TIA-569 Standards Update
Pathways & Spaces

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TIA-569 Pathways & Spaces Standard

- The purpose of this Standard is to standardize specific pathway and space design and construction practices in support of telecommunications media and equipment within buildings.

- Scope limited to telecommunications aspect of building design but influences design of other building services (i.e. HVAC, electrical power, etc)

- Define requirements for key spaces
  - Building Spaces
  - Access & Service Provider Spaces
  - Multi-tenant Building Spaces
  - Building Pathways

*Cabling distribution should try to find a solution that will:
  - Accommodate cabling changes
  - Minimize occupant disruption when horizontal pathways are accessed
  - Allow for future growth
TIA-569 Pathways & Spaces Standard

A standard established for rooms, pathways, and areas into and through which structured cabling, components, and equipment are installed. Applies to:

- Conduits
- Under-floor ducts and Floor Boxes
- Access floor (Raised Floors)
- Ceiling pathways (J-Hooks & Rings)
- Cable tray systems
- Perimeter pathways
  - *Raceways*
- Telecommunications Closet & Equipment Room
  - *Sizes & Provisions*
TIA-569 Pathways & Spaces Standard
Building Spaces: General Requirements

- General Requirements apply to
  - Distributor Room
  - Common Distributor Room
  - Entrance Room
  - Access Provider Space
  - Service Provider Space

- Temperature & humidity guidelines per ASHRAE *Thermal Guidelines for Data Processing Environments*
  - Temperature & humidity in telecommunications space shall meet requirements for ASHRAE Class 3

- UPS larger than 100kVA located in separate room

- Bonding & grounding system shall be provided per ANSI/TIA-607-B
TIA-569 Pathways & Spaces Standard

Building Spaces: General Requirements

- Plywood backboard
  - ¾ in plywood (at least one wall)
  - Painted with two coats fire-retardant paint
  - No longer required to be painted white

- Ceilings
  - Ceiling height - min, 8 ft clear space (10ft between finished floor and lowest point of ceiling)
  - Recommend for max flexibility not to use suspended ceiling

- Floor loading
  - Static & dynamic capacity shall be sufficient to bear both distributed & concentrated loads
  - Shall consult structural engineer

- Lighting
  - Min 500 lux in horizontal plane
  - Min 200 lux in vertical plane
  - Measured 1 m (3 ft) above finished floor
  - Powered separately from telecommunications equipment
  - Should not use dimmer switches

- Doors
  - Minimum of 36” x 80” (optional 72”x 90”)

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TIA-569 Pathways & Spaces Standard

Building Spaces: Distributor Room

- Common access for cabling subsystems & building pathways
- Contains telecommunications equipment, cable terminations, & cross-connect
  - In a commercial building it is called an equipment room or telecommunications room depending on what is in it
- Should follow general guidelines
- Multiple distributor rooms on same floor interconnected by minimum of one metric designator 78 (trade size 3) conduit or equivalent pathway
TIA-569 Pathways & Spaces Standard
Building Spaces: Distributor Room

- Distributor B (i.e. intermediate cross-connect (IC) in commercial building) min. of 10 m² (100 ft²)

- Distributor C (i.e. MC in commercial building) min. 12 m² (120 ft²) for building with gross area up to 50,000 m² (500,000 ft²)
  - Increase 1 m² (10 ft²) per 10,000 m² (100,000 ft²) increase in building size

- Minimum 1 distributor room per floor

- Minimum two dedicated 120 VAC /20A outlets
  - 6 ft spacing;
  - 6 in above floor
TIA-569 Pathways & Spaces Standard
Building Spaces: Entrance Room / Space

• Entrance Room /Space
  – Entrance for outside plant & pathways shall meet requirements of ANSI/TIA-758-B (Outside Plant) standard
  – In buildings up to 10,000 sq m (100,000 sq ft), wall mounting terminating hardware may be suitable
  – Minimum of two dedicated 120 VAC /20 A outlets

• Distributor Enclosure
  – Centrally located
  – Lighting, measured in distributor enclosure, minimum 500 lux
  – Minimum of one dedicated 120 VAC /20 A outlet
TIA-569 Pathways & Spaces Standard

Access & Service Provider Spaces

– Used for the location of transmission, reception, and support equipment

– Minimum Access & Service Provider Space: 1.5 m x 2 m (4ft x 6 ft)

– Should be close to Distributor C (i.e. MC)

– At least one dedicated 120 VAC/20 A, non-switched duplex electrical receptacle for equipment
TIA-569 Pathways & Spaces Standard
Building Spaces: Racks & Cabinets

- Minimum 3 ft front clearance; 4 ft is preferable
- Minimum 2 ft rear clearance; 3 ft is preferable
  - Equipment may require additional clearance
- Suggest using cabinets 6 in deeper or wider than largest equipment
- Should have adjustable mounting rails
- Rails should have markings
Cabinets shall be selected & configured to provide adequate cooling (some suggestions listed below)

- Forced airflow using fans
- Natural airflow between hot & cold aisles
- Hot aisle/cold aisle cabinet arrangement
- Use of blanking panels and baffles
- Sealing air leaks around cable ingress points

Vertical cable manager shall be installed between racks and at both ends of every row (at least 3.25 in wide)

Horizontal management sufficient to provide strategic growth of up to 100% but not impair cooling
Consider quantity, size & bend radius requirements of cable when determining size of pathway

- Allow for growth

- Not located in elevator shafts

- Areas above ceilings may be used as pathway for telecommunications cables & for connecting hardware

- Co-installation of telecommunications cable & typical branch circuit (120/240 VAC/ 20A) must meet requirements of NFPA 70
TIA-569 Pathways & Spaces Standard

Building Pathways

- Zero pathway separation permitted when telecommunications cables & power cables both enclosed in metallic pathways
  - (min wall thickness of 1 mm (0,04 in) of steel or 1.5 mm (0,06 in) aluminum)

- Provides table with guidelines for separation of telecommunications pathways for balanced twisted-pair cabling from adjacent power wiring

- Balanced TP cabling separated from fluorescent lamps/fixtures by minimum of 125 mm (5 in)
Pathway separation from sources of electromagnetic energy:

<table>
<thead>
<tr>
<th>Condition</th>
<th>&lt;2KVA</th>
<th>2-5KVA</th>
<th>&gt;5KVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unshielded Power Lines in proximity to open PVC Pathways</td>
<td>5 in</td>
<td>12 in</td>
<td>24 in</td>
</tr>
<tr>
<td>Unshielded Power Lines in proximity to Grounded Metallic Pathways</td>
<td>2.5 in</td>
<td>6 in</td>
<td>12 in</td>
</tr>
<tr>
<td>Power Lines enclosed in Metal Grounded Pathways in proximity to Grounded Metallic Pathways</td>
<td>&lt;1 in</td>
<td>3 in</td>
<td>6 in</td>
</tr>
</tbody>
</table>
TIA-569 Pathways & Spaces Standard

**Building Pathways**

- Minimum 75 mm (3 in) clear vertical space available above ceiling tiles if using as pathway

- Min. 300 mm (12 in) clearance above cable tray system or runway

- Trays may be divided with barrier for physical separation between power & TP cable

- Non-continuous supports located at intervals not to exceed 1.5 m (5 ft)
TIA-569 Pathways & Spaces Standard
Building Pathways

- Cable Trays
  - Planned for initial max calculated fill ratio of 25%
  
  Note: A calculated fill ratio of 50% for 4-pair & similar cable will physically fill entire tray due to spaces between cables

- Cable Runway
  - Stacked no higher than 150 mm (6 in)

- Pathways free from burrs, sharp edges or projections
  
  Trays and wireways may be divided with a barrier to allow for physical separation of different types of services.

  If nonmetallic trays and wireways are located in the plenum, they shall be plenum rated.
TIA-569 Pathways & Spaces Standard

Building Pathways

- Ceiling Pathway (J-Hooks & Bridle Rings)
  - Spacing 48” to 60” off-center (eliminate copper degradation)
  - Maximum of Q(75) 4Pair UTP
  - Over Q(75) - add another J-Hook or migrate to Cable Tray
Conduit

- Sections between pull points shall not exceed 30 m (100 ft)
  - in runs that total more than 30m (100’), insert pull boxes so that no segment between pull points exceeds the 30m (100’) limit.
- No section shall contain more than two 90 degree bends
- Conduits with internal diameter of 50 mm (2 in) or less, inside bend radius of a bend in conduit shall be at least 6 times the internal diameter
- Conduits with an internal diameter of more than 50 mm (2 in), the inside radius of a bend in conduit shall be at least 10 times the internal diameter.

- Bonded to ground, in accordance to national or local requirements

- Has reference table for pull box sizes

- Maximum fill for furniture pathways is 40%
TIA-569 Pathways & Spaces Standard

**Building Pathways**

- Conduit (RIGID, EMT, ENT, PVC, HDPE)
  - Must be a minimum of 3/4”
  - 40% Fill-Ratio (NEC) applies
  - Fire Codes apply and must be respected regarding the use of polymers
Pull Box Installation

Locate pull boxes in easily accessible locations. Horizontal cable boxes should be installed above suspended ceilings. Should be used when installing a pull string or cable, fishing the conduit’s run, and pulling and looping the cable in the next length of conduit.

Pull boxes should be used when:

- Conduits runs are more than 30m (100')
- Contain more than two 90° bends.

Pull boxes shall not be used for splicing cable.

Splice boxes

Intended to be used for splicing in addition to pulling cable. A slip sleeve is a conduit sleeve that is larger than the main conduit, and slipped over an opening in a conduit run after the cable is in place. A gutter is a square, sheet-metal housing, which is placed over an opening in a conduit. Slip sleeves or gutters cannot be used for splices, but can be used in place of a pull box, are more economical to install, and will provide more space for pulling.
**TIA-569 Pathways & Spaces Standard**

**Other Pathway Types**

**Power pole specifications**
Power poles standard sizes accommodate **3m (10’), 3.7m (12’), and 4.6m (15’)** ceiling heights.

**Power pole installation**
Mount rigidly between the ceiling support channel grid and carpeted or tiled floor. Utility columns may be attached to the cross rails only if the rails are securely anchored to the main ceiling support channel.

**Poke-thru specification**
Poke-thru distribution is usually implemented by installing cable from the ceiling of the floor below, to a point where service is desired on that same floor, then “poking-thru” the floor to allow the cable to be attached to telecommunications device.

**Poke-thru installation**
Poke-thru installation should be done in accordance to all local and national codes, in strict accordance with the Underwriters Laboratories procedures found in the Fire Resistance Directory, and the poke-thru addendum 4 to ANSI/TIA/EIA -569-A.
The NEC and local codes take precedence when installing conduit, choices in conduit type shall be of the type permitted under the appropriate electrical codes.
TIA-569 Pathways & Spaces Standard

**Backbone**

- Backbone pathways consist of:
  - Interbuilding backbone pathways which extend between buildings
  - Intrabuilding backbone pathways which are contained within a building
Intrabuilding pathways consist of:

- Ceiling pathways
- Conduits
- Sleeves
- Slots
- Trays
TIA-569 Pathways & Spaces Standard

**Backbone**

- Slots
- Sleeves
- Trays
Sleeves –
An opening, usually circular, through the wall, ceiling, or floor to allow the passage of cables and wires.

Slots –
An opening through a wall, floor, or ceiling, usually rectangular, to allow the passage of cables and wires.
TIA-569 Pathways & Spaces Standard

Firestopping
TIA-569 Pathways & Spaces Standard

New Version!

– New revision work has been going on for past year
  • Reference for all premise standards
  • No longer specific to commercial buildings

– New revision just approved for publication as ANSI/TIA-569-C

– Other Changes include
  • Removed 60% fill max limit for furniture pathways for growth; only recommends initially designing to 40% fill
  • Power & noise separation apply to all applications; no new recommendations for 10Gb/s applications
TIA-569 Pathways & Spaces Standard
Accommodating New ASHRAE Guidelines

– TIA-569-C draft was almost complete when ASHRAE changed guidelines

– Two phase approach to including changes
  1. Added new class names editorially to TIA-569-C
     – No change to requirements for TIA-569-C
  2. Working on addendum to harmonize
     – Will be TIA-569-C.1
     – May be complete by end of year
TIA-569 Pathways & Spaces Standard

- ASHRAE changes to Thermal Guidelines for Data Processing Environments
  - Class 1 & 2 now A1 & A2
  - Two new classes, A3 & A4
  - A1, A2, A3 & A4 have allowable & recommended ranges
    - No change with A1 & A2
    - Expanded allowable range for A3 & A4
  - Class 3 & 4 replaced by Class B & C with no changes

Table 3. 2011 and 2008 Thermal Guideline Comparisons

<table>
<thead>
<tr>
<th>2011 classes</th>
<th>2008 classes</th>
<th>Applications</th>
<th>IT Equipment</th>
<th>Environmental Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>1</td>
<td></td>
<td>Enterprise servers, storage products</td>
<td>Tightly controlled</td>
</tr>
<tr>
<td>A2</td>
<td>2</td>
<td>Datacenter</td>
<td>Volume servers, storage products, personal computers, workstations</td>
<td>Some control</td>
</tr>
<tr>
<td>A3</td>
<td>NA</td>
<td></td>
<td>Volume servers, storage products, personal computers, workstations</td>
<td>Some control</td>
</tr>
<tr>
<td>A4</td>
<td>NA</td>
<td></td>
<td>Volume servers, storage products, personal computers, workstations</td>
<td>Some control</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>Office, home, transportable environment, etc.</td>
<td>Personal computers, workstations, laptops, and printers</td>
<td>Minimal control</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>Point-of-sale, industrial, factory, etc.</td>
<td>Point-of-sale equipment, ruggedized controllers, or computers and PDAs</td>
<td>No control</td>
</tr>
</tbody>
</table>
ASHRAE changes to Thermal Guidelines for Data Processing Environments
Other Standards and TIA-569

Because ANSI/TIA-569-C is now a generic reference for pathways, specific requirements unique to an application will be specified in the application standard.

For example, specific pathway and spaces requirements for commercial buildings will be specified in ANSI/TIA-568-C.1.

Specific pathway and spaces requirements for healthcare facilities will be specified in ANSI/TIA-1179.

Let’s take a look!
TIA-1179 Healthcare Facilities Standard

Healthcare vs. Premises

- Broader scope of application-specific IP devices
- Sensitive installation environment
- Larger pathways
- Larger Telecom Rooms
- Greater Workstation densities
TIA-1179 Healthcare Facilities Standard

**Unique Cabling Challenges**

- Redundant and high-density pathways (conduits, cable tray)
- High-levels of EMI, high temperature, chemicals and gasses may be present
- Cable selection dependent on attributes to comply with atmospheric conditions
  - Cable selection affects pathways
- Application-specific, high termination work area densities
- Stringent codes and regulations
Pathway Guidelines

- Pathways should not compromise operation of the facility
- Enclosed pathway systems -- in air handling spaces to meet Infection Control Requirements (ICR)
- Segregation of cables for different networks & applications (due to safety protocols)
TIA-1179 Healthcare Facilities Standard

**Entrance Facilities (EF) & Equipment Rooms (ER)**

- Route diversity - two separate pathways from the entrance facility to the equipment room
- Demarcation point of outside access providers may be determined by federal or local regulations.
- Accommodation of other systems may increase size (BAS, nurse call, security, CATV, biomedical systems)
- Twice the size of a data/telecommunications closet (allowing for future double growth rate)
TIA-1179 Healthcare Facilities Standard

Telecommunications Rooms (TR) and Telecom Enclosures (TE)

- Non-telecommunications services (i.e. gasses, fluids) not allowed
- Larger TR than office building -- 12m² (130 ft²) or larger
- TE serves smaller floor area or where TR is not allowed (be aware of exposure of magnetic fields, radiation, chemicals, etc)