“HOT TOPIC”
EXPANSION JOINT
PROPER DESIGN

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at EFFOX-FLEXTOR (A CECO Environmental Company)

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EFFOX-FLEXTOR

- Established 1980
- Effox-Flextor merger creates a world leader in DAMPERS and EXPANSION JOINTS
- Engineer, Design & Manufacture Dampers and Expansion Joints
- Staff of Engineers with over 100 years of combined experience in EJ industry.
- Active member in FSA (Fluid Sealing Association)
Proper Expansion Joint Design Criteria

“The Better the information the Better the results”

Several Factors Important in EJ Design:

- True Temperature Data
- Accurate Movements
- Ductwork Tolerances
True Temperature Data

- **Operating / Design Temps**
  - Design Temperature should be based on actual continuous operating conditions.

- **Excursion Temps**
  - Realistic Maximum intermittent conditions, frequency and duration.

- **Ambient Conditions** (High/Low)
  - Possible elevated external temperature at belt surface due to confined area or other radiant heat source.
  - Low temps at operation and outage periods.

- Critical on FGD applications near dewpoint
FGD Applications

- Confirm Design, Operating & Dewpoint Temps
- Select belt material suitable for service
- Minimize EJ setback / cavity
- Externally insulate if MAX temperatures will NEVER exceed belt continuous rating
- Recommended: Viton integrally flanged U-belt
Accurate Movements

- Base thermal movements on operating and max design temp not excursion
- Provide thermal movements @ excursion conditions for EJ manufacturer design information
- Do NOT add additional tolerances to provided movements
- Limit lateral to 3” max without cold preset in ductwork.
- Seismic and Wind load movements should be considered excursion conditions acting on EJ in one direction per occurrence.
- Excessive design movements result in reduced EJ belt life at normal operating conditions
<table>
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<th>TYPE</th>
<th>ACTIVE LENGTH</th>
<th>AXIAL COMPRESSION</th>
<th>AXIAL EXTENSION</th>
<th>LATERAL MOVEMENT</th>
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<td>Single Layer</td>
<td>6&quot; (150mm)</td>
<td>2&quot; (50mm)</td>
<td>1/2&quot; (13mm)</td>
<td>+/- 1&quot; (25mm)</td>
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<td>Elastomer or Fluoroplastic</td>
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<td>3&quot; (75mm)</td>
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<td>+/- 1 1/2&quot; (38mm)</td>
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Provided by FSA
Stack Inlets

- Confirm Operating & Excursion movements required for Thermal & Non-Thermal conditions
- Design EJ for typical operating conditions taking into consideration normal Seismic / Wind loads
- Multi-directional Lateral movements possible
- Excessive Movements = Excess Belt at normal Operation Possible shortened belt life from instability (Flutter)
- Once in a Lifetime Occurrences
Ductwork Tolerances

- Maximum duct offsets as indicated in FSA guidelines: ½" (13mm) Compression, ¼" (6mm) Extension, ½" (13mm) Lateral
- Additional offsets limit movement capabilities and sacrifice service life
- Special attention is required at EJ location where Inlet side of ductwork breaching is by one contractor and outlet by another.
- Mating Ductwork must conform to structural tolerances allowed by AISC structural Steel Codes at both EJ breach inlet and outlet flanges