

# CEDIA HOME THEATER DESIGN SPECIALIST (HTDS) DETAILED CONTENT OUTLINE

## DOMAIN I: DESIGN AND ENGINEERING

010000

***Task 1: Perform needs analysis by using a formal evaluation survey in order to explore creative solutions to clients' needs, establish budgets, set performance standards, and establish project parameters.***

010100

### Knowledge of:

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|--|--------|
| 1. Applicable technologies   | 010101 |
| 2. Appropriate theater common practices  | 010102 |
| 3. Effective interview techniques  | 010103 |
| 4. Emerging technologies   | 010104 |
| 5. Ergonomics and human factors  | 010105 |
| 6. Estimation techniques/cost benefit analyses   | 010106 |
| 7. Lifestyle issues of the intended users  | 010107 |
| 8. Technical disciplines (e.g., audio, video, control, power management, equipment mounting, lighting) | 010108 |

### Skill in:

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|---|--------|
| 1. Accurately recording information     | 010109 |
| 2. Communicating effectively            | 010110 |
| 3. Establishing the decision makers     | 010111 |
| 4. Establishing the intended users      | 010112 |
| 5. Using survey and questionnaire forms | 010113 |
| 6. Visualizing concepts                 | 010114 |

***Task 2: Convert the clients' needs to project concepts by integrating the disciplines of human factors, user interface design, and aesthetics along with common technical practices in order to determine specific requirements for a finished design.***

010200

### Knowledge of:

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|---|--------|
| 1. Applicable codes and standards, i.e. ADA | 010201 |
| 2. CAD/drafting techniques                  | 010202 |
| 3. Ergonomics and human factors             | 010203 |
| 4. Interior design techniques               | 010204 |
| 5. Motion picture culture                   | 010205 |
| 6. User interface design                    | 010206 |

**Skill in:**

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|---|--------|
| 1. Conveying design intentions both verbally and visually | 010207 |
| 2. Creating themes  | 010208 |
| 3. Decorating   | 010209 |
| 4. Designing with a computer                              | 010210 |
| 5. Determining optimal screen size                        | 010211 |
| 6. Drafting architectural documents                       | 010212 |
| 7. Illustrating concepts both verbally and visually       | 010213 |
| 8. Observing objectively                                  | 010214 |

***Task 3: Specify room parameters, including mechanical, acoustical, cabinetry, and millwork, by integrating architectural plans with the established project concepts in order to communicate project information to the relevant parties.***

***010300***

**Knowledge of:**

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|--|--------|
| 1. Acoustic performance                                    | 010301 |
| 2. Applicable building codes, i.e., local, state, national | 010302 |
| 3. Blueprints, plans, and specifications                   | 010303 |
| 4. Building and construction materials                     | 010304 |
| 5. CAD/drafting techniques                                 | 010305 |
| 6. Construction methods                                    | 010306 |
| 7. Electrical requirements                                 | 010307 |
| 8. Equipment mounting techniques                           | 010308 |
| 9. HVAC requirements                                       | 010309 |
| 10. Illumination   | 010310 |
| 11. Imaging design requirements                            | 010311 |
| 12. Interior design techniques                             | 010312 |
| 13. Millwork   | 010313 |
| 14. Motorization   | 010314 |
| 15. Project planning                                       | 010315 |
| 16. Psychoacoustics  | 010316 |
| 17. Security and life safety                               | 010317 |
| 18. Sound isolation  | 010318 |
| 19. Structural engineering                                 | 010319 |

**Skill in:**

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|--|--------|
| 1. Calculating heat loads, electrical loads, sight lines, and acoustical separations | 010320 |
| 2. Communicating effectively   | 010321 |
| 3. Drafting architectural documents  | 010322 |
| 4. Estimating, modeling, and analyzing   | 010323 |
| 5. Identifying and solving problems  | 010324 |
| 6. Illustrating design concepts  | 010325 |
| 7. Interpreting building plans   | 010326 |
| 8. Performing field measurements   | 010327 |
| 9. Performing mathematical calculations  | 010328 |
| 10. Understanding spatial relationships  | 010329 |

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| 11. Verifying project site conditions             | 010330 |
| 12. Writing technical documents and presentations | 010331 |

**Task 4: Determine minimum materials specifications, equipment specifications, and system features by applying accepted engineering practices in order create a written documentation set.** **010400**

**Knowledge of:**

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|--|--------|
| 1. Acoustical materials and treatments, i.e. psychoacoustics                     | 010401 |
| 2. Applicable codes and safety requirements, i.e., local, state, national        | 010402 |
| 3. Appropriate theater common practices  | 010403 |
| 4. Audio and video transmission  | 010404 |
| 5. Construction and construction materials                                       | 010405 |
| 6. Control systems   | 010406 |
| 7. Equipment specifications and interpretations                                  | 010407 |
| 8. Ergonomics and human factors  | 010408 |
| 9. HVAC systems  | 010409 |
| 10. Imaging techniques   | 010410 |
| 11. Interior design techniques, including color perception and window treatments | 010411 |
| 12. Lighting design techniques   | 010412 |
| 13. Loudspeaker placement and surround sound modes                               | 010413 |
| 14. Photometrics   | 010414 |
| 15. Power management techniques  | 010415 |
| 16. Source content technologies and formats, i.e., broadcast, MPEG, etc.         | 010416 |
| 17. User interface design techniques   | 010417 |

**Skill in:**

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|---|--------|
| 1. Assessing acoustic and sound isolation requirements  | 010418 |
| 2. Assessing imaging requirements   | 010419 |
| 3. Calculating electrical loads   | 010420 |
| 4. Designing an illumination plan   | 010421 |
| 5. Designing for serviceability   | 010422 |
| 6. Drafting architectural documents   | 010423 |
| 7. Interpreting and applying accepted industry practices, i.e., SMPTE, VESA, THX, AES, IEEE, Dolby, DTS | 010424 |
| 8. Modeling and interpreting  | 010425 |
| 9. Specifying HVAC systems  | 010426 |
| 10. Writing technical documents and presentations   | 010427 |

**Task 5: Choose optimal materials, equipment, and feature sets based on an engineering review and validation of manufacturers' specifications in order to create a bill of materials, reassess room parameters, and finalize the theater design.** **010500**

**Knowledge of:**

1. Acoustical materials and treatments, i.e. psychoacoustics	010501
2. Appropriate theater common practices	010502
3. Communication protocols	010503
4. Construction and construction materials	010504
5. Control systems	010505
6. Electrical systems	010506
7. Equipment specifications and interpretations	010507
8. Furniture design	010508
9. HVAC systems	010509
10. Imaging requirements	010510
11. Interior design techniques, including the effects of colors and materials on design	010511
12. Lighting design techniques	010512
13. Loudspeaker placement and surround sound modes	010513
14. Photometrics	010514
15. Power management techniques	010515
16. Product knowledge and upgrade options	010516

**Skill in:**

1. Assessing acoustic and sound isolation requirements	010517
2. Calculating electrical loads	010518
3. Creating spreadsheets	010519
4. Designing an illumination plan	010520
5. Designing for serviceability	010521
6. Drafting architectural documents	010522
7. Estimating project costs	010523
8. Evaluating products with a critical eye	010524
9. Evaluating project specifications	010525
10. Identifying appropriate technology	010526
11. Integrating subsystems	010527
12. Interpreting manufacturer's specifications	010528
13. Making decisions	010529
14. Modeling and interpreting	010530
15. Organizing and presenting information to clients, coworkers, vendors, etc.	010531
16. Specifying HVAC systems	010532
17. Writing a bill of materials	010533

***Task 6: Determine the theater system topology, i.e., schematics, placement, features, type and termination of each cable, and control system logic, using common engineering practices in order to instruct technicians on the proper system configuration.***

**010600**

**Knowledge of:**

1. Applicable codes and safety requirements, i.e., local, state, national	010601
2. Applicable technical symbols and icons	010602
3. Appropriate connector and wire types	010603
4. Audio and video transmissions	010604
5. Back boxes	010605
6. Basic electronics	010606
7. CAD/drafting techniques	010607
8. Control system usability and interfaces	010608
9. I/O requirements	010609
10. Low-voltage and high-voltage systems	010610
11. Power management techniques	010611
12. Product installation procedures	010612
13. Schematic topologies	010613
14. Signal flow	010614
15. System grounding techniques	010615
16. Termination impedance	010616
17. Wall plates	010617

**Skill in:**

1. Applying scientific method	010618
2. Communicating effectively	010619
3. Creating schematics	010620
4. Creating spreadsheets	010621
5. Interpreting applicable codes, guidelines, and standards	010622
6. Tracking complex details, i.e., connection schedules	010623
7. Using modeling software	010624
8. Writing technical documents and presentations	010625

***Task 7: Write instructions for validating system operation, installation, and calibration by determining appropriate installation methods, checklists, and setup configuration in order to ensure correct system performance.*** **010700**

**Knowledge of:**

1. Acoustics calibrations	010701
2. Applicable codes and standards, i.e. imaging and audio	010702
3. Equipment owners' manuals	010703
4. Function and limitations of installed equipment	010704
5. Function and limitations of test equipment	010705
6. Photometrics	010706
7. Programming and control systems	010707
8. Standard testing procedures	010708
9. Video setup, colorimetry, and calibration procedure	010709

**Skill in:**

1. Analyzing and interpreting data from appropriate tests, i.e., total room performance	010710
2. Calibrating equipment	010711

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|---|--------|
| 3. Creating checklists                        | 010712 |
| 4. Inspecting and assessing design compliance | 010713 |
| 5. Operating test equipment                   | 010714 |
| 6. Troubleshooting                            | 010715 |
| 7. Verifying configurations                   | 010716 |
| 8. Verifying control functionality            | 010717 |
| 9. Writing test procedures                    | 010718 |
| 10. Writing validation procedures             | 010719 |

## **DOMAIN II: DESIGN DOCUMENTATION**

**020000**

***Task 1: Generate theater plans for distribution to relevant parties by preparing or modifying architectural plans in order to illustrate the location of devices, wire routes, and generate installation and construction notes.***

**020100**

### **Knowledge of:**

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|---|--------|
| 1. Applicable building codes, i.e., local, state, national, OSHA, NEC, ADA, ICBO, UBC | 020101 |
| 2. Applicable industry standards, i.e., subsystem practices                           | 020102 |
| 3. Applicable technical symbols and icons   | 020103 |
| 4. Blueprint legends  | 020104 |
| 5. Current drafting conventions and notations   | 020105 |
| 6. Document control and flow  | 020106 |
| 7. Drawing types, i.e., plans, elevation, sections, reflected ceiling plans           | 020107 |
| 8. Installation criteria  | 020108 |
| 9. Product placement criteria   | 020109 |
| 10. Serviceability and usability  | 020110 |

### **Skill in:**

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|---------------------------------------|--------|
| 1. Designing with a computer          | 020111 |
| 2. Drafting architectural documents   | 020112 |
| 3. Interpreting installation criteria | 020113 |
| 4. Reading and annotating blueprints  | 020114 |
| 5. Tracking revisions                 | 020115 |

***Task 2: Generate block diagrams to show system level interconnection between components and subsystems in order to illustrate and troubleshoot signal flow. Generate block diagrams to show system level interconnection between components and subsystems in order to illustrate and troubleshoot signal flow.***

**020200**

### **Knowledge of:**

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|---|--------|
| 1. CAD/drafting techniques                  | 020201 |
| 2. Concepts of signal flow conventions      | 020202 |
| 3. Device, signal, and control nomenclature | 020203 |
| 4. System components                        | 020204 |

**Skill in:**

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|---|--------|
| 1. Creating a symbolic representation of components and device  | 020205 |
| 2. Designing with a computer                                    | 020206 |
| 3. Drafting architectural documents, including block diagrams   | 020207 |
| 4. Organizing layout and annotation for clarity of presentation | 020208 |
| 5.  |        |

**Task 3: Communicate the exact details of the project to all relevant parties by generating hardware specifications, schematics, and schedules in order to ensure a final installation that complies with the design. Communicate the exact details of the project to all relevant parties by generating hardware specifications, schematics, and schedules in order to ensure a final installation that complies with the design.** 020300

**Knowledge of:**

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|---|--------|
| 1. Applicable codes, i.e., local, state, national   | 020301 |
| 2. Building and construction materials  | 020302 |
| 3. Cable termination types  | 020303 |
| 4. Component and subsystem interconnection and interaction  | 020304 |
| 5. Conduit, trim, and wire schedules  | 020305 |
| 6. Construction methods   | 020306 |
| 7. Control system schedules   | 020307 |
| 8. Electrical and lighting fixture schedules and details  | 020308 |
| 9. Equipment and device mounting methods, including backpanel layouts   | 020309 |
| 10. Product knowledge   | 020310 |
| 11. Responsibilities of associated trades   | 020311 |
| 12. Schematic conventions, including symbols, grounding, voltage requirements, and safety-related information | 020312 |
| 13. Signal types  | 020313 |
| 14. Wire and cable properties   | 020314 |
| 15. Wire management practices   | 020315 |

**Skill in:**

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|---|--------|
| 1. Applying electrical and safety illustration conventions                          | 020316 |
| 2. Creating a dimension report, including weight                                    | 020317 |
| 3. Creating schematics  | 020318 |
| 4. Creating spreadsheets  | 020319 |
| 5. Defining drawing layers, i.e., audio, video, RF, lighting, control, power        | 020320 |
| 6. Defining equipment and material specifications, e.g., heat load, electrical load | 020321 |
| 7. Detailing connectors and terminations  | 020322 |
| 8. Generating equipment, components, and materials details                          | 020323 |
| 9. Organizing layout and annotating for clarity of presentation                     | 020324 |

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| 10. Referencing schematics to wiring schedules        | 020325 |
| 11. Reviewing and interpreting product specifications | 020326 |

<b>Task 4: Compile as-built drawings, user guides, and project files for all relevant parties by accumulating and updating all construction documents in order to reflect actual installation conditions.</b>	<b>020400</b>
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**Knowledge of:**

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|---|--------|
| 1. Change order process                 | 020401 |
| 2. Document archival techniques         | 020402 |
| 3. Project change history               | 020403 |
| 4. Project revision tracking techniques | 020404 |
| 5. Red-line techniques                  | 020405 |
| 6. Service department procedure         | 020406 |

**Skill in:**

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| 1. Creating and managing archive documents and files               | 020407 |
| 2. Documenting the effects of change orders to the original design | 020408 |
| 3. Objectively assessing the final results                         | 020409 |
| 4. Recording compliance data for archival reference                | 020410 |
| 5. Red-lining project drawings                                     | 020411 |

<b>DOMAIN III: COMPLIANCE</b>	<b>030000</b>
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<b>Task 1: Validate system functionality by executing the operational checklist in order to ensure that all equipment is present and in working order. Validate system functionality by executing the operational checklist in order to ensure that all equipment is present and in working order.</b>	<b>030100</b>
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**Knowledge of:**

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|---|--------|
| 1. Common failure modes                       | 030101 |
| 2. Control system functionality               | 030102 |
| 3. Function and limitations of test equipment | 030103 |
| 4. Project documents                          | 030104 |
| 5. Proper equipment operation                 | 030105 |
| 6. Standard test procedures                   | 030106 |

**Skill in:**

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|---|--------|
| 1. Configuring audio and video equipment    | 030107 |
| 2. Implementing cycling and thermal testing | 030108 |
| 3. Interpreting test results                | 030109 |
| 4. Operating test equipment                 | 030110 |
| 5. Reading instruction manuals              | 030111 |
| 6. Reading schematics                       | 030112 |
| 7. Testing for and simulating system faults | 030113 |

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| 8. Troubleshooting                                    | 030114 |
| 9. Understanding equipment specifications             | 030115 |
| 10. Verifying controls system and user interfaces     | 030116 |
| 11. Verifying proper operation of all equipment modes | 030117 |

<b>Task 2:</b> <b><i>Calibrate all theater components using appropriate test equipment and methodology in order to meet the original specifications.</i></b>	<b>030200</b>
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**Knowledge of:**

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|--|--------|
| 1. Acoustical materials and treatments, i.e. psychoacoustics, room acoustics | 030201 |
| 2. Audio and video calibration procedures and standards                      | 030202 |
| 3. Common test procedures  | 030203 |
| 4. Critical viewing and listening techniques                                 | 030204 |
| 5. Function and limitations of test equipment                                | 030205 |
| 6. Function and limitations of the installed systems                         | 030206 |
| 7. Photometrics  | 030207 |
| 8. Thorough understanding of installation requirements document              | 030208 |
| 9. Video setup, colorimetry, and calibration procedure                       | 030209 |

**Skill in:**

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|--|--------|
| 1. Calibrating audio and video systems                       | 030210 |
| 2. Identifying and setting up audio and video signal formats | 030211 |
| 3. Interpreting test results and performance specifications  | 030212 |
| 4. Operating test equipment                                  | 030213 |
| 5. Reading instruction manuals                               | 030214 |
| 6. Recording calibration data and results                    | 030215 |
| 7. Troubleshooting   | 030216 |
| 8. Understanding and applying photometrics                   | 030217 |
| 9. Understanding equipment specifications                    | 030218 |
| 10. Using test signals                                       | 030219 |
| 11. Writing calibration procedures and checklists            | 030220 |

<b>Task 3:</b> <b><i>Verify system performance by validating the calibration against the specifications and remedy any discrepancies in order to ensure the installation complies with the design.</i></b>	<b>030300</b>
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**Knowledge of:**

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|--|--------|
| 1. Function and limitations of the installed systems | 030301 |
| 2. Installation requirement and compliance documents | 030302 |

**Skill in:**

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|---|--------|
| 1. Documenting results  | 030303 |
| 2. Evaluating test results against performance specifications | 030304 |
| 3. Interpreting performance specifications                    | 030305 |
| 4. Interpreting test results and performance specifications   | 030306 |

