Fire Rated Duct Wrap

• **Air Duct Wrap**

and

• **Key Duct Wrap Benefits**

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Agenda

• Concept & Applications
• Codes & Standards
• Testing & Listings
• Compliance
• New Standard → Industry Impact
• Key Duct Wrap Benefits
• Outlook
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Concept

Take what we did with Grease Duct and apply to Air Duct

1. Shaft Alternative
2. Move or Replace Fire Damper
3. Clearance Reduction
Applications – Air Duct

- Life Safety/Smoke Control
  - Stairwells, elevator shaft + vestibules, exit corridors
  - Pressurization, Smoke Evac
- Commercial Dryer
- Residential Kitchen
- Toilet Exhaust
- Healthcare, universities, hi-rise condos, hotels, retrofit
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Codes & Standards

• Code requirements exist for ventilation ducts to be enclosed in rated shaft or fire barrier →
  – Dedicated ducts that must remain functional
  – Ducts that pass thru fire zones (exit passageway)
  – Duct for which traditional shaft or damper protection is not feasible

• No allowance for wrap as “exception”
• No N.A. test standard to reference
• No success with past code change proposals
Codes & Standards

• Example: IBC Sect. 909.20.6.1
Smokeproof Enclosure Ventilation Sys.
  – “Smokeproof ventilation systems shall be independent of other building ventilation systems”. “Equipment and ductwork shall be located within the building if separated from the remainder of the building...by a 2-hour fire barrier”.

• Example: IMC Sect. 504.7 and 504.8
Commercial Dryer Exhaust – Multi-Story
  – “Ducts shall have a min. clearance of 6” to combustible materials”...”The shaft in which the duct is installed shall be constructed and fire resistance rated as required by the IBC”...“Dampers shall be prohibited.”
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Testing - ISO 6944

- EU Test Standard - Metallic Ventilation Air Duct Systems
- Engulfment Fire
- Operating conditions
  - Fan cycles on/off
- Open & closed duct systems
  - Vertical & Horizontal
- Through-Pen Firestop
- Limits cold side temp rise
Listings

- ISO 6944 Ratings
  - Stability
  - Integrity
  - Insulation
- Need all 3! All 3 should be equal
- Dedicated/Closed Ducts
  - Single Layer Systems - details vary
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Compliance

• IBC Ch.1 - Alternate materials, design, and methods of construction and equipment
  – AHJ can approve - meets “intent of code” and provides equivalent protection

• Project Submittal
  – VE – value engineering (projected savings)
  – Supporting documentation, supplier involvement

• Equal Ratings – Insulation is mandatory
  – Shaft Alternative requires temp limits
Compliance

• Successes
  – Growing acceptance by AHJ’s
  – Existing Listings are adequate

• Limitations
  – ISO 6944 uses non-mandatory language
  – Code compliance difficult to articulate
  – Individual project approvals
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Strategy

• Build the Air Duct Wrap Market
Approach

• “By-Pass the Road Block”
ASTM E2816 – New Standard

- Fire Resistive Metallic HVAC Duct Systems
- N.A. version of ISO 6944
- Published June ‘11
## ASTM E2816 vs ISO 6499

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM E2816</th>
<th>ISO 6944</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combustibility – E136</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Flame Spread/Smoke – E84</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Insulation Durability – C518</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Covering: Glowing &amp; Smoldering – C411</td>
<td>Pending</td>
<td>No</td>
</tr>
<tr>
<td>Hose Stream Test</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Support Anchorage</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Compliant Mandatory Language</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Test: Time•Temperature Curve</td>
<td>ASTM</td>
<td>ISO</td>
</tr>
<tr>
<td>Test: Furnace Thermocouples</td>
<td>ASTM</td>
<td>ISO</td>
</tr>
</tbody>
</table>

- Uses N.A. test criteria & aligns with US building codes
### ASTM E2816

<table>
<thead>
<tr>
<th>Ducts</th>
<th>Horizontal Ducts</th>
<th>Vertical Ducts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ducts without Openings</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Ducts with Openings</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

- E119 Engulfment Test
- Enclosure + Firestop
ESR – AC179 Revision

- Modified - add ASTM E2816
- Alternate to a shaft and/or Fire Damper
- Evidence of compliance
- Interim solution until code changes
- Offers equal or better protection

“The ICC-ES evaluation process culminates with the issuance of technical reports. …Manufacturers use reports as evidence that their products (and this is especially important if the products are new and innovative) meet code requirements and warrant regulatory approval.”
CODE

- Next Code Cycle = 2015
- Proposals due Jan. 2012
- Great opportunity
  - ASTM (N.A. criteria) + AC179 (code org. support)

- IFC to draft code changes
  - Coordination with FCIA
Impact on Industry

- ISO 6944 Listings still valid
  - single layer systems

- ASTM E2816 = multi-year transition
  - Multiple conditions → criteria by duct type TBD
  - Existing offering + expanded coverage – new sys?

- Positive effect on demand for wraps!
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Key Benefits

• SAVES SPACE
  – Installed at zero clearance to combustibles
  – Thin systems provide fire rating

• SAVES LABOR
  – Lightweight, easy to handle
  – Conforms to complex configurations
Key Benefits

- PROBLEM SOLVER
  - Job site obstructions
  - Retrofit projects
  - New building design
  - Situations where shaft would be difficult, if not impossible to build!
  - Tested alternative - AHJ
  - Lower installed cost - Contractor
  - Better space utilization – A/E
  - Damper Access – Owner
Benefit: Space Utilization

- Luxury high rise condominium
- Locating HVAC ducts within general mechanical shaft would result in wall protrusion into each unit
- Wrap used – space savings eliminated protrusions
  - Max. space utilization
  - Achieved desired aesthetics
Benefit: Fire Damper Access

- High Rise Residential Condominium

Access to fire damper for maintenance/inspection not possible when damper was located at branch duct exit from shaft. Damper location moved to duct outlet permitting access within each condo unit.
Benefit: Billable Square Footage

- Grease duct adjacent to exit corridor wall
- Wrap used in lieu of shaft; Eliminated 6” clearance;
- Relocate wall and increase rentable room space
- Saved Space = 7”x40’ = 23 sq.ft. per floor
- **Reclaimed billable space = SF x # floors x real estate value = $$$**
Green/LEED Features

• **Materials & Resources**
  – Construction Waste Management
    • % diverted from disposal
  – Recycled Content
    • % post industrial
  – Regional Materials
    • % material extracted within 500 mi. of project TBD

• **Indoor Environmental Quality Construction IAQ Mgt.**
  • No VOC’s, Resistant to Mold Growth, Formaldehyde free

• **Innovation in Design**
  • Useable space, increased thermal efficiency, etc.
Other Features

• Energy Savings
  – Duct thermal insulation requirements
    – Example: IECC Sect. 503.26 (2009)
      • “All supply and return air ducts and plenums shall be insulated with a min. R-5 insulation when located in unconditioned spaces….When located within a building envelope assembly, the duct or plenum shall be separated from the ..exempt or unconditioned spaces by a min. R-8 insulation”
  – Duct Wraps typ. > R-4 per inch @ 75F
  – Dual Function: FP + thermal insulation?!
Other Features

• Condensation
  – Covering provides vapor barrier (taped joints); data per vendor

• Sound Properties
  – Sound transmission and absorption data
Key Benefits - Summary

AHJ & Building Inspector
- Code Compliant

Architect & Engineer
- Design Flexibility

Building Owner
- Billable Square Footage

Installer
- Less Labor

Duct Wrap delivers benefits to every member of the project team!
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• Near-term →
  – Growth > economy

• Regulations = Code driven opportunity!

• Long-term →
  – Significant growth potential

• “Repeat the Play”
  – Faster, Bigger than grease duct wrap
Questions?