

# **“HOT TOPIC” EXPANSION JOINT PROPER DESIGN**

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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



<b>TYPE</b>	<b>ACTIVE</b>	<b>AXIAL</b>	<b>AXIAL</b>	<b>LATERAL</b>
	<b>LENGTH</b>	<b>COMPRESSION</b>	<b>EXTENSION</b>	<b>MOVEMENT</b>
<b>Single Layer</b>	6" (150mm)	2" (50mm)	1/2" (13mm)	+/- 1 "(25mm)
<b>Elastomer or</b>	9" (230mm)	3" (75mm)	1/2" (13mm)	+/- 1 1/2"(38mm)
<b>Fluoroplastic</b>	12" (305mm)	4" (100mm)	1" (25mm)	+/- 2"(50mm)
<b>Flexible Element</b>	16" (405mm)	5" (125mm)	1" (25mm)	+/- 2 1/2"(63mm)
<b>Composite Type</b>	6" (150mm)	1" (25mm)	1/2" (13mm)	+/- 1/2"(13mm)
<b>Flexible Element</b>	9" (230mm)	2" (50mm)	1/2" (13mm)	+/- 1 "(25mm)
	12" (305mm)	3" (75mm)	1" (25mm)	+/- 1 1/2" (38mm)
	16" (405mm)	4" (100mm)	1" (25mm)	+/- 2" (50mm)

# 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

