clearances, and methods of component assembly.

E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Control" Article.

F. Maintenance data for each type pipe expansion joint specified to include in the "Operating and Maintenance Manuals" specified in the Section "Project Closeout."

1.5 QUALITY CONTROL

A. Qualify welding processes and welding operators according to AWS D1.1 "Structural Welding Code--Steel."
   1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Qualify welding processes and welding operators according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."

C. Licensed Engineer's Design Drawings and Calculations: Design and prepare drawings and calculations for seismic restraint of pipe expansion joints, pipe alignment guides, and pipe anchors. Include seal and signature of Registered Engineer, licensed in jurisdiction where Project is located, certifying compliance with specifications.

D. All anchoring methods between the pipe and the anchor shall conform to the requirements of Pipe Fabrication Institute (PFI) Standard ES 26.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include but are not limited to the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Expansion Joints:
      a. Adsco Manufacturing Corp.
      b. Advanced Thermal
      c. Hyspan Precision Products, Inc.
      d. Senior Flexonics Inc., Expansion Joint Div.
   2. Pipe Alignment Guides:
      a. Adsco Manufacturing Corp.
      b. Fee and Mason
      c. Hyspan Precision Products, Inc.

2.2 PIPE EXPANSION JOINTS, GENERAL
SECTION 15124
EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

A. Provide expansion joints of the same size as the pipe in which they are installed. Refer to drawings for amount of expansion which must be absorbed.

B. Refer to "Pipe Expansion Joint Schedule" for criteria of individual pipe expansion joints.

2.3 EXPANSION JOINTS

A. Expansion joints 2 1/2 inches and smaller shall be constructed of multi ply laminated corrugated Series 300 stainless steel bellows enclosed in a floating brass shroud, pipe ends shall be all bronze construction having threaded or sweat ends to suit the piping in which it is installed. Design Basis: ADSCO Model STCA or SSCA.

B. Expansion joints 3 inches and larger shall have semi steel bodies constructed for 150 psig hydronic working pressure. Units shall be of the packless type, controlled flexing, and shall have multiple bellows of stainless steel and cast iron equalizing rings. Joint shall also be provided with internal sleeve. Joint ends shall be flanged. Provide sheet metal shrouds for each unit. Design Basis: ADSCO Corroflex Packless Equalizing Expansion Joints.

C. Expansion joints 3 inches and larger shall have semi steel bodies constructed for 150 psig hydronic working pressure, unless otherwise noted on the drawings. Units shall be of the externally pressurized packless type and shall have multiple bellows of stainless steel. Joint ends shall be flanged. Outer casing shall be provided with an anchor and a drain plug. Design Basis: ADSCO Pressure Master externally pressurized guided expansion joint.

D. Expansion joints 2 1/2 inches and larger shall be internally and externally guided, packed type expansion joints suitable for 150 psig hydronic working pressure, unless otherwise noted on the drawings. The internal cylinder shall be machined from heavy wall ASTM A 53 Grade B seamless steel pipe and coated with a 2 mil thick coating of hard chrome; internal cylinder shall be provided with a limit stop. Joint stuffing box shall be packed with asbestos free self-lubricating braided sealing ring packing and provided with packing cylinders/plungers for addition of semi plastic self lubricating injection packing. Traverse chamber (outer casing) shall be provided with an anchor and a drain plug. The joint shall have flanged ends. Design Basis: Advanced Thermal Model TP2.

2.4 EXPANSION LOOPS

A. Expansion Loops shall be field or shop fabricated to meet the piping systems expansion based on temperature of service and field installed parameters.

B. Expansion Loops shall be designed to meet the amount of expansion based on expansion rate and linear footage.

C. Design shall meet ASTM-A53, GR.B seamless pipe based on Code for Pressure Piping.

D. Expansion Loop stress levels shall be at or below 22,500 PSI. Contractor shall submit Expansion Loop shop drawings for submittal approval (with stress analysis calculations by an engineer licensed in the State of Nevada).
E. Expansion Loops shall only be allowed when suitable rooms is available and the Owner has approved of the installation.

2.5 PIPE ALIGNMENT GUIDES

A. Guides shall be constructed of steel having a split housing and split cast steel segmented spider, sized to the O.D. of pipe, free to move axially in the segmented steel cylinder. The spider shall be clamped to the pipe and the guiding cylinder securely fixed to the supporting structure. The guides shall be so designed to provide clearance for complete insulation through the guides. Design Basis: Fee and Mason Figure 120 Spider Guide.

B. At the Contractor's option, guides shall be T shaped sliding supports with restraining side guide lugs. Length of sliding supports shall be as required to accommodate movement and 12 inches minimum. In addition to the sliding support, a baseplate shall be provided for welding to the guide support structure. Each plate (guide and baseplate) shall be provided with a minimum 3/32 inch thick Teflon (graphite) wearing surface bonded to a 10-gauge plate. The size of the web on the guide shall be selected to match the required insulation thickness. Design Basis: Fee and Mason Figure 144 sliding support guide.

1. Refer to Pipe Fabrication Institute (PFI) Standard ES 26 for requirements concerning welding guides onto piping materials.

2.6 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36, steel plates, shapes, and bars, black and galvanized.

B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex-head, track bolts and nuts.

C. Washers: ASTM F 844, steel, plain, flat washers.

D. Powder-Actuated Fasteners: Attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

E. Concrete: Portland-cement mix, 3000 psi.
   1. Cement: ASTM C 150, Type I.

F. Grout: ASTM C 1107, Grade B, nonshrink, nonmetallic.
   1. Characteristics include post-hardening volume-adjusting dry hydraulic-cement-type grout that is nonstaining, non-corrosive, non-gaseous and is recommended for both interior and exterior applications.
   2. Design Mix: 5000 psi, 28-day compressive strength.

PART 3 - EXECUTION
3.1 EXAMINATION
A. Examine substrates and conditions under which pipe expansion joints, pipe alignment guides, and pipe anchors are to be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PIPE EXPANSION JOINT INSTALLATION
A. Install pipe expansion joints according to manufacturer’s written instructions.
B. Align expansion joints to avoid end-loading and torsional stress.

3.3 FABRICATED-TYPE PIPE EXPANSION COMPENSATION INSTALLATION
A. Install pipe expansion loops cold-sprung in tension or compression as required to absorb 50 percent of total compression or tension that will be produced during anticipated change in temperature.
B. Connect risers to mains with at least 5 pipe fittings including tee in main.
C. Connect risers to terminal units with at least 4 pipe fittings including tee in riser.

3.4 PIPE ALIGNMENT GUIDE INSTALLATION
A. Install pipe alignment guides on piping that adjoins pipe expansion joints.
B. Install pipe alignment guides on piping that adjoins pipe expansion loops.
C. Install pipe alignment guides on piping elsewhere as indicated.
D. Secure pipe alignment guides to building substrate.

3.5 PIPE ANCHOR INSTALLATION
A. Install pipe anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
B. Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and with AWS D1.1.
C. Construct concrete pipe anchors of poured-in-place concrete of dimensions indicated.
D. Where pipe expansion joints are indicated, install pipe anchors according to expansion unit manufacturer’s written instructions to control movement to compensators.
E. Pipe Anchor Spacings: Where not otherwise indicated, install pipe anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and
bends. Preset anchors as required to accommodate both expansion and contraction of piping.

F. Use grout to form flat bearing surfaces for pipe expansion joints, pipe alignment guides, and pipe anchors that are installed on or in concrete.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint and paint, exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal is specified in Division 9 Section "Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.7 FIELD QUALITY CONTROL

A. Licensed Engineer's Installation Report: Prepare report covering installation of pipe expansion joints, pipe alignment guides, and pipe anchors. Include seal and signature of Registered Engineer, licensed in jurisdiction where Project is located, certifying compliance with specifications.

END OF SECTION