Preparing Activity: NAVFAC Superseding
UFGS-27 05 14.00 10 (April 2006)
UFGS-27 41 16.00 10 (April 2006)
UFGS-27 54 00.00 20 (April 2006)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
****

SECTION TABLE OF CONTENTS

DIVISION 27 - COMMUNICATIONS

SECTION 27 05 13.43

TELEVISION DISTRIBUTION SYSTEM

05/20

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Television Distribution System
1.2.2 Headend
1.2.3 Distribution System
1.2.4 Cable
1.3 SYSTEM DESCRIPTION
1.3.1 Headend
1.3.2 Distribution System
1.3.3 Cable
1.3.4 System Components
1.3.4.1 System Bandwidth
1.3.5 System Performance
1.3.5.1 Receiver Termination Signal Level
1.3.5.2 Distribution System
1.3.5.3 System Tolerance
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Wiring Diagrams and Installation Details
1.5.2 Television Distribution System Loss Calculations
1.5.3 Operational Test Plan
1.5.4 Operational Test Procedures
1.5.5 Connector Installation

PART 2 PRODUCTS

2.1 ELECTRONIC EQUIPMENT
2.2 HEADEND EQUIPMENT
2.2.1 Headend Amplifiers
2.2.2 Attenuators

2.2.3 Power Supplies
2.3 DISTRIBUTION EQUIPMENT
2.3.1 Distribution Amplifiers
2.3.1.1 Trunk Amplifiers
2.3.1.2 Bridging Amplifiers
2.3.1.3 Fiber Optic Amplifiers
2.3.1.4 Fiber Optic Receiver Distribution Amplifier
2.3.2 Cables and Associated Hardware
2.3.2.1 Trunk Cable
2.3.2.2 Feeder Cable
2.3.2.3 Drop Cable
2.3.2.4 Low Voltage Patient Television Drop Cable
2.3.3 Category 6 Drop Cable
2.3.4 Category 6 Patch Cords
2.3.5 Terminators
2.3.6 Splitters/Combiners
2.3.7 Fiber Optic Couplers
2.3.8 Line Taps
2.3.9 Coaxial Outlets
2.3.10 Coaxial Connectors
2.3.11 Tilt Compensator
2.3.12 Distribution Hubs
2.3.13 Baluns
2.4 GROUNDING AND BONDING
2.4.1 Grounding Block
2.5 BACKBOARDS

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Distribution System
3.1.1.1 Raceway
3.1.1.2 Grounding System
3.1.1.3 Trunk, Feeder, and Drop Cable
3.1.1.4 Splitters, Directional Couplers, Attenuators, Amplifiers
3.2 FIELD QUALITY CONTROL
3.2.1 System Pretest
3.2.2 Acceptance Tests
3.3 OPERATION AND MAINTENANCE MANUALS

-- End of Section Table of Contents --

****

USACE / NAVFAC / AFCEC / NASA	**UFGS-27 05 13.43 (May 2020)**

Preparing Activity: NAVFAC	**Superseding** **UFGS-27 05 14.00 10 (April 2006)** **UFGS-27 41 16.00 10 (April 2006)** **UFGS-27 54 00.00 20 (April 2006)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023

****

SECTION 27 05 13.43

TELEVISION DISTRIBUTION SYSTEM

05/20

****

NOTE: This guide specification covers the requirements for procurement and testing of a television distribution system for housing units and for other jobs where the local cable television company provides service to the facility.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

****

****

NOTE: This guide specification covers the usual methods and frequently used alternatives for providing conventional television distribution systems for all types of facilities, including medical facilities. It does not include unusual methods or alternatives which may be required for special applications. The documentation is intended to be used in conjunction with other guide specifications required by the design. This specification includes provisions for a television distribution system with the headend amplifier provided by the Contractor. Coordinate with the

local television serviceprovider as to who will provide the headend amplifier. Modify this specification accordingly if the headend amplifier is provided by the local television service provider.

Use Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM, for empty conduit television distribution systems instead of this section. Include the backboard, outlet, faceplate, and other special requirements in that section.

****

****

NOTE: This UFGS must be used in conjunction with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM to specify conduit, boxes, outlets, and backboards.

****

****

NOTE: As a minimum, the Designer shall provide the television distribution system loss and tilt compensation calculations using manufacturer's data and including the amplifier sizes and system requirements to the EFA/EFD. Project drawings shall show the cable system, grounding, homeruns, and passive and active devices in a one-line diagram. Where television mounting brackets are required on a job, provide bracket requirements and details in architectural drawings and specifications.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2	(2023) National Electrical Safety Code
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-83-596	(2021) Indoor Optical Cable

NATIONAL CABLE AND TELECOMMUNICATIONS ASSOCIATION (NCTA)

NCTA RP	(1989) NCTA Recommended Practices for Measurements on Cable Television Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2023) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-568.3	(2022e) Optical Fiber Cabling Components Standard

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

47 CFR 76.605	Technical Standards

UNDERWRITERS LABORATORIES (UL)

UL 969	(2017; Reprint May 2023) UL Standard for Safety Marking and Labeling Systems
UL 1581	(2001; Reprint Jan 2023) UL Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 1666	(2007; Reprint Sep 2021) UL Standard for Safety Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts

1.2 DEFINITIONS

1.2.1 Television Distribution System

The television distribution system system, commonly referred to as cable television, is a network of cables, headend, electronic and passive components that process and amplify television (TV) signals for distribution of adequate signals to each receiver from the headend equipment to the individual television outlets and provides distortion-free signal to TV sets by isolating each receiver from the

system an providing the proper amount of signal to each set.

1.2.2 Headend

The connection point between television distribution system equipment and equipment provided by the local television service provider.

1.2.3 Distribution System

Distribution system transports and delivers adequate signals to each receiver. Provides distortion-free signal to TV sets by isolating each receiver from the system and by providing proper amount of signal to each set.

1.2.4 Cable

****
NOTE: Delete the first bracketed item for single housing units and small systems where trunk and feeder cables are not used. Edit the last sentence accordingly.
****

[Trunk and feeder cables are low-loss cables used to transport the desired signal from the headend equipment to the telecommunications room in the area to be served. These cables are used to transport signal from the [telecommunications room][headend equipment] into close proximity to a number of user locations in excess of 60 meters 200 feet from the [telecommunications room][headend equipment].]Drop cables are used to transport the desired signal used from the [telecommunications closet room][headend equipment] to the wall outlet.

1.3 SYSTEM DESCRIPTION

1.3.1 Headend

Contractor shall provide interior equipment up to headend [and including the main amplifier] located at the interior television distribution system [backboard][cabinet][rack].

1.3.2 Distribution System

****
NOTE: Choose the bracketed item corresponding to the television distribution system design.
****

[[Distribution system shall be star topology with each outlet connected to a telecommunications room with a feeder cable or a drop cable and each telecommunications room connected to the headend equipment with a [coaxial][fiber optic] trunk cable][Distribution system shall be star topology with each outlet connected to headend equipment with the drop cable].

][Distribution system shall be a star topology utilizing a coaxial trunk cable and category [6] UTP drop cables with the exception of low voltage patient television outlets. Low voltage patient television outlets shall be connected with coaxial drop cables.

]1.3.3 Cable

****
NOTE: Delete the first bracketed item for single housing units and for small systems where trunk and feeder cables are not used. Edit the last sentence accordingly.
****

[Provide trunk cables to transport the desired signal from the headend equipment to the telecommunications room in the area to be served.][Provide [trunk] [feeder] cables to transport signal from the [headend equipment][telecommunications room] to user locations for cable lengths in excess of 60 meters 200 feet from the [headend equipment][telecommunications room].]Provide drop cables to transport the desired signal from the [telecommunications room][headend equipment] to the outlet.

1.3.4 System Components

****
NOTE: Delete the first bracketed item for medical projects
****

System shall provide high quality TV signals to all outlets[with a return path for interactive television and cable modem access]. Provide any combination of items specified herein to achieve required performance, subject to approvals, limitations, acceptance test, and other requirements specified herein. System shall include amplifiers, splitters, combiners, line taps, cables, outlets, tilt compensators and all other parts, components, and equipment necessary to provide a complete and usable system.

1.3.4.1 System Bandwidth

a. Downstream: 50-1000 MHz minimum.

b. Upstream 5-40 MHz minimum.

1.3.5 System Performance

System shall be in compliance with 47 CFR 76.605.

1.3.5.1 Receiver Termination Signal Level

Each termination for a TV receiver must have a minimum signal level of 0 decibel millivolts (dBmV) (1000 microvolts) at 55 MHz and of 0 dBmV (1000 microvolts) at 1000 MHz and a maximum signal of 15 dBmV or a level not to overload the receiver for the entire system bandwidth.

1.3.5.2 Distribution System

a. Modulation distortion at power frequencies: 4 percent or less hum distortion;

b. Composite third order distortion for:

(1) CW carriers: 53 dB.

(2) Modulated carriers: 59 dB.

c. Subscriber terminal isolation: 18 dB or greater.

d. Carrier to second order beat ratio: 60 dB.

e. Amplitude characteristic:within a range of plus or minus 2 decibels from 0.75 MHz to 5.0 MHz above the lower boundary frequency of the cable television channel, referenced to the average of the highest and lowest amplitudes within these frequency boundaries.

f. Visual, aural carrier level, 24-hour variation: 47 CFR 76.605, subpart (a), rules (4), (5), and (6).

g. Frequency determination: 47 CFR 76.605, subpart (a), rules (1),(2), and (3).

1.3.5.3 System Tolerance

The system must not show a serious loss of carrier to noise when the system levels are lowered 3 dB below normal or a significant distortion when the levels are increased 3 dB above normal, as observed on a TV set located at the far end extremities of the system.

1.4 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.
****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Television Distribution System Wiring Diagrams And Installation Details; G[, [_____]]

Television Distribution System Components; G[, [_____]]

SD-03 Product Data

Attenuators; G[, [_____]]

[Amplifiers, including [Headend,]Trunk, Bridging, and Distribution; G[, [_____]]

] Cables, including [Trunk, Feeder, and]Drop; G[, [_____]]

Terminators; G[, [_____]]

Splitters/Combiners; G[, [_____]]

[Fiber Optic Couplers; G[, [_____]]

] Line Taps; G[, [_____]]

Coaxial Outlets; G[, [_____]]

Coaxial Connectors; G[, [_____]]

Tilt Compensator; G[, [_____]]

[Distribution Hubs; G[, [_____]]

][Baluns; G[, [_____]]

][Grounding Block; G[, [_____]]

] Submittals for each manufactured item must be the current manufacturer's descriptive literature of catalog products, equipment drawings, diagrams, performance and characteristics curves, and catalog cuts.

SD-05 Design Data

Television Distribution System Loss Calculations; G[, [_____]]

SD-06 Test Reports

Operational Test Plan; G[, [_____]]

Operational Test Procedures; G[, [_____]]

System Pretest; G[, [_____]]

Acceptance Tests; G[, [_____]]

SD-08 Manufacturer's Instructions

Connector Installation; G[, [_____]]

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals; G[, [_____]]

Submit Data Package 5 for each component in accordance with requirements of Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.5 QUALITY ASSURANCE

1.5.1 Wiring Diagrams and Installation Details

Illustrate how each item of equipment functions in the system and include an overall system schematic indicating the relationship of television distribution system units on one diagram. Drawings must include wiring diagrams and installation details of equipment indicating proposed locations, layout and arrangements, and other items that must be shown to ensure coordinated installation.

1.5.2 Television Distribution System Loss Calculations

****

NOTE: Use second bracketed option in the first sentence for systems that include amplifiers.

****

Calculations must verify that the system does not exceed the loss values specified in dBmV at the [receiver terminations][input of all active devices and the receiver terminations]. Provide a drawing displaying all distribution network calculations. The drawing should accurately show taps, splitters, outlets, and the type and length of all [trunk, feeder, and]drop cables. The drawing must show how many taps, splitters, or outlets are served by each tap or splitter.

1.5.3 Operational Test Plan

****

NOTE: The test methods in Parts I and II of the NCTA recommended practices are used to establish proper operating parameters during initial setup and alignment. They are also used to verify proper operation of a unit following a needed repair. Only a few of the tests can be used during normal operations of a television distribution system without interruption to the system or the specific channel under test.

****

Test plan must define tests required to ensure that the system meets technical, operational, and performance specifications. Test plan must be based on NCTA RP and be in accordance with FCC proof of performance requirements. Test plan must include plan for testing for signal leakage. Provide test requirements and guidelines.

1.5.4 Operational Test Procedures

Use test plan and design documents to develop test procedures. Procedures must consist of detailed instructions for a test setup, execution, and evaluation of test results.

1.5.5 Connector Installation

Provide manufacturer's instructions for installing connectors.

PART 2 PRODUCTS

****

NOTE: This specification is written for bidirectional devices operating from 5 to 40 MHz and from 50 to 1000 MHz. The lower end, 5 to 40 MHz provides an active return path and allows ordering of pay-per-view, cable modem and communication back to the television system service provider. The 50 to 1000 MHz provides one-way communication to the user's service. Passive devices are rated 1000 MHz since they require more work if upgrading of the system is required in the future. Coordinate with the television service provider to ensure these specifications meet their minimum requirements for television service.

****

2.1 ELECTRONIC EQUIPMENT

Electronic components of similar type must be produced and designed by the same manufacturer as major components of the equipment and must have the manufacturer's name and model permanently attached. Equipment must function properly as a complete integrated system. Equipment must be shielded. The system must be designed to operate within 5 to 1000 MHz bandwidth using 1000 MHz passive devices and a minimum of 1000 MHz active devices.

2.2 HEADEND EQUIPMENT

****

NOTE: Use the headend equipment paragraphs when the headend equipment is provided by the Contractor. Delete when provided by local cable television company.

****

2.2.1 Headend Amplifiers

****

NOTE: Broadband amplifiers are used to amplify a number of TV channels. Single-channel amplifiers are used to amplify a single TV channel.

****

****

NOTE: Delete first bracketed option for medical projects.

****

Provide broadband distribution amplifiers. Amplifiers must amplify broadband signals from 40 to 1000 MHz[and provide an amplified return path for signals from 5 to 40 MHz for 75 ohms impedance]. Amplifiers must be bidirectional with variable slope and gain control.

2.2.2 Attenuators

Provide attenuators to equalize signal levels, when required. Variable attenuators are not permitted.

2.2.3 Power Supplies

Power supplies must contain a current limiter circuit to protect against short circuits on the radio frequency (RF) line. Provide overvoltage protection to protect solid state equipment from line surges and induced voltages, in accordance with IEEE C62.41.1 and IEEE C62.41.2.

2.3 DISTRIBUTION EQUIPMENT

****

NOTE: Delete paragraphs for distribution amplifiers when design calculations indicate they are not required.

****

[2.3.1 Distribution Amplifiers

****

NOTE: Delete bracketed option in last sentence for medical projects.

****

Distribution amplifiers shall be equipped for 75 ohms input and output impedance. Electronic equipment exposed to weather shall be equipped with weatherproof housings. Amplifiers shall be bidirectional with variable slope and gain control and shall amplify broadband signals from 50 to 1000 MHz[and provide an amplified return path for signals from 5 to 40 MHz for 75 ohms impedance].

2.3.1.1 Trunk Amplifiers

Trunk amplifiers shall have automatic level and slope control features.

2.3.1.2 Bridging Amplifiers

Bridging amplifiers shall be used to connect feeder cables to trunk cables.

[2.3.1.3 Fiber Optic Amplifiers

****

NOTE: Include the following paragraphs as needed when specifying a fiber optic trunk distribution

system to a coaxial sub-distribution system.
****

Provide fiber optic amplifiers in fiber optic backbone distribution systems as required to provide required optical power to fiber optic receivers.

][2.3.1.4 Fiber Optic Receiver Distribution Amplifier

Provide fiber optic receiver with integrated broadband distribution amplifier to receive the fiber optic video signal and distribute it to the coaxial cable sub-distribution system.

]]2.3.2 Cables and Associated Hardware

****
NOTE: For cable subject to moisture from flooding or to atmospheric contamination such as cable near coastal areas or in cities with significant air pollution, specify the same cable be protected by a black polyethylene jacket with a flooding or other water migration deterrent compound between the jacket and the aluminum shield. When this type of cable is required, add the requirement to the item specifying the jacket and insulation in the applicable cable paragraph(s).

For systems under 90 meters 295 feet from headend equipment to telecommunications room or from telecommunications room to communication closet, provide RG-11 coaxial trunk cable. For systems exceeding 90 meters 295 feet from headend equipment to telecommunications room or from telecommunications room to telecommunications room, consideration should be given to utilizing 625 series cable to reduce system losses. Edit paragraphs for type of cable required in job. Delete paragraphs for trunk and feeder cable for single family housing units and for small systems where only drop cables are used.
****

Cabling shall be UL listed for the application and shall comply with NFPA 70. Provide a labeling system for cabling as required by UL 969. Cabling manufactured more than 12 months prior to date of installation shall not be used.

2.3.2.1 Trunk Cable

[UL 1666. Provide trunk cable with an NFPA 70 rating of CATVR.

a. Provide RG-11 coaxial cable with the following characteristics:

(1) 14 AWG copper-clad steel center conductor.

(2) Gas injected foam polyethylene dielectric with nominal 7.11 mm 0.28 inches outer diameter.

(3) Bonded foil inner-shield and 60 percent aluminum braid[or quad

shield].

(4) 75 ohms impedance.

(5) 82 to 85 percent nominal velocity of propagation.

(6) Black PVC jacket

(7) Maximum attenuation characteristics:

MHz	DB/100 m ft
5	1.25 0.38
55	3.15 0.96
300	7.38 2.25
350	7.94 2.42
450	9.02 2.86
500	9.51 2.90
600	10.43 3.18
750	11.97 3.65
1000	14.27 4.35

b. Provide 625 Series cable with an NFPA 70 rating of CATVR and the following characteristics:

(1) Copper-clad aluminum center conductor

(2) Seamless aluminum tubing shield

(3) Expanded polyethylene dielectric

(4) 75 ohms impedance

(5) Nominal diameter over outer conductor: 15.88 mm 0.625 inches.

(6) Maximum attenuation at 20 degrees C and 1000 MHz: 6.79 dB/100m 2.07 dB/100 feet

(7) Black medium density polyethylene jacket

(8) Nominal 87 percent velocity of propagation

][Provide fiber optic trunk cable as indicated and in accordance with ICEA S-83-596, TIA-568.3, UL 1666 and NFPA 70. Provide the number of strands indicated, (but not less than 6 strands between the main telecommunication room and each of the other telecommunication rooms), of single-mode, tight buffered fiber optic cable as recommended by the television distribution system manufacturer.

][2.3.2.2 Feeder Cable

****
NOTE: CATVP is plenum rated cable. Provide type CATVP plenum rated cabling in ducts, plenums and other air-handling spaces. Choose the first bracketed option for CATV cable and the second bracketed option for CATVP cable throughout. Delete feeder cable paragraphs for single family housing units and for small systems where only drop cables are used.
****

UL 1581, provide RG-11 coaxial trunk cable with an NFPA 70 rating of [CATV][CATVP] and the following characteristics:

a. 14 AWG copper-clad steel center conductor.

b. [Gas injected foam polyethylene][Foam FEP] dielectric with 7.11 mm .28 inches nominal outer diameter.

c. Bonded foil inner-shield and a minimum of 60 percent aluminum braid[or quad shield].

d. 75 ohms impedance.

e. 81 to 84 percent nominal velocity of propagation.

f. [Black PVC][PVC low smoke polymer or FEP] jacket.

g. Maximum attenuation characteristics:

[

CATV	
MHz	DB/100 m ft
50	3.1 .95
100	4.2 1.3
200	5.7 1.9
400	8.85 2.7
700	11.0 3.9
1000	14.26 4.8

][

CATVP	
MHz	DB/100 m ft
50	3.9 1.2

CATVP	
MHz	DB/100 m ft
100	5.6 1.7
200	8.2 2.5
400	11.5 3.5
700	115.1 4.6
900	117.4 5.3
1000	18.4 5.6

]][2.3.2.3 Drop Cable

****
NOTE: CATVP is plenum rated cable. Provide type CATVP plenum rated cabling in ducts, plenums and other air-handling spaces. Choose the first bracketed option for CATV cable and the second bracketed option for CATVP cable throughout.
****

UL 1581. Provide RG 6 coaxial cable with an NFPA 70 rating of [CATV][CATVP] and with the following characteristics:

a. No. 18 AWG copper-clad steel center conductor.

b. Bonded foil inner-shield and 90 percent aluminum braid.

c. Characteristic impedance of 75 ohms.

d. [Gas injected foam polyethylene][Foam FEP] dielectric

e. Nominal capacitance, conductor to shield, of 53 pf per 100 m 16.2 pf per 100 ft .

f. Maximum operating voltage of 350 V RMS.

g. Maximum attenuation:

[

CATV	
MHz	DB/100 m ft
10	2.59 0.81
50	5.08 1.46
100	7.19 2.05

CATV	
MHz	DB/100 m ft
200	10.17 2.83
400	14.38 4.0
500	15.48 4.53
700	19.02 6.0
1000	22.74 7.3

][

CATVP	
MHz	DB/100 m ft
10	2.3 0.7
50	4.9 1.5
100	6.9 2.1
200	10.2 3.1
400	14.8 4.5
500	19.7 6.0
700	22.6 6.9
1000	23.9 7.3

] h. [Black polyvinyl chloride (PVC)][PVC low smoke polymer or FEP] jacket.

i. 100 percent sweep testing from 5 MHz to a minimum of 1000 MHz.

][2.3.2.4 Low Voltage Patient Television Drop Cable

****
NOTE: CATVP is plenum rated cable. Provide type CATVP plenum rated cabling in ducts, plenums and other air-handling spaces. Choose the first bracketed option for television distribution cable and the second bracketed option for CATVP cable throughout.
****

****
NOTE: Delete this paragraph if low voltage patient televisions are not included in the project.
****

UL 1581. Provide RG 6 coaxial cable with an NFPA 70 rating of

[CATV][CATVP] and with the following characteristics:

a. No. 18 AWG solid copper center conductor.

b. Aluminum/Polyesetr/Aluminum tape 100 percent coverage inner-shield and tinned copper outer braid with 60 percent coverage.

c. Characteristic impedance of 75 ohms.

d. [Gas injected foam polyethylene][Foam FEP] dielectric

e. Nominal capacitance, conductor to shield, of 53 pf per m 16.2 pf per ft.

f. Maximum operating voltage of 300 V RMS.

g. Maximum attenuation:

[

CATV	
MHz	DB/100 m ft
10	2.3 0.70
50	4.9 1.5
100	6.58 2.0
200	9.2 2.8
400	13.1 4.0
700	17.43 5.3
900	20.07 6.1
1000	21.3 6.5
1500	27.3 8.3

][

CATVP	
MHz	DB/100 m ft
10	2.3 0.70
50	4.9 1.5
100	6.58 2.0
200	9.2 2.8
400	13.1 4.0

CATVP	
MHz	DB/100 m ft
700	17.43 5.3
1000	21.3 6.5
1500	27.3 8.3

] h. [Black polyvinyl chloride (PVC)][PVC low smoke polymer or FEP] jacket.

i. 100 percent sweep testing from 5 MHz to a minimum of 1000 MHz.

]2.3.3 Category 6 Drop Cable

Provide as indicated on the drawings and 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM.

2.3.4 Category 6 Patch Cords

Provide patch cords, as complete assemblies, with matching connectors as specified in 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM. Patch cords shall meet minimum performance requirements specified in 27 10 00 BUILDING TELECOMMUNICATIONS CABLING SYSTEM for cables, cable length and hardware specified.

2.3.5 Terminators

Coaxial terminators shall be rated for 75 ohms and 1/4 watt.[Category 6 port terminators shawl be plug-in hub type and shall have integral 8-pin modular connector.]

2.3.6 Splitters/Combiners

****
NOTE: Slope is the straight line of the average response between 54 MHz and 450 MHz. Return loss is a measure of impedance matching.
****

Use splitters/combiners with characteristics equal to or exceeding the characteristics listed in this paragraph over the entire operating band. All unused outlets must be terminated with 75-ohm terminators.

a. Peak to Valley: Not to exceed 1 dB across bandwidth of device.

b. Return loss: 18 dB minimum.

c. Bandwidth: 5-1000 Mh

[2.3.7 Fiber Optic Couplers

****
NOTE: Include this paragraph when specifying a fiber optic backbone distribution system.
****

Use fiber optic couplers to split fiber optic light sources equal to or exceeding the characteristics listed in this paragraph.

a. Number of inputs: 1

b. Wavelength: 1310 and 1550 nm

****
NOTE: Select number of outputs as required. Provide a minimum of two spare outputs for each fiber optic coupler required.
****

c. Number of Outputs: [2 with insertion loss of 3.3 dB, uniformity of greater than 0.7 dB, and directivitiy of greater than 50 dB][4 with insertion loss of 6.3 dB, uniformity of greater than 1.4 dB, and directivitiy of greater than 50 dB][8 with insertion loss of 9.5 dB, uniformity of greater than 2.1 dB, and directivitiy of greater than 50 dB][16 with insertion loss of 12.6 dB, uniformity of greater than 2.8 dB, and directivitiy of greater than 50 dB]

]2.3.8 Line Taps

Line taps shall have 18 dB minimum isolation from each tap to the thru-line.Pressure tapoffs are not permitted. Taps shall be rated from 5 to 1000 MHz and shall have a peak to valley not to exceed 1 dB to 1 GHz.

****
NOTE: Designer has the option to provide a combination convenience receptacle and CATV outlet in one outlet box. If used, provide detail on drawings indicating combined outlet with isolation barrier between power and communication sections.
****

2.3.9 Coaxial Outlets

Provide flush mounted, 75-ohm, F-type connector outlets rated from 5 to 1000 MHz in standard electrical outlet boxes[with isolation barrier].

2.3.10 Coaxial Connectors

****
NOTE: Delete trunk and feeder cable connectors for housing units and when trunk cable and feeder cable are not used in job.
****

Provide one piece connectors. [Trunk and feeder cable connectors shall be pin type.]Drop cable connectors shall be feed thru type.

2.3.11 Tilt Compensator

Provide tilt compensators as required.

[2.3.12 Distribution Hubs

Rack-mountable passive distribution hubs with 16 front mounted modular

8-pin jacks for connection to UTP 4-pair category 6 cabling, and “F” fitting on rear panel for connection to coaxial trunk cable. Hubs shall be tested compliant with FCC Part 15 requirements. Bandwidth: 5 – 860 MHz. Hubs shall be supplied with quantities of plug-in terminators to terminate all unused ports. Provide quantities of hubs as indicated.

][2.3.13 Baluns

Provide single-port converters (for use at TV outlet locations). Converter shall convert balanced line signal to coaxial unbalanced signal for connection to coaxial inputs of television receiver/monitors. Converter shall be equipped with integral 8-pin modular jack on one end and male “F” fitting on the opposite end. Provide quantities as indicated

]2.4 GROUNDING AND BONDING

Provide ground rods and connections in accordance with Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM.

****
NOTE: Include this paragraph only when a telecommunications grounding system is not being specified in other sections.
****

[2.4.1 Grounding Block

Provide [corrosion-resistant] grounding block suitable for [outdoor][indoor] installation.

][2.5 BACKBOARDS

****
NOTE: Include this paragraph only when backboards are not included in other specification sections.
****

Provide void-free, fire rated interior grade plywood, 19 mm 3/4 inch thick, [1200 by 2400 mm][4 by 8 feet][as indicated]. Backboards shall be painted with a gray, nonconductive fire-resistant overcoat. Do not cover the fire stamp on the backboard.

]PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Distribution System

****
NOTE: Show cable routing and equipment locations on the drawings.
****

Distribution system shall conform to requirements specified herein. Installation shall be in accordance with IEEE C2 and NFPA 70.

3.1.1.1 Raceway

****

NOTE: Use the bracketed option when conduit stubout is provided for the local cable television company.
****

Provide cable installed in raceways such as conduit and cable trays in compliance with NFPA 70. Raceway shall comply with Section 26 20 00, INTERIOR DISTRIBUTION SYSTEM.[Provide 78 mm 3 inch, minimum, PVC from interior headend location to exterior television service provider connection location. Coordinate location and requirements with the local cable television service provider.]

[3.1.1.2 Grounding System

****
NOTE: Include this paragraph only when a telecommunications grounding system is not being specified in other sections.
****

****
NOTE: Show location of grounding blocks on drawings. Grounding blocks may be used either inside or outside. Since they are intended to protect equipment from foreign currents, they are most frequently placed inside, close to the cable entrance.
****

Provide the grounding block [at the main television distribution backboard][_____]. Ground this device according to the requirements of IEEE C2 and NFPA 70.

]3.1.1.3 Trunk, Feeder, and Drop Cable

****
NOTE: Delete Trunk and Feeder from the title for housing units and when trunk and feeder cable are not used in the job.
****

Provide cable to grounding blocks, to line taps, and to outlets.

3.1.1.4 Splitters, Directional Couplers, Attenuators, Amplifiers

Install in accordance with manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

3.2.1 System Pretest

****
NOTE: Use the first bracketed item requiring the Contractor to align and balance the system, where amplifiers are provided. For single family housing units, delete second bracketed item requiring testing at 151 and 547 MHz. Testing at these frequencies is required for other applications.

Use option for testing at each outlet instead of

random sampling and at furthest outlet when a small number of outlets are provided in the job.
****

Upon completing installation of the television distribution system, the Contractor [shall align and balance the system and]shall perform complete pretesting. During the system pretest, Contractor, utilizing the approved spectrum analyzer or signal level meter, shall verify that the system is fully operational and meets all the system performance requirements of the specification. Contractor shall test the signal loss in dBmV at 55[, 151, 547,] and 1000 MHz. The signal levels shall be 0 dBmV (1000 microvolts), minimum. The signal shall not exceed 15 dBmV over the entire system bandwidth. Any deficiencies found shall be corrected and revalidated by follow up testing. Contractor shall measure and record the video and audio carrier levels at each of the frequency levels specified at each of the following points in the system:

a. Furthest outlet from [each communications room][service entrance point of connection].

b. A random sampling of 25 percent of the [outlets[from each communications room]][housing units].

[c. At each outlet.

][d. [Headend and]Distribution amplifier inputs and outputs.

]3.2.2 Acceptance Tests

****
NOTE: Use option for testing at each outlet instead of random sampling and at furthest outlet when a small number of outlets are provided in the job.
****

Contractor shall notify the Contracting Officer of system readiness 10 days prior to the date of acceptance testing. Contractor shall also coordinate with the local television service provider and allow them to attend witness tests. The television distribution system shall be tested in accordance with the approved test plan in the presence of the Contracting Officer's representative to certify acceptable performance. System test shall verify that the total system meets all the requirements of the specification and complies with the specified standards. Contractor shall verify that no signal leakage exists in conformance with NCTA RP and 47 CFR 76.605. System leakage shall also be tested at the headend location with signal applied to system. Deficiencies revealed by the testing shall be corrected on the [housing units][outlets] sampled as well as on the [units][outlets] not sampled and revalidated by follow-up testing. Contractor shall conduct testing at each of the following points in the system:

a. Furthest outlet from [each communications room][service entrance point of connection].

b. A random sampling of 25 percent of the [outlets[from each telecommunications room]][housing units] as designated by the

Contracting Officer.

[c. At each outlet.

][d. [Headend and]Distribution amplifier inputs and outputs.

]3.3 OPERATION AND MAINTENANCE MANUALS

Submit commercial, off-the-shelf manuals for operation, installation, configuration, and maintenance of products provided as a part of the cable television premises distribution system.

-- End of Section --