

SCOPE

- I 1.1 This practice covers the design, fabrication, and inspection of expansion joints intended for use in low pressure air and flue gas service associated with fired heaters, boilers, and other fired equipment.
- I 1.2 **An asterisk (*)** indicates that a decision by the Purchaser is required, or that additional information is furnished by the Purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices which shall be used with this practice.
- I * 2.2 **Table 2** lists the practices, code, standard, and publication which shall be used with this practice as specified by the Purchaser.

TABLE 1

PRACTICES	
IP 4-1-2	Structural Steel Design
IP 18-7-1	Welding Procedures
IP 18-12-1	Positive Materials Identification
IP 19-1-1	Paint and Protective Coatings
IP 19-3-3	Fired Heater Linings
IP 20-1-1	Inspection of Equipment and Materials

TABLE 2

PRACTICES	
IP 4-5-1	Steel Stacks
IP 20-1-2	Administrative Procedures for Obtaining Exxon Engineering Inspection
CODE, STANDARD AND PUBLICATION	
ASME Code Section VIII Pressure Vessels, Division 1	
EJMA STANDARD Standards of the Expansion Joint Manufacturer's Association	
FLUID SEALING ASSOCIATION Technical Handbook	

DOCUMENTATION

PROPOSAL INFORMATION

- I ↗ 3.1 **The Vendor shall submit** as a minimum the following information with his proposal:
 - a. General Arrangement drawings showing critical dimensions, materials, insulation, and attachment details.
 - b. Materials of Construction of each layer (for fabric expansion joints).
 - c. Leakage rate.

REVIEW INFORMATION

- I ↗ 3.2 The Vendor shall submit, as a minimum, the following information for review:
 - a. Detailed and General Arrangement drawings, including all information required to perform detailed ductwork design.
 - b. All mechanical and thermal calculations.

IP 7-9-1	Expansion Joints for Fired Equipment (This practice is appropriate for attachment to Inquiry or Purchase Document)	EXXON INTERNATIONAL PRACTICE
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FINAL RECORDS

- I ♦ 3.3 The following information shall be submitted for final records:
 - a. Complete "as built" documentation issued for review.
 - b. Installation (including tolerances for misalignment), operation, and maintenance instructions.

MATERIALS

- R ♦ 4.1 **Materials of construction** of each layer of belting shall be in accordance with the **Fluid Sealing Association's "Technical Handbook."**
- R ♦ 4.2 **Metal bellows shall be fabricated** from austenitic stainless steel, Type 321.

DESIGN

- I ♦ *5.1 **Purchaser shall specify:**
 - a. Maximum operating pressure and temperature (continuous and short duration).
 - b. Number of cycles.
 - c. Movement in all planes.
 - d. Permissible leakage.
 - e. Joint orientation.
 - f. Requirements for blinding or purging.
 - g. Flue gas composition and acid dewpoint.
- R 5.2 The **design life** shall be the greater of 10 times the anticipated number of cycles in 20 years or 1,000 cycles.
- R ♦ 5.3 **The design pressure** shall be the greater of:
 - a. Ten inches water gauge (250 mm H₂O).
 - b. 1.5 x the expected maximum operating pressure (or fan shut-in pressure).
 - c. 5 psig (0.34 barg) for metal bellows.
- R ♦ 5.4 The **design temperature** shall be 50°F (28°C) above the maximum short duration temperature.
- R 5.5 All expansion joints shall have an **external shroud** to protect them from damage.
- R ♦ 5.6 **An internal baffle** shall be provided to protect the flexible element from debris in the air or gas stream.
- R 5.7 **Ceramic fiber insulation**, encased in a ceramic fiber cloth bag, shall be installed in the void area between the metal bellows or fabric belt and the internal sleeve.
- R ♦ 5.8 **Metal temperature of expansion joint parts** in contact with the flue gas shall be maintained above the acid dewpoint.
- M 5.9 **Attachment of fabric belts** shall be such that they can be replaced without dismantling the joint or removing it from the ducting.
- R ♦ 5.10 **Slip joints may be used** where motion is < 1 in. (25 mm) and will occur in one plane only.

FABRICATION

- R ♦ *6.1 For applications with design temperature above 1000°F (538°C), **austenitic stainless steel bellows** after cold forming shall be fully solution annealed followed by rapid air cooling. Solution annealing temperature and duration shall be specified by the Owner's Engineer.

INSPECTION AND TESTING

- R 7.1 **All expansion joints shall be inspected** by the Owner's Representative prior to shipment.

ADDITIONAL INSPECTION/TESTING FOR BELLOWS

- R 7.2 **All welds** shall be 100 percent liquid penetrant inspected after forming.
- R 7.3 **All longitudinal welds** shall be 100 percent radiographed. Acceptance standards shall be per **ASME Code Section VIII, Par. UW-51.**