

## STANDARDS OVERVIEW

The latest addition of the Residential Telecommunications Cabling Standard is ANSI/TIA/EIA-570-A. This revision no longer incorporates light commercial buildings and no longer classifies residential cabling by the number of access lines. This document is a member of a family of standards including ANSI/TIA/EIA-568-A\*, ANSI/TIA/EIA-569-A, ANSI/TIA/EIA-606-A, ANSI/TIA/EIA-607, and ANSI/TIA/EIA-758 and terminology between these standards is similar.

### PURPOSE

- Standardize requirements for Residential Cabling based on facilities that are necessary for existing and emerging Telecommunications Services
- Specifies grades of cabling for expected services
- Intended to support voice, data, video, multimedia, home automation systems, environmental control, security, audio, television, sensors, alarms and intercom

### SCOPE

- Applies to telecommunications cabling systems, pathways, and spaces for single and multi-tenant buildings
- Applies to telecommunications cabling within and between structures. This includes cabling within the living space and backbone cabling
- Specifications addressed:
  - Grades of residential cabling
  - Single family units/ Multi-tenant units:
    - Demarcation point
    - Auxiliary Disconnect Outlets (ADO)
    - ADO cable
    - Distribution Devices
    - Recognized cables
    - Topology
    - Pathways
    - Telecommunication outlet/connectors
    - Backbone pathways
    - Recognized backbone cables
  - Installation practices
  - Testing requirements

### CABLING ELEMENTS

- Single Residential Unit:
  - Demarcation point
  - Auxiliary Disconnect Outlet /Cable
  - Distribution Device
  - Outlet Cable:
    - Recognized cables
    - Topology for outlets
    - Cabling for fixed devices
    - Outlet cable pathways
  - Telecommunications outlet / connector
  - Equipment cords, patch cords, and jumpers
- Multi-tenant /Campus Infrastructure:
  - Entrance facility
  - Main terminal space
  - Equipment room
  - Floor serving terminal
  - Backbone pathways
  - Backbone cabling:
    - Recognized cables
    - Topology
    - Interbuilding cabling protection

### ANNEX INFORMATION

- Annex A (Normative):
  - Optical fiber connector performance specifications
- Annex B (Normative):
  - Field Test Requirements
    - Reference to testing perimeter from ANSI/TIA/EIA-568-A, TIA/EIA TSB67 and ANSI/TIA/EIA-568-A-5\*
- Annex C (Informative):
  - Cabling Residential Buildings
    - Information on planning, constructing and components of a residential system
- Annex D (Informative):
  - Bibliography and references

\*Since the Publication of '570-A, '568-A Standard has been revised ('568-B Series) and was released for publication.

## GRADES OF RESIDENTIAL CABLING

### GRADE 1:

Provides a generic cabling system that meets the minimum requirements for telecommunications services. Typical applications consist of telephone, fax, modem and CATV services including cable modem and DSL services.

#### CABLING REQUIREMENTS:

One (1) 100  $\Omega$  4-pair UTP cable and connectors that meets or exceeds the requirements for Category 3 (Category 5 recommended)

One (1) 75  $\Omega$  coaxial cable Series 6 or 11 (Quad shield recommended)

### GRADE 2:

Provides a generic cabling system that meets the requirements for basic, advanced and multimedia telecommunications services. Typical applications consist of telephone, fax, modem, CATV, cable modem, and DSL services.

#### CABLING REQUIREMENTS:

Two (2) 100  $\Omega$  4-pair UTP cable and connectors that meet or exceed the requirements for Category 5 (Category 5e recommended)

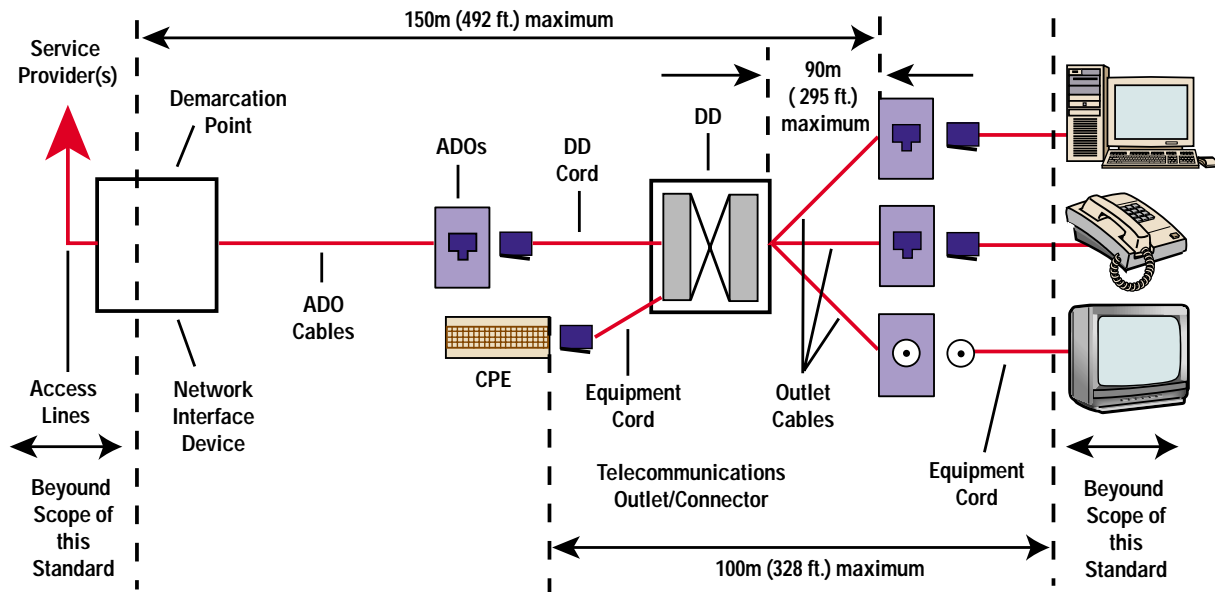
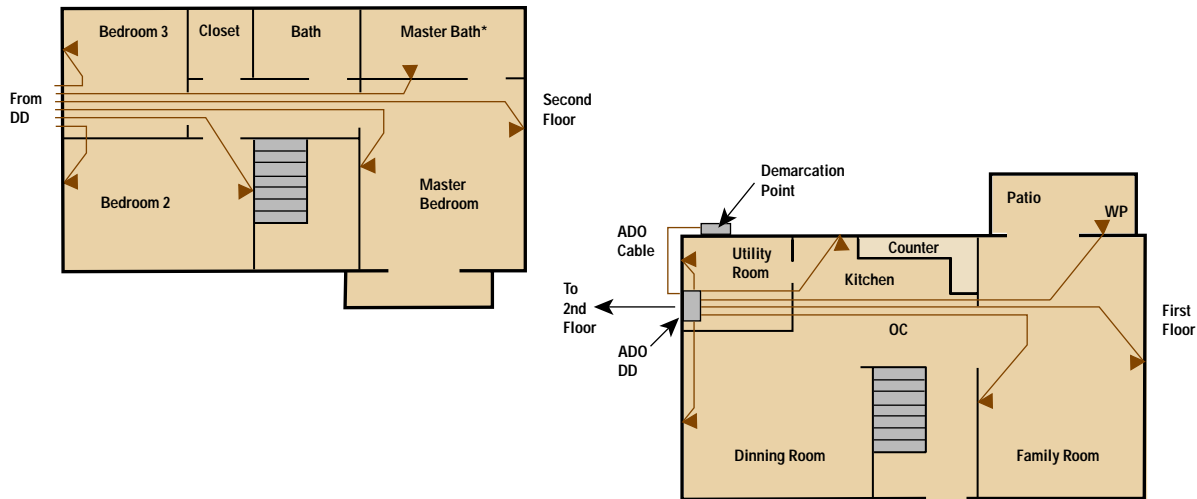
Two (2) 75  $\Omega$  coaxial cable Series 6 or 11 (Quad shield recommended)

Cabling	Grade 1	Grade 2
4-pair UTP	One (1) Category 3 Category 5 recommended	Two (2) Category 5 Category 5e recommended
75 $\Omega$ coaxial	One (1) Series 6 Quad shield recommended	Two (2) Series 6 Quad shield recommended
Optical fiber		Optional
<b>Services</b>		
Telephone	X	X
Television	X	X
Data	X (limited)	X
Multimedia		X

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## SINGLE RESIDENTIAL UNIT

The following terms detail a residential cabling system from entrance of the home to equipment.



**Demarcation Point:** This is the interface between the service provider and the customer's cabling and equipment. This is usually installed and provided by the service provider in the form of a NID (Network Interface Device).

- When cabling distances from the Demarcation point and the furthest outlet exceeds 150m (492 ft.) the service provider shall be contacted in the design stages in order to accommodate transmission requirements

**Auxiliary Disconnect Outlet Cable:** Cable that extends from the demarcation point to the ADO. (Not necessary if demarcation point is co-located with the Distribution Device).

**Auxiliary Disconnect Outlet (ADO):** Provides a means of disconnect within the customer's distribution device and the incoming

services provided through the ADO cable (Not necessary if demarcation point is co-located with the DD).

**Distribution Device (DD):** A DD is a cross-connect facility used for the termination and connection of outlet cables, DD cords, equipment cords, and ADO cables (when used). The DD is used to connect services to the residence and to facilitate moves, adds and changes of the premise cabling within the residence. Electrical ground shall be within 1.5m (5 ft.) and installed in accordance to applicable codes.

- Note: Electrical power may be required at the DD. It is recommended that a 15A 120VAC non-switched duplex outlet be installed within 1.5m (5 ft.) of the DD

### Space Allocation Guidelines for the DD and Associated Equipment

Number of Outlet/Connectors	Grade 1	Grade 2
1 to 8	410mm (16 in.) wide 610mm (24 in.) high	815mm (32 in.) wide 915mm (36 in.) high
9 to 16	410mm (16 in.) wide 915mm (36 in.) high	815mm (32 in.) wide 915mm (36 in.) high
17 to 64	410mm (16 in.) wide 1220mm (48 in.) high	815mm (32 in.) wide 1220mm (48 in.) high
More than 64	410mm (16 in.) wide 1525mm (60 in.) high	815mm (32 in.) wide 1525mm (60 in.) high

**Outlet Cable:** In commercial applications this is known as the horizontal cabling. The outlet cable provides the transmission path from the DD to the telecommunications outlet/connector.

- Maximum length of 90m for permanent link (100m channel which includes patch cords/ jumper wire and equipment cords)
- Recognized cables:
  - 4-pair 100  $\Omega$  UTP (ANSI/TIA/EIA-568-A, ANSI/TIA/EIA-568-A-5)\*
  - 50/125 $\mu$ m multi-mode fiber (ANSI/EIA/TIA-492AAAC)
  - 62.5/125 $\mu$ m multi-mode fiber (ANSI/EIA/TIA-492AAAA-A)
  - Single-mode fiber (ANSI/EIA/TIA-492CAAA) (intended only for special case future applications)
  - Series 6 coaxial (SCTE IPS-SP-001)
- Outlet cabling shall be placed in a star topology
- Fixed devices such as intercom, security system keypads, sensors and smoke detectors may be hard wired to the fixed device controller. Fixed devices may be cabled using a star, loop, or daisy chain topology according to the manufacturers recommendations
- A minimum of one outlet location shall be cabled within the following rooms:
  - Kitchen
  - Each bedroom
  - Family/great room
  - Den/study/library

- An outlet should be provided within each room and additional outlets should be provided within unbroken wall spaces of 3.7m (12 ft.)

- Maximum distance between outlets along the floor line in any wall space shall be 7.6m (25 ft.)

#### Outlet Cable Pathways:

- New construction shall have pathways that conceal the cabling from the DD to the telecommunications outlet/connector
- Reconstruction should have pathways that conceal the cabling from the DD to the telecommunications outlet/connector

#### Telecommunications Outlet/Connector:

- These shall be compatible with the outlet cable provided at the location
- Application specific devices shall be placed external to the telecommunications outlet/connector

#### Equipment Cords, Patch Cords, and Jumpers:

- Equipment cords extend from the
  - DD to the electronic equipment, or
  - Telecommunications outlet/connector to the terminal/equipment connector
- For the channel a total length of 10m (33 ft.) is allowed for the equipment cords and patch cords or jumpers

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## MULTI-TENANT/CAMPUS INFRASTRUCTURE

### GENERAL INFORMATION

Earthing and bonding shall be performed in accordance with applicable electrical codes. ANSI/TIA/EIA 607 provides additional information.

The demarcation point in multi-tenant buildings may be located at a minimum point of entry or in the individual tenant space. The building owner or agent shall control shared use space.

**Entrance Facility:** Consists of the telecommunications service entrance to the building, including the entrance point through the wall and continuing to the main terminal space or equipment room.

- For more information on entrance facilities see ANSI/TIA/EIA-569-A

**Main Terminal Space (MTS):** May

- Be colocated with the Entrance Facility
- Contain active equipment
- House the demarcation points, ADO cables, and backbone cables
- Contain pathways, protection devices, and any necessary equipment to provide a connection to service providers lines

**Equipment Room:** May include Entrance Facility, main Terminal space, floor serving terminal, PBX, server, satellite receivers, modulators, high speed internet equipment

- Equipment Rooms have specific requirements for power, heating, ventilation and air conditioning

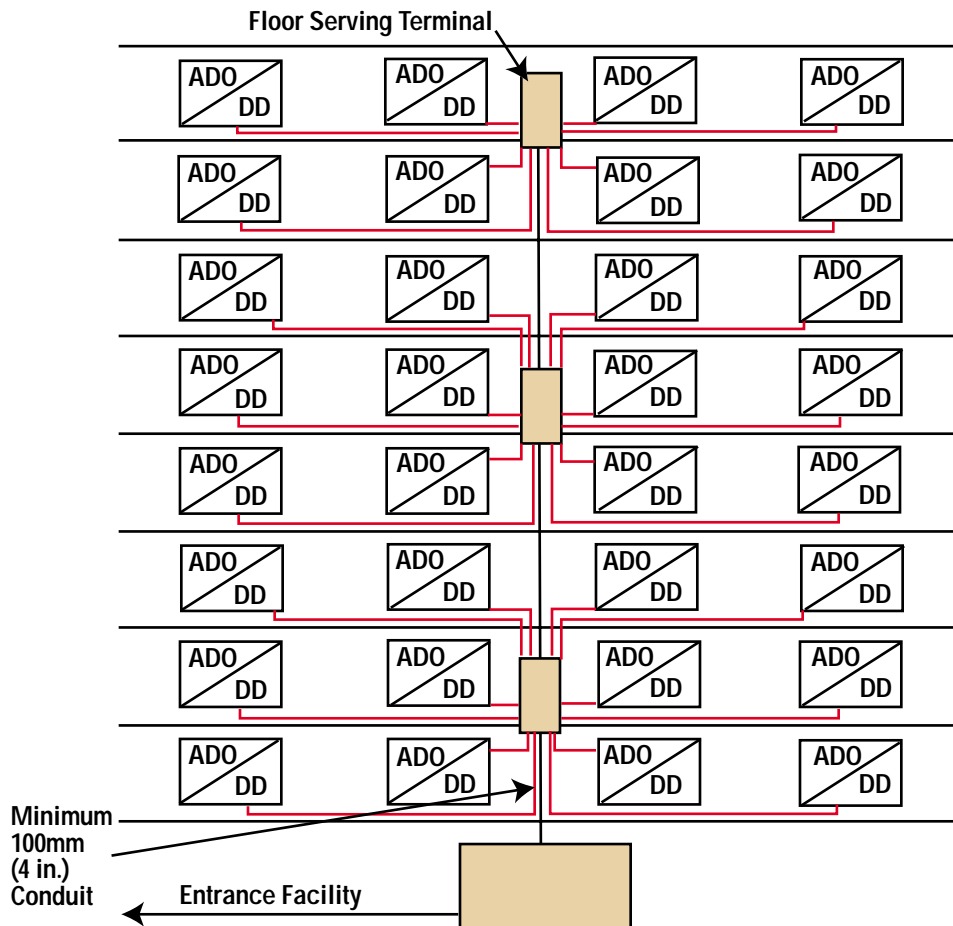
For more information on equipment rooms see ANSI/TIA/EIA- 569-A

**Floor Serving Terminal:** The space where backbone cables and ADO cables terminate, may contain active equipment, and

- Should be located on every floor or
- Every third floor, serving that floor and the floors above and below

**Backbone Pathway:** Consideration must be given for spare capacity for future media additions or modifications.

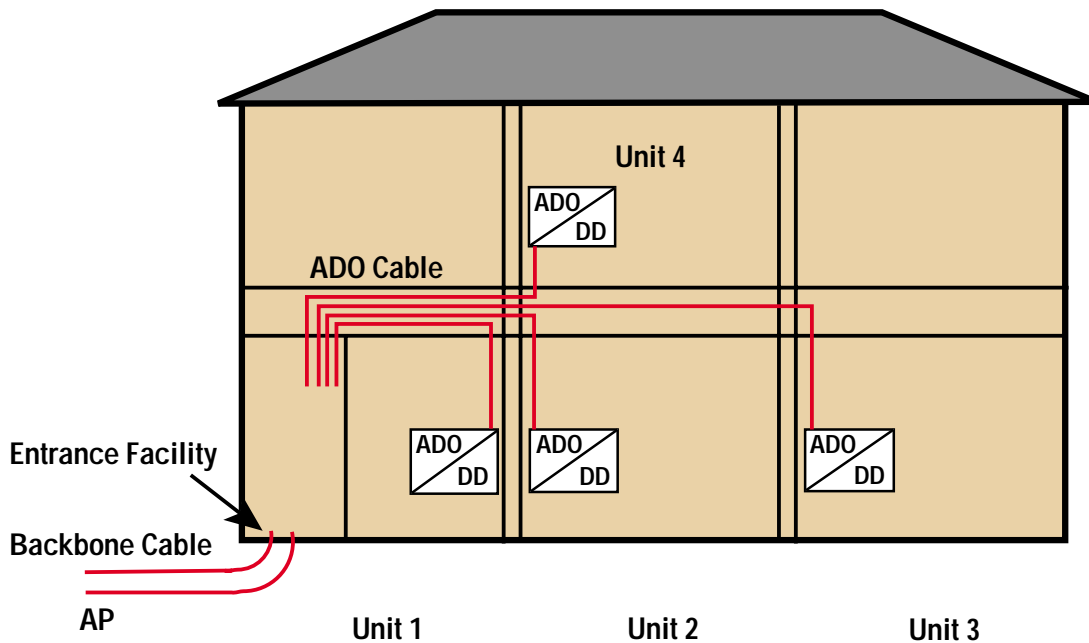
- Infrastructure back bone pathways:
  - Typically uses conduits, slots, sleeves or cabletray
  - Minimum of one 100mm (4 in.) trade size conduit shall be provided for each pathway which extends from the MTS to a floor serving terminal space



— Where cable bundles with an equivalent diameter of 25mm (1 in.) or less extend through each apartment closet, a minimum of one 40mm (1 1/2 in.) trade size conduit shall be provided for the backbone pathway

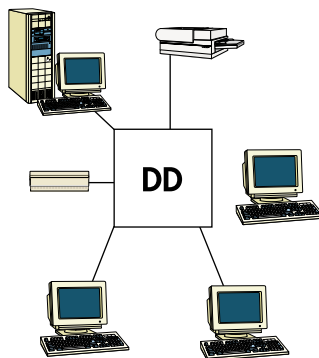
**Interbuilding Telecommunications Backbone Pathway:** Provide a means of connecting separate buildings and consist of:

- Aerial
  - Buried
  - Underground
  - Tunnel
- For more information refer to ANSI/TIA/EIA-758



**Backbone Cabling:**

- Recognized cables:
  - 100  $\Omega$  twisted pair
  - 50/125 $\mu$ m and 62.5/125 $\mu$ m multi-mode optical fiber
  - Single-mode fiber
- Topology:
  - Hard-line coaxial
  - Series 6 and 11 coaxial
  - Twisted pair and fiber should be a star topology
  - Coaxial should be a star or bus topology



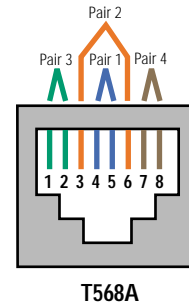
## COMPONENT SPECIFICATIONS

### GENERAL INFORMATION

Cable and associated components shall be suitable for the environment in which they are installed.

**UTP Cable and Connectors:** Shall meet all specifications including transmission and reliability requirements for the appropriate category as contained in ANSI/TIA/EIA-568-A and ANSI/TIA/EIA-568-A-5\*.

- All UTP cables shall be terminated in an 8 position T568A telecommunications outlet/connector



**Optical Fiber Cables** Shall meet all specifications as included in the following table:

Optical Fiber Type	Wavelength (nm)	Maximum Attenuation (dB/km)	Minimum Information Transmission Capacity (MHz•km)
50/125	850	3.5	500
	1300	1.5	500
62.5/125	850	3.5	160
	1300	1.5	500
Single-Mode Intra-building Cable	1310	1.0	N/A
	1550	1.0	N/A
Single-Mode Inter-building Cable	1310	0.5	N/A
	1550	0.5	N/A

Note: the information transmission capacity of the fiber, as measured by the fiber manufacturer, can be used by the cable manufacturer to demonstrate compliance with this requirement

- To prevent damage to 8 position outlet/connectors all 6 position plugs shall have a 6 to 6.2mm tab width
- 2 and 4 fiber cables intended for outlet or Intra-building cabling shall support a bend radius of 25.4mm (1 in.) under no load conditions and a bend radius of 50.8mm (2 in.) when being pulled through a pathway at 222 N (50 lbf)
- Intra-building, backbone optical fiber shall not exceed the manufacturers bend radius recommendation or if not known shall not exceed 15 times the cable's outside diameter when under load or 10 times when at rest
- Interbuilding, backbone optical fiber shall be of a water block construction with a minimum pull strength of 2670 N (600 lbf)
- Interbuilding, backbone optical fiber shall not exceed the manufacturers bend radius recommendation or if not known shall not exceed 20 times the cables outside diameter when under load or 10 times when at rest
- For connector orientation and acceptable connector style see ANSI/TIA/EIA-568-B.1

#### Coaxial cable:

- Outlet cables shall be either 75  $\Omega$  Series 6 or 11 coaxial cable
- Outlet cables shall terminate with F-type connectors
- Backbone cables shall be 75  $\Omega$  Series 6, 11 or hard-line trunk cable
- Series 6 and 11 shall terminate with F-type connectors, hard-line trunk cables shall terminate with either F-type or N-type connectors
- Impedance matching 75  $\Omega$  termination caps should be attached to each unused coaxial outlet/connector and at each unused energized coaxial connector at the connecting block, splitter, amplifier or other electronic elements

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## FIELD TESTING REQUIREMENTS (ANNEX B–NORMATIVE)

### GENERAL INFORMATION

Transmission performance depends on cable characteristics, connecting hardware, patch cords, and cross-connect wiring, the total number of connections and the care with which they are installed and maintained. All field test instruments shall be calibrated and maintained at intervals specified by the manufacturer.

**Administration:** All test results shall be recorded and provided to the building owner or agent.

#### 100 $\Omega$ UTP Cabling:

- Category 3 and 5 shall meet or exceed the testing requirements in TIA/EIA TSB-67

- Category 5e cabling shall meet or exceed the testing requirements contained in ANSI/TIA/EIA-568-A-5\*
- Backbone cabling shall be tested for wiremap and length

### Test Requirements

	Category 3 or 5 (TSB-67)	Category 5 (Gigabit Applications) (TSB-95)	Category 5e (ANSI/TIA/EIA-568A-5)
Wiremap	X	X	X
Length	X	X	X
Attenuation	X	X	X
Near End Cross-Talk (NEXT)	X	X	X (3dB over CAT 5)
PowerSum NEXT			X
Equal Level Far End Cross-Talk (ELFEXT)		X	X
PowerSum ELFEXT			X
Return Loss		X	X (3dB over CAT 5)
Propagation Delay		X	X
Delay Skew		X	X

#### Optical Fiber cabling:

- Field testers for multi-mode optical fiber shall meet the requirements as specified in ANSI/EIA/TIA-526-14A, Method B, One Jumper Reference
- Field testers for single-mode optical fiber shall meet the requirements as specified in ANSI/EIA/TIA-526-7, Method A.1, One Jumper Reference
- Field tests required for Residential cabling include
  - Length
  - Polarity
  - Attenuation

#### 75 $\Omega$ Coaxial Cabling:

- Minimum Test results for 75-ohm coaxial cable shall include
  - Continuity of center conductor and shield
  - Attenuation
  - Length
  - Local, state, and federal required testing

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