Testing Standards for Seismic Restraint Components

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KINETICS
Noise Control
Requirements

- IBC 2003: 1707.7.2
  - Certificate of compliance required
  - Shake table, shock test, analytical methods

- OSHPD
  - Requirements vary by product and reviewer
Current/Pending Standards

- AC-156
- ATC-58
- ASHRAE SPC-171
AC-156

- Shake table testing protocol
- Equipment certification
- De-facto standard
- Not appropriate for restraints
  - Can be used with multiple equipment types
  - Dynamic response of equipment affects results
OSHPD

- OSHPD approval often used as a standard
- Not an actual standard
- Case-by-case approval (or pre-approval)
- No legal/practical bearing outside limited applications
ATC-58

- Fragility testing standards
- Good basis for certification testing
- Intended to establish fragility – not certification
ASHRAE SPC-171

- Intended for seismic restraint testing
- Static, cyclic tests
- Supported equipment independent
  - Equipment type enters through demand
- Does not specify how to use test results to obtain “rating”
Component Types

- Cable restraints
- Combination isolators/snubbers
- Seismic snubbers
- Structural shapes
General Provisions

- Independent testing/observation required
- Standard for specimen selection
- Standard for testing setup
- Required tests: vertical tension; vertical compression; longitudinal horizontal; transverse horizontal; combined horizontal and vertical
Cable Restraints

- Ceiling mounted piping, ductwork, etc.
- Ceiling mounted equipment
- Tall floor mounted equipment
Cable Restraints - Tests

- Cyclic static testing
- Increase load
- Record cable slippage, component deformation
Combined Isolators/Restraints

- Directly mounted to equipment
- Mounted to structural frames attached to equipment
- Isolated curbs
- Must consider effect of spring forces
Isolator/Restraints - Tests

- Test fixture must be “rigid” and hold specimen in proper position
- Load to avoid racking/distortion
- Cyclic load – record transient and permanent deformations
Seismic Snubbers

- No isolation
- Directly mounted to equipment
- Mounted to structural frames
- Test procedure similar to isolator/restraints
Structural Shapes

- Ceiling supported pipe, ductwork, electrical bus, ducts, etc.
- Ceiling supported equipment
- Tall floor mounted equipment
- Wall mounted equipment
- Test procedure similar to cable restraints
Summary

- New standard for testing seismic restraints
- Allow for comparison/consistent ratings
- Basis for certification
- Public comment – late 2005
Questions?

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