

Testing Standards for Seismic Restraint Components

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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

OSHPPD

- OSHPPD 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

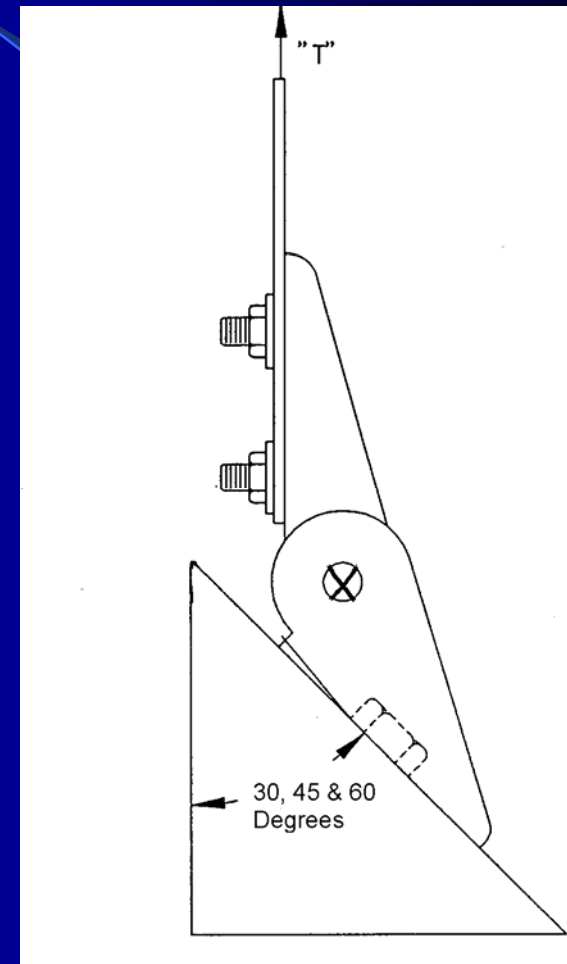
- Independent testing/observation required
- Standard for specimen selection
- Standard for testing setup
- Required tests: vertical tension; vertical compression; longitudinal horizontal; transverse horizontal; combined horizontal and vertical

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

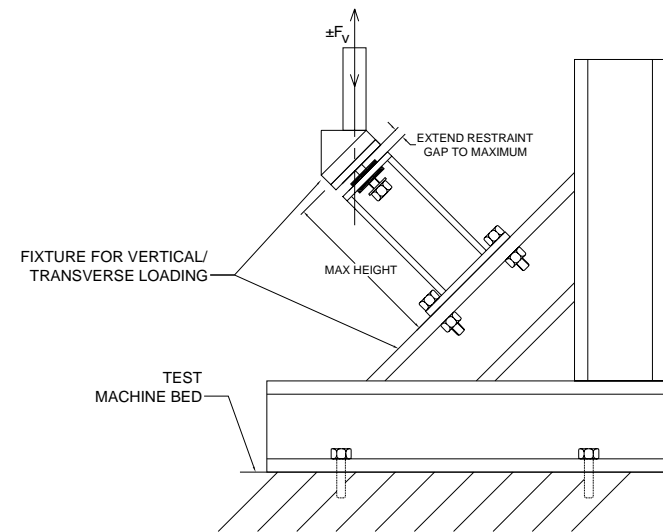


Combined Isolators/Restraints

- 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



45° LATERAL - VERTICAL LOAD (F_{yv})

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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