

# CTS-D Candidate Handbook

Certified Technology Specialist - Design

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## CTS-D Examination: Job Task Analysis

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### Domain A: Conducting a Needs Assessment

#### Task 1: Identify stakeholders/decision-makers

**Knowledge of:**

- Contractual relationships
- How to identify project decision makers

**Attributes:**

- Ability to work as part of a team or team leader
  - Good verbal communication skills
  - Good written communication skills
  - Attention to detail
  - Good interpersonal skills
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### Domain A: Conducting a Needs Assessment

#### Task 2: Identify skill level of end users

**Knowledge of:**

- Video components
- Networking
- AV terminology

**Attributes:**

- Ability to translate AV speak into IT speak
  - Ability to translate AV speak into lay terms
  - Good listening skills
  - Good verbal communication skills
  - Good written communication skills
  - Good interpersonal skills
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### Domain A: Conducting a Needs Assessment

#### Task 3: Educate the AV client

**Knowledge of:**

- Basic concepts of auxiliary systems
- Accessibility issues
- AV systems
- Networking
- Local regulatory issues
- AV products

**Attributes:**

- Basic computer skills
  - Ability to communicate ideas clearly
  - Public speaking
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**Domain A: Conducting a Needs Assessment****Task 4: Review client technology master plan****Knowledge of:**

- Basic fiscal planning terminology (ROI, etc.)
- Client's structured cabling system
- Equipment life cycles
- RoHS and other green issues

**Attributes:**

- Good verbal communication skills
- Good written communication skills

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**Domain A: Conducting a Needs Assessment****Task 5: Identify clients' procurement processes****Knowledge of:**

- Purchasing terms and processes

**Attributes:**

- Good verbal communication skills
- Good written communication skills
- Good interpersonal skills

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**Domain A: Conducting a Needs Assessment****Task 6: Research clients' business process****Knowledge of:**

- Workflows in business environments

**Attributes:**

- Good verbal communication skills
- Good written communication skills
- Good interpersonal skills

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**Domain A: Conducting a Needs Assessment****Task 7: Research clients' business environment****Knowledge of:**

- Existence of encryption standards
- IT bandwidth
- Network systems & terminology (IP based networks)

**Attributes:**

- Good verbal communication skills
- Good written communication skills
- Good interpersonal skills

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**Domain A: Conducting a Needs Assessment****Task 8: Define AV needs (absolutes)****Knowledge of:**

- AV systems
- Networking

**Attributes:**

- Good verbal communication skills
- Good written communication skills

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## Domain A: Conducting a Needs Assessment

### Task 9: Identify scope of work

#### Knowledge of:

- Basic drafting skills
- General AV products
- AV systems
- markups/profit margins for budgeting
- other technology disciplines (structured cabling, lighting, acoustics, networking etc.)
- Program report checklists

#### Skill in:

- Basic and Advanced math
- Good verbal communication skills
- Good written communication skills
- Flexibility

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## Domain A: Conducting a Needs Assessment

### Task 10: Identify regulatory requirements and project certification goals

#### Knowledge of:

- Local regulatory issues

#### Skill in:

- Utilizing reference materials
- Good verbal communication skills
- Good written communication skills
- Good interpersonal skills

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## Domain B: Collaborating With Other Professionals

### Task 1: Review A/E (architectural and engineering) drawings

#### Knowledge of:

- Architectural details that impact AV
- Architectural drawing symbols
- AV best practices (stage height, size of screen vs. seating arrangements, viewing angles, viewing distances, height of screen, ceiling soffits, distribution of audio, etc.)
- Drawing conventions

#### Skill in:

- Ability to calculate room dimensions
- Ability to read construction drawings
- Good math skills
- Understanding of construction specifications
- Understanding of drawing scale
- Attention to detail
- Ability to mentally visualize based on drawings
- Ability to use a scale ruler
- Ability to use a scientific calculator

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## Domain B: Collaborating With Other Professionals

### Task 2: Coordinate architectural/interior design criteria

#### Knowledge of:

- AV design best practices
- AV equipment capabilities
- Construction materials
- Construction practices
- Current display technologies

#### Attributes:

- Ability to calculate area
- Ability to identify 3 dimensional interference issues from 2 dimensional plans
- Ability to visualize spatial relationships from plans
- Understanding of AV maintenance requirements

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- Understanding of AV systems operational requirements
- Understanding of equipment space and access requirements
- Understanding of ergonomic best practices
- Understanding of Inverse Square Law
- Ability to utilize reference materials

**Skill in:**

- CAD Software
- Using a calculator
- Using a computer
- Using light meters
- RTA (real time analyzer)
- Using scale rulers and measuring devices
- Using a SPL (sound pressure level) meter

**Domain B: Collaborating With Other Professionals**

**Task 3: Coordinate structural/mechanical criteria**

**Knowledge of:**

- Mechanical (HVAC) components
- Equipment clearance/safety issues
- equipment mounting technologies
- Mechanical handling and access equipment
- Local codes
- Equipment mounting best practices
- Structural mounts
- Types of mounting hardware

**Attributes:**

- Ability to calculate BTU loads
- Understanding of proper air flow
- Ability to understand manufacturer specifications

**Skill in:**

- CAD Software
- Using a calculator
- Using a computer
- Using scale rulers and measuring devices
- Mechanical drawings

**Domain B: Collaborating With Other Professionals**

**Task 4: Coordinate electrical criteria**

**Knowledge of:**

- AV best practices
- Electrical regulatory requirements
- Appropriate use of 3 phase power
- Grounding
- Ohm's Law

- Ability to calculate amplifier load requirements
- Understanding of electrical terminology
- Understanding of power management technology

**Attributes:**

- Ability to calculate conduit size
- Ability to calculate electrical power loads

**Skill in:**

- Using a calculator
- Utilizing reference materials

**Domain B: Collaborating With Other Professionals**

**Task 5: Coordinate lighting criteria**

**Knowledge of:**

- Attributes of luminaries
- Color Rendering Index (CRI) by application
- Lighting color temperature by application

- Lighting controls protocols (DMX, RS 232, closed contact, DALI, RS 485, RS 422, etc.)
- Lighting fixture types
- Maximum allowable light levels at the screen

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- Room lighting levels by application

**Attributes:**

- Ability to measure lighting levels
- Ability to calculate contrast ratios
- Ability to use a light meter

**Skill in:**

- CAD Software
- Using a calculator
- Lighting cut sheets
- Lighting design software
- Utilizing reference manuals

**Domain B: Collaborating With Other Professionals**

**Task 6: Coordinate IT and network security criteria**

**Knowledge of:**

- Existence of encryption standards
- IP protocols and addressing
- Fiber optics
- IT terminology
- Networking terminology

- Structured cabling
- Wireless network systems

**Skill in:**

- Ability to communicate with IT professionals

**Domain B: Collaborating With Other Professionals**

**Task 7: Recommend Acoustical Criteria**

**Knowledge of:**

- Inverse Square Law
- Ohm's Law
- Speaker placement
- Speech intelligibility metrics
- Acoustic isolation from adjacent spaces

**Skill in:**

- Basic math and physics of sound (wavelengths, frequency, logarithms, etc.)
- Ability to calculate speaker coverages
- Ability to measure ambient noise

**Domain B: Collaborating With Other Professionals**

**Task 8: Coordinate life safety and security criteria**

**Knowledge of:**

- Electronic security systems
- Fire alarm systems
- Equipment network requirements
- Local codes

- Physical security issues

**Skill in:**

- Utilizing reference materials

**Domain C: Developing AV Designs**

**Task 1: Create draft AV design**

**Knowledge of:**

- Image aspect ratios
- Audio components
- Audio crossovers
- AV systems
- Cable types
- Control components

- Digital world clock
- Distance limitations
- Equipment manufacturers
- AV market forces/trends
- Networks
- Properties of sound and light
- Signal types

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- AV streaming over IP
- Video components
- Video formats (HDTV, SDTV, etc.)
- Video timing (Genlock, video sync)
- Signal limitations
- Content encryption techniques and DRM
- Redundancy

**Attributes:**

- Ability to apply Inverse Square Law, logarithmic calculations
- Ability to apply Ohm's Law
- Ability to calculate contrast ratio
- Ability to calculate PAG/NAG
- Ability to calculate required amplifier power
- Ability to calculate screen brightness/contrast ratio
- Ability to calculate speaker coverages
- Ability to calculate video bandwidth
- Ability to calculate audio delay
- Ability to calculate projector throw distances
- Ability to calculate viewing angles
- Ability to determine screen size for application
- Basic computer skills
- Basic drafting skills
- Basic understanding of control system protocols
- Understanding of basic principles of RF propagation

- Understanding of bit rate
- Understanding of decibels
- Understanding of display technologies (plasma, LCD, CRT, DLP, LED, LCoS)
- Understanding of limitations of control systems
- Understanding of microphone and loudspeaker polar patterns
- Understanding of product warranties
- Understanding of quantization
- Understanding of resolution capabilities (pitfalls of mixing resolutions)
- Understanding of relationship between font size and screen size (visual acuity)
- Understanding of sampling rate and Nyquist Frequency
- Understanding of sensory communication (human ear, eyes, etc.)
- Understanding of signal properties (frequency, wavelength, amplitude, phase, bandwidth)

**Skill in:**

- Math and physics
- Audio design software
- Computers
- Utilizing reference manuals
- Comprehending user manuals and specifications

**Domain C: Developing AV Designs**

**Task 2: Confirm site conditions**

**Attributes:**

- Ability to mark site
- Ability to use SPL and light meters
- Ability to use a tape measure or other measuring device
- Understanding of construction blueprints
- Understanding of construction processes
- Understanding and knowledge of construction site safety
- Ability to use a recording device (camera, camcorder, etc.)

**Skill in:**

- Using ladders safely
- Using a light meter
- PPE
- Using scale rulers and measuring devices
- SPL meters

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## Domain C: Developing AV Designs

### Task 3: Produce infrastructure drawings

#### Knowledge of:

- Architectural terminology
- Construction abbreviations
- Construction practices
- Architectural/engineering drawing symbols

#### Skill in:

- CAD software
- Computers
- Drafting supplies
- Using scale rulers and measuring devices

#### Attributes:

- Ability to convert measurements
- Ability to direct the production of CAD drawings
- Ability to read construction drawings
- Basic drafting skills
- Attention to detail

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## Domain C: Developing AV Designs

### Task 4: Produce AV system documents

#### Knowledge of:

- Network systems & terminology( IP based networks)
- Architectural terminology
- AV best practices
- Reading equipment setup configurations
- Regulatory requirements

- Ability to direct the production of CAD drawings
- Ability to produce custom furniture details
- Basic drafting skills
- Understanding of DSP products

#### Attributes:

- Ability to convert measurements
- Ability to create schematic diagrams

#### Skill in:

- CAD software
- Computers
- Drafting supplies
- Using a printer/plotter

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## Domain C: Developing AV Designs

### Task 5: Finalize project documentation

#### Knowledge of:

- AV delivery models
- Project documentation

#### Attributes:

- Understanding of specification and tender documentation
- Ability to specify performance criteria

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## Domain D: Conducting Project Implementation Activities

### Task 1: Participate in project implementation communication

#### Knowledge of:

- Construction contractual relationships
- Construction roles and responsibilities
- Construction terminology

#### Attributes:

- Understanding of construction processes
- Good verbal communication skills

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- Good written communication skills
- Attention to detail
- Diplomacy
- Flexibility
- Tact
- Understanding of construction documents
- Understanding of construction forms
- Understanding of project documents and specifications

## **Domain D: Conducting Project Implementation Activities**

### ***Task 2: Perform system verifications***

#### **Knowledge of:**

- Audio and video theory
- Acceptable signal levels
- Test equipment

#### **Attributes:**

- Ability to identify common audio problems
- Ability to identify common video problems
- Ability to read system schematic diagrams

#### **Skill in:**

- Using an audio analyzer
- Using an audio generator
- Using a colorimeter

- Using an impedance meter
- Using a laptop
- Using a level (spirit level)
- Using a light meter
- Using a multimeter
- Using an oscilloscope
- RTA
- Using a SPL meter
- Using a tape measure
- Using a test pattern generator
- Using testing software
- Using UTP cable testers
- Using a wave form monitor

## **Domain D: Conducting Project Implementation Activities**

### ***Task 3: Conduct system close out activities***

#### **Attributes:**

- Conflict resolution skills
- Good verbal communication skills
- Good written communication skills

- Attention to detail
- Common sense
- Meticulous

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