

Residential Construction Academy
National Association of Home Builders
Home Builders Institute

Residential Carpentry Standards Summary

Introduction

We are pleased to present a summary of residential carpentry standards. The goal of this project is to establish national standards for the residential construction industry that reflect industry skill requirements. The standards will provide a basis for the certification and training of workers and provide employers with objective benchmarks for selecting employees and evaluating training needs. In addition, educators will find the standards useful for designing curriculum and evaluating an individual's training outcomes.

These standards in and by themselves do not represent a model-training program. These standards are designed to be a source for developing program and curriculum and evaluating the outcomes of residential carpentry training programs.

Residential Carpenter standards have been developed and validated and incorporate Level I standards for semi-skilled carpenters and Level II standards for skilled carpenters. Standards were developed and validated for the following 11 carpentry specialties: ***Wood Framing; Metal Framing, Interior Trim; Exterior Trim; Siding; Concrete Forms; Drywall; Roof Application; Stairs; Insulation; and, Cabinets and Countertops.*** Thirty-two (32) critical work functions or duty areas were identified. Critical work functions describe the major tasks and content areas of work within each specialty. Key activities or major tasks and knowledge involved in completing critical work functions are also provided.

Performance Indicators, which help determine when critical work functions and key activity are being performed competently and meet standards, are referenced to critical

work functions. These indicators are found in *Residential Construction Performance Guidelines for Professional Builders & Remodelers 2nd Edition* published by the National Association of Home Builders.¹

In addition, applied academic skills required to perform key activities are provided. These include measurement, arithmetic, layout, geometry, communications and applied academic skills. Safety requirements involved in completing key activities have also been identified.

This report presents each of the 32 critical work functions or duty areas as a series of two–page summaries. The first page of each summary lists the critical work function and carpentry specialty or specialties that performs the work function. Key activities, performance indicators and applied academic skills and safety requirements are also listed on the first page. Page references from Delmar’s **Residential Construction Academy: Carpentry** correspond with each key activity.

Descriptions of the codes used on the first page of each standard are listed on the second page of each summary. This format offers a concise presentation of the critical parts of each standard. For more detailed information, the reader is encouraged to review the complete report, *Residential Carpentry Standards*, published by the Home Builders Institute.

¹ Residential Constructional Performance Guidelines for Professional Builders & Remodelers 2nd Edition, National Association of Home Builders, Washington, DC, 2000.

Standard Scales

These scales will be used to assess performance to standard and required knowledge necessary to achieve competency.

Applied Academics

| Math | | Communication Skills | | Materials | | Safety |
|---------------------|----|------------------------------|----|---------------------------------|-----|--------------------------|
| 1. Measurement | 1. | 1. Follow Verbal Directions | 1. | 1. Select Appropriate Materials | 1. | 1. Fall Protection |
| 2. Arithmetic | 2. | 2. Follow Written Directions | 2. | 2. Apply as Specified | 2. | 2. Silica Protection |
| 3. Layout | 3. | 3. Give Simple Directions | | | 3. | 3. HAZMAT |
| 4. Applied Geometry | 4. | 4. Give Complex Directions | | | 4. | 4. Electrical Protection |
| | | | | | 5. | 5. Power Tools |
| | | | | | 6. | 6. Rigging |
| | | | | | 7. | 7. Concrete |
| | | | | | 8. | 8. Ladders & Scaffolds |
| | | | | | 9. | 9. PPE |
| | | | | | 10. | 10. Trenching |

Skill Level

| | |
|--------------|--|
| Semi-Skilled | Qualified to perform effectively under supervision |
| Skilled | Qualified to perform work independently |

Carpentry Specialties

| | |
|-------------------|---------------------------|
| WF= Wood Framing | CF= Concrete Forms |
| MF= Metal Framing | D= Drywall |
| ET= Exterior Trim | C= Cabinets & Countertops |
| IT= Interior Trim | I= Insulation |
| S= Siding | R= Roofing |
| ST= Stairs | |

General Quality Guidelines

Lay out and Material Cutting Accuracy: +/- 1/16" of specifications

Location of Features: +/- 1/8" of specifications

Level: +/- 1/4" in eight linear feet

Plumb: +/- 1/8" in eight linear feet

Square: Foundations – 1/2" maximum discrepancy for outside corner-to-corner diagonal measurement

Framing – 1/8" maximum discrepancy for every ten linear feet of diagonal measurement

Straight: Maximum curve or bow of 1/8" for every ten linear feet of material length

HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): WF, MF, IT, ET, S, CF, D, RA, ST, I, C

Critical Work Function (The major responsibilities of work within a concentration): **Engineered Products, Panels & Sheet Goods**

| The Work (What does the worker need to do to be able to perform the work competently) | | The Worker (What knowledge does the worker need) | | | | |
|---|--|---|------|------|--------|---|
| Key Activity (The major tasks or knowledge involved in completing the CWF) | Performance Indicators (Indicators of how to determine when the key activity is being performed competently) | Additional Knowledge (Additional skills and knowledge required to perform key activities) | | | | References (Nationally recognized training materials) |
| | NAHB Performance Guidelines 2000 | Math | Com. | Mat. | Safety | Delmar/RCA: Carpentry |
| 1. Plywood | See Chapter 3, Page 15, 3-5 & 3-6. | 1 | | 2 | 3 | 55-57 |
| 2. OSB | Chapter 4 pages 24-30, 4-20 to 4-37 | 1 | | 2 | 3 | 55 |
| 3. Siding | Chapter 9 pages 65-66, 9-31 to 9-34 | 1 | | 2 | 3 | 364-367 |
| 4. Particleboard | | 1 | | 2 | 3 | 56 |
| 5. Drywall, wallboard, cement board | | 1 | | 2 | 2,3 | 421-425 |
| 6. Fiberboard (Hardboard, MDF & others) | | 1 | | 2 | 3 | 56-58 |
| 7. Softboard (e.g., ceiling tiles) | | 1 | | 2 | 3 | 58 |
| 8. Insulation board | | 1 | | 2 | 3 | 415-417 |
| 9. Waterproofing membranes | | 1 | | 2 | 3 | 420 |
| 10. Plastic laminates | | 1 | | 2 | 3 | 537&538 |
| 11. Metal framing products | | 1 | | 2 | 3 | 200-202 |
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HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): **WF, MF, CF**

Critical Work Function (The major responsibilities of work within a concentration):

Concrete Forms

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

Key Activity

(The major tasks or knowledge involved in completing the CWF)

Performance Indicators

(Indicators of how to determine when the key activity is being performed competently)

NAHB Performance Guidelines 2000

Additional Knowledge

(Additional skills and knowledge required to perform key activities)

Math **Com.** **Mat.** **Safety**

References

(Nationally recognized training materials)

Residential. Cons. Academy: Carpentry

| Key Activity | Performance Indicators | Math | Com. | Mat. | Safety | References |
|--|--------------------------------------|------|------|------|------------------|------------------|
| 1. Characteristics & testing of concrete | See Chapter 2, Pages 3 to 7, | 2 | 3 | 2 | 2,3,7,9 | 117 |
| 2. Concrete forms (panels, ICFs, etc.) | Residential Construction Performance | 4 | 3 | 2 | | 123&124 |
| 3. Construct wall & column forms | Guidelines for Builders and | 4 | 3 | 2 | 4,5,8,9,10 | 122, 132-138 |
| 4. Prepare concrete stair forms | Remodelers (2 nd Ed) | 4 | 3 | 2 | 4,5,8,9,10 | 124&125, 139&140 |
| 5. Lay out building lines | Guidelines 2-1 to 2-15 | 4 | 3 | 2 | 4,5,8,9,10 | 97-112 |
| 6. Construct slab-on-grade forms | | 4 | 3 | 2 | 4,5,8,9 | 120&121 |
| 7. Construct pier & footing forms | | 4 | 3 | 2 | 4,5,8,9,10 | 118-120, 130&131 |
| 8. Set elevated slab forms | | 4 | 3 | 2 | 1,4,5,8,9 | N/A |
| 9. Place expansion joints | | 3 | 3 | 2 | 1,4,5,8,9 | N/A |
| 10. Construct tie beam forms | | 4 | 3 | 2 | 1,4,5,8,9,10 | N/A |
| 11. Construct structural beam forms | | 4 | 3 | 2 | 1,4,5,8,9 | N/A |
| 12. Construct curved arch forms | | 4 | 3 | 2 | 4,5,8,9 | N/A |
| 13. Construct lintel forms | | 4 | 3 | 2 | 4,5,8,9 | N/A |
| 14. Place reinforcement | | 3 | 3 | 2 | 1,4,5,8,9 | 125&126 |
| 15. Place anchoring devices | | 3 | 3 | 2 | 4,5,8,9,10 | 137 |
| 16. Place & finish concrete | | | 3 | 2 | 2,3,7,8,9,10 | 126-129 |
| 17. Strip and clean forms | | | 3 | 2 | 2,3,4,5,6,8,9,10 | 125 |
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HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): WF, MF

Critical Work Function (The major responsibilities of work within a concentration): **Wall Framing with Wood**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

| Key Activity (The major tasks or knowledge involved in completing the CWF) | Performance Indicators (Indicators of how to determine when the key activity is being performed competently) NAHB Performance Guidelines 2000 | Additional Knowledge (Additional skills and knowledge required to perform key activities) | | | | References (Nationally recognized training materials) Delmar/RCA: Carpentry |
|--|--|---|-------------|-------------|---------------|--|
| | | Math | Com. | Mat. | Safety | |
| 1. Identify load bearing & non-load bearing walls & partitions | See Chapter 4, Page 19, 4-1 and 4-2 | | 2 | | | 187&188 |
| 2. Lay out walls on floor deck or foundation | | 4 | 4 | 2 | 1,8,9 | 190, 207 |
| 3. Lay out wall framing detail on wall plates | | 4 | 4 | 2 | 1,8,9 | 208&209 |
| 4. Cut wall plates | | 3 | 3 | 2 | 1,4,5,8,9 | 42 |
| 5. Calculate lengths of wall components | | 2 | 3 | 2 | 1,8,9 | 204&205 |
| 6. Cut studs, headers, jacks, rough sills and cripples | | 2 | 3 | 2 | 1,4,5,8,9 | 190 |
| 7. Assemble header, corner and tee posts | | 3 | 3 | 2 | 1,4,5,8,9 | 210&211 |
| 8. Frame door opening | | 3 | 4 | 2 | 1,4,5,8,9 | 206, 218-220 |
| 9. Frame window opening | | 3 | 4 | 2 | 1,4,5,8,9 | 182&183, 210 |
| 10. Assemble wall section | | 4 | 4 | 2 | 1,4,5,8,9 | 210-215 |
| 11. Install sheer panels & moment frames | | 3 | 3 | 2 | 1,4,5,8,9 | 191 |
| 12. Install connectors and ties | | 3 | 3 | 2 | 1,4,5,8,9 | 191 |
| 13. Install backing, blocking & bases | | 3 | 3 | 2 | 1,4,5,8,9 | 192&193, 215 |
| 14. Install top plate (cap plate) | | 3 | 3 | 2 | 1,4,5,8,9 | 211 |
| 15. Install draft (fire) stops | | 3 | 3 | 2 | 1,4,5,8,9 | 215 |
| 16. Install corner, diagonal or wind bracing | | 4 | 4 | 2 | 1,4,5,8,9 | 213 |
| 17. Install exterior wall sheathing | | 3 | 3 | 2 | 1,4,5,8,9 | 191 |
| 18. Raise and anchor wall section | | 3 | 4 | | 1,4,5,8,9 | 214 |
| 19. Plumb, align and brace wall section | | 4 | 4 | 2 | 1,4,5,8,9 | 214 |
| 20. Install fur downs, soffits, bulkheads, chases | | 3 | 4 | 2 | 1,4,5,8,9 | 192&193 |

HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): **WF**

Critical Work Function (The major responsibilities of work within a concentration): **Ceiling Framing in Wood**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

Key Activity

(The major tasks or knowledge involved in completing the CWF)

Performance Indicators

(Indicators of how to determine when the key activity is being performed competently)

NAHB Performance Guidelines 2000

Additional Knowledge

(Additional skills and knowledge required to perform key activities)

References

(Nationally recognized training materials)

| Key Activity | Performance Indicators | Additional Knowledge | | | | References |
|---|------------------------|----------------------|------|------|-----------|---------------------------------------|
| | | Math | Com. | Mat. | Safety | Residential. Cons. Academy: Carpentry |
| 1. Lay out ceiling framing detail on top wall plate | | 3 | 3 | | 1,8,9 | 196, 216 |
| 2. Cut ceiling joists | | 1 | 3 | 2 | 1,4,5,8,9 | 196 |
| 3. Install ceiling joists | | | 2 | 2 | 1,4,5,8,9 | 199, 216 |
| 4. Frame ceiling opening | | 3 | 3 | 2 | 1,4,5,8,9 | 196, 199 |
| 5. Install riband | | 1 | 3 | 2 | 1,4,5,8,9 | 199 |
| 6. Install strongback (stiffner) | | 1 | 3 | 2 | 1,4,5,8,9 | 199 |
| 7. Install ceiling backing (deadwood or nailers) | | 1 | 3 | 2 | 1,4,5,8,9 | 192&193 |
| 8. Frame interior soffit | | 3 | 3 | 2 | 1,4,5,8,9 | 192 |
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HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): WF, MF

Critical Work Function (The major responsibilities of work within a concentration): **Truss Installation (Metal & Wood)**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

| Key Activity <i>(The major tasks or knowledge involved in completing the CWF)</i> | Performance Indicators <i>(Indicators of how to determine when the key activity is being performed competently)</i> | Additional Knowledge <i>(Additional skills and knowledge required to perform key activities)</i> | | | | References <i>(Nationally recognized training materials)</i> |
|---|---|--|-------------|-------------|---------------|--|
| | | Math | Com. | Mat. | Safety | |
| 1. Lay out for truss installation | See Chapter 5, page 37, 5-1 and 5-2 | 3 | 3 | | 1,8,9 | 272&273 |
| 2. Set trusses by hand | | 1 | 3 | 2 | 1,8,9 | 293 |
| 3. Set trusses with light crane | | 1 | 3 | 2 | 1,6,8,9 | 293 |
| 4. Brace trussed roof assembly | | 3 | 4 | 2 | 1,4,5,8,9 | 273-275 |
| 5. Frame opening in trussed roof assembly | | 3 | 3 | 2 | 1,4,5,8,9 | 275 |
| 6. Frame overhangs | | 3 | 3 | 2 | 1,4,5,8,9 | 377 |
| 7. Install framing hardware (connectors, hurricane clips, etc.) | | 1 | 3 | 2 | 1,8,9 | 274 |
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HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): **WF**

Critical Work Function (The major responsibilities of work within a concentration): **Roof Framing**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

| Key Activity (The major tasks or knowledge involved in completing the CWF) | Performance Indicators (Indicators of how to determine when the key activity is being performed competently) NAHB Performance Guidelines 2000 | Additional Knowledge (Additional skills and knowledge required to perform key activities) | | | | References (Nationally recognized training materials) Residential. Cons. Academy: Carpentry |
|--|--|---|-------------|-------------|---------------|--|
| | | Math | Com. | Mat. | Safety | |
| 1. Lay out roof framing detail on cap plate & ridge | See Chapter 5, pages 37-42, 5-1 to 5-23 | 3 | 4 | | 1,8,9 | 382 |
| 2. Lay out & cut common rafters | | 3 | 4 | | 1,8,9 | 255, 278-281 |
| 3. Lay out & cut hip & valley rafters & jacks | | 3 | 4 | | 1,8,9 | 261-269, 286-292 |
| 4. Install ridgeboard & rafters | | 1 | 4 | 2 | 1,4,5,8,9 | 255, 263, 269, 282&283 |
| 5. Install collar beams (rafter ties) | | 1 | 4 | 2 | 1,4,5,8,9 | 283 |
| 6. Frame/install hips & valleys | | 3 | 4 | 2 | 1,4,5,8,9 | 261-269, 286-292 |
| 7. Install rafter support purlins & bracing | | 1 | 4 | 2 | 1,4,5,8,9 | N/A |
| 8. Frame roof opening | | 3 | 4 | 2 | 1,4,5,8,9 | 259 |
| 9. Install sub-facia | | 2 | 4 | 2 | 1,4,5,8,9 | 377-379 |
| 10. Frame gable end | | 3 | 4 | 2 | 1,4,5,8,9 | 260, 285 |
| 11. Frame gable end overhang | | 3 | 4 | 2 | 1,4,5,8,9 | 259 |
| 12. Frame dormers | | 4 | 4 | 2 | 1,4,5,8,9 | 266-269 |
| 13. Install roof sheathing (e.g., nailing zones) | | 3 | 4 | 2 | 1,4,5,8,9 | 275-277 |
| 14. Frame chimney saddle (cricket) | | 4 | 4 | 2 | 1,4,5,8,9 | 348&349 |
| 15. Provide for proper roof ventilation | | 2 | 4 | 2 | 1,4,5,8,9 | 354, 415, 418-421 |
| 16. Install dry-in (roofing felt, ice & water shield) | | 2 | 4 | 2 | 1,8,9 | 341, 352 |
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HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): ET,S

Critical Work Function (The major responsibilities of work within a concentration): **Cornices**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

Key Activity

(The major tasks or knowledge involved in completing the CWF)

Performance Indicators

(Indicators of how to determine when the key activity is being performed competently)

Additional Knowledge

(Additional skills and knowledge required to perform key activities)

References

(Nationally recognized training materials)

NAHB Performance Guidelines 2000

| Math | Com. | Mat. | Safety |
|------|------|------|--------|
|------|------|------|--------|

Delmar/RCA:
Carpentry

1. Install soffit (wood, aluminum, vinyl, stucco)

3

3

2

1,4,5,8,9

377-380

2. Install fascia

3

3

2

1,4,5,8,9

378

3. Install frieze

3

3

2

1,4,5,8,9

378

HBI National Residential Carpentry Skill Standards

Specialty (Major concentration in career area): WF,ET,S

Critical Work Function (The major responsibilities of work within a concentration): **Siding**

The Work

(What does the worker need to do to be able to perform the work competently)

The Worker

(What knowledge does the worker need)

Key Activity

(The major tasks or knowledge involved in completing the CWF)

Performance Indicators

(Indicators of how to determine when the key activity is being performed competently)

NAHB Performance Guidelines 2000

Additional Knowledge

(Additional skills and knowledge required to perform key activities)

References

(Nationally recognized training materials)

| Key Activity | Performance Indicators | Additional Knowledge | | | | References |
|--|--|----------------------|------|------|-----------|-----------------------|
| | | Math | Com. | Mat. | Safety | Delmar/RCA: Carpentry |
| 1. Apply underlayment (building wrap) | See Chapter 4, Pages 24-32, 4-20 to 4-46, Chapter 5, Page 43, 5-24 to 5-26 | 2 | 3 | 2 | 1,8,9 | 307, 323 |
| 2. Install window and door flashing | | 2 | 3 | 2 | 1,8,9 | 324 |
| 3. Install beveled siding | | 3 | 3 | 2 | 1,4,5,8,9 | 367&368, 387-389 |
| 4. Install board-and-batten siding | | 3 | 3 | 2 | 1,4,5,8,9 | 389 |
| 5. Install board-on-board siding | | 3 | 3 | 2 | 1,4,5,8,9 | 389 |
| 6. Install log siding | | 3 | 3 | 2 | 1,4,5,8,9 | 389 |
| 7. Install tongue-and-groove siding | | 3 | 3 | 2 | 1,4,5,8,9 | 389, 390&391 |
| 8. Install lap siding | | 3 | 3 | 2 | 1,4,5,8,9 | 367 |
| 9. Install shake or shingle siding | | 3 | 3 | 2 | 1,4,5,8,9 | 371-373, 392&393 |
| 10. Install plywood siding | | 3 | 3 | 2 | 1,4,5,8,9 | 368-370, 392 |
| 11. Install hardboard and particleboard siding | | 3 | 3 | 2 | 1,4,5,8,9 | 368 |
| 12. Install fiber-cement siding | | 3 | 3 | 2 | 1,4,5,8,9 | N/A |
| 13. Install vinyl and metal siding & accessories | | 3 | 3 | 2 | 1,4,5,8,9 | 373-376, 394-399 |
| 14. Install gutters & downspouts | | 3 | 3 | 2 | 1,4,5,8,9 | 380&381, 400&401 |
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