



# Code Check Building 5<sup>th</sup> Edition

## Electronic Version

An Illustrated Reference for Planning, Building & Inspection



BY DOUGLAS HANSEN, SKIP WALKER & REDWOOD KARDON

Illustrations by Paddy Morrissey, Douglas Hansen & Kaia Mathewson

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Based on the 2021 editions of the International Residential Code® and related standards

### Conventions used in this book

Figures and tables accompany the text. In this relatively small book, we have used a large number of other codes and standards.

### How to navigate this book:

This PDF file contains the first (building) section of Code Check Complete 3rd edition. The print version of Code Check Building 5th (flipchart version) does not have as much material as this electronic edition, and therefore the figure and table references are not the same. The easiest way to navigate and find a particular topic is through the "Table of Contents" button at the top of the screen, where every line is directly linked to the topic it describes. Figures and tables are referenced in the text by the letters **F** and **T** followed by the figure or table number. Within the text of this book, every figure reference, page reference, and table reference is also a link. When the text references a figure or table that is not on the same page as the text, clicking on the reference number takes you to that reference, and clicking on the red "Return to Previous Page" button at the top of the screen takes you back to the text.

THE BUTTONS AT THE TOP OF EACH PAGE ARE LINKS  
THAT TAKE YOU TO THE DESCRIBED DESTINATIONS  
(LINKS NOT ACTIVE IN THESE SAMPLE SCREEN SHOTS)

summarize a particular code rule. A large amount of information into a book also uses references from a

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## ABBREVIATIONS

<b>1&amp;2FD</b> = 1- & 2-Family Dwellings	<b>DFU</b> = drainage fixture unit	<b>n/a</b> = not applicable
<b>AAMA</b> = American Architectural Manufacturers Association	<b>DW</b> = dishwasher	<b>NFPA</b> ® = National Fire Protection Association
<b>ABW</b> = Alternate Braced Wall	<b>DWB</b> = diagonal wood boards	<b>NDW</b> = naturally durable wood
<b>ACI</b> = American Concrete Institute	<b>DWV</b> = drain, waste & vent	<b>NM</b> = nonmetallic-sheathed cable
<b>AFF</b> = above finished floor	<b>EERO</b> = emergency escape & rescue openings	<b>NP</b> = not permitted
<b>AHJ</b> = Authority Having Jurisdiction	<b>e.g.</b> = for example (exempli gratia)	<b>O.C.</b> = on center
<b>AMI</b> = in accordance with MFR's instructions	<b>ex:</b> = example	<b>O.D.</b> = outside diameter
<b>AMM</b> = Alternative Materials, Design, & Methods	<b>EXC</b> = except, exception	<b>OSB</b> = oriented strand board
<b>ANSI</b> = American National Standards Institute	<b>F</b> = Fahrenheit	page, as in "see <b>p.5</b> "
<b>ASCE</b> = American Society of Civil Engineers		particleboard sheathing
<b>ASTM</b> = ASTM International (formerly American Society for Testing & Materials)		Portland cement plaster
<b>BFE</b> = base flood elevation		portal frame at garage
<b>BIPV</b> = building-integrated photovoltaic		portal frame w/ hold-downs
<b>BO</b> = building official		preservative treated
<b>BWL</b> = braced wall line		pressure-preservative treated
<b>BWP</b> = braced wall panel		pounds per square foot
<b>BTE</b> = building thermal envelope		pounds per square inch
<b>BUR</b> = built-up roof		Seismic Design Category
<b>BV-WSP</b> = WSP w/ stone/masonry veneer		SDC D <sub>0</sub> , D <sub>1</sub> , & D <sub>2</sub> inclusive
<b>C</b> = centigrade		structural fiberboard sheathing
<b>cfm</b> = cubic feet per minute	<b>IFC</b> = 2021 International Fire Code	<b>SFD</b> = Single-Family Dwelling
<b>CI</b> = cast iron	<b>in.</b> = inch(es)	<b>SHGC</b> = Solar heat gain coefficient
<b>CMU</b> = concrete masonry unit	<b>IRC</b> = International Residential Code	<b>spec</b> = specification
<b>CPSC</b> = Consumer Product Safety Commission	<b>L&amp;L</b> = listed & labeled, listing & labeling	<b>sq.</b> = square, as in sq. ft
<b>CPVC</b> = chlorinated PVC pipe	<b>lb.</b> = pound(s)	<b>SS</b> = stainless steel
<b>CS</b> = continuous sheathing (wall bracing)	<b>LIB</b> = let-in bracing	<b>T&amp;G</b> = tongue & groove
<b>CSA</b> = cross sectional area	<b>LL</b> = lot line	<b>UDWS</b> = Ultimate Design Wind Speed
<b>CS-G</b> = CS-WSP adjacent garage openings	<b>LVL</b> = laminated veneer lumber	<b>UL</b> ® = Underwriters Laboratory
<b>CS-PF</b> = continuously sheathed portal frame	<b>max</b> = maximum	<b>w/</b> = with
<b>CS-SFB</b> = CS structural fiberboard	<b>MEP</b> = mechanical, electrical, & plumbing	<b>w/o</b> = without
<b>CS-WSP</b> = CS wood structural panel	<b>MFD</b> = multifamily dwelling	<b>WR</b> = weather-resistant
<b>cu.</b> = cubic, as in cu. ft.	<b>MFR</b> = manufacturer	<b>WRB</b> = water-resistive barrier
<b>Cu</b> = copper	<b>mil</b> = thousands of an inch	<b>WSP</b> = wood structural panel
<b>DFE</b> = design flood elevation	<b>min</b> = minimum	<b>X</b> = exception in code citation
	<b>mph</b> = miles per hour	<b>Zi</b> = zinc, galvanized

Abbreviations are always accessible from the button at the top of every page. If an abbreviation is not familiar, you can look it up from here and then return to your place in the text with the red "RETURN TO PREVIOUS PAGE" button.

- Headers** 21 IRC
- Header spans per **T35,36A-E** \_\_\_\_\_ 602.7
  - Min number of full-height studs **F60** adjacent to headers per **T37** \_\_\_\_\_ 602.7.5
  - Single member headers min 2×material, face nail  
12 in. O.C. top & bottom w/ 10d nails **F60** \_\_\_\_\_ 602.7.1
  - Headers not required for nonbearing wall openings; single flat 2 in. × 4 in. member OK for span up to 8 ft. if ≤24 in. below nailing surface above 602.7.4

**Rim Board Headers**

- Rim board headers (header above top plate below top plate to top of opening) span \_\_\_\_\_
- Number of full height studs each end \_\_\_\_\_ least the number of studs displaced by \_\_\_\_\_
- Joists hangers required for all joists at \_\_\_\_\_

The eBook contains 100 illustrations and 79 tables. The text lines contain links to these illustrations and tables. When the link takes you to a different page, you can quickly return with the "RETURN TO PREVIOUS PAGE" button at the top.

**FIG. 60**

**Headers**

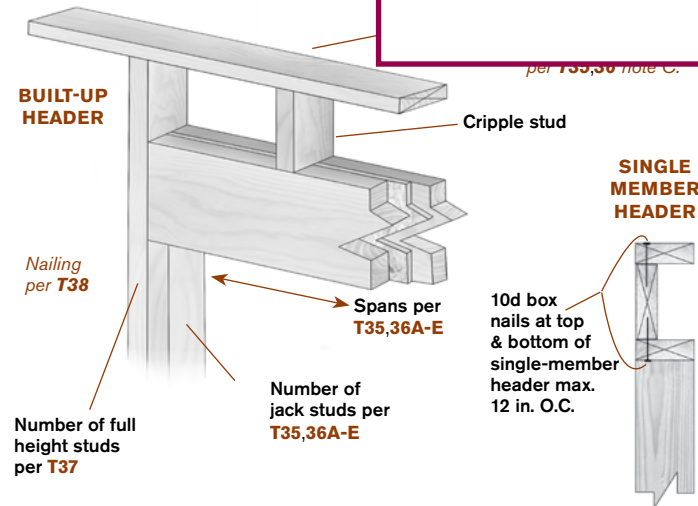
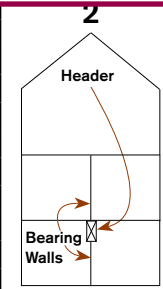


TABLE 35	ALLOWABLE GIRDER AND HEADER SPANS FOR INTERIOR BEARING WALLS <sup>A</sup> ♦ T602.7(2)					
	No. of floors supported	Size	Building Width <sup>B</sup>			
			12 ft.		24 ft.	
Span <sup>C</sup>	NJ <sup>D</sup>	Span <sup>C</sup>	NJ <sup>D</sup>	Span <sup>C</sup>	NJ <sup>D</sup>	
1	1	2-10	1	2-4	1	
1	1	4-4	1	3-6	1	
1	1	5-5	1	4-5	2	
1	1	6-6	2	5-3	2	
1	1	7-7	2	6-3	2	
1	1	6-10	1	5-7	1	
1	1	8-1	1	6-7	2	
1	1	9-6	2	7-9	2	
1	1	7-11	1	6-5	1	
1	1	9-4	1	7-8	1	
1	1	11-0	1	9-0	2	
2	1	1-11	1	1-7	1	
2	1	2-11	2	2-5	2	
2	1	3-8	2	3-1	2	
2	2	4-4	2	3-7	2	
2	2	5-2	2	4-3	3	
2	1	4-7	2	3-10	2	
2	2	5-6	2	4-6	2	
2	2	6-5	2	5-4	2	
2	1	5-4	1	4-5	2	
2	1	6-4	2	5-3	2	
2	2	7-5	2	6-2	2	



A. Based on No. 2 grade Douglas fir-larch, hem-fir, Southern pine, and spruce-pine-fir.  
 B. Building width is measured perpendicular to ridge. For building widths between those shown, spans listed in table are permitted to be interpolated.  
 C. Where top of header not laterally braced (e.g., cripple studs bearing on header as in F60), spans for 2 × 8, 2 × 10, or 2 × 12 to be multiplied by 0.70.  
 D. Number of jack studs required to support each end. If NJ=1, headers are permitted to be supported by an approved framing anchor to the full-height wall stud.

**Landings at Stairs & Interior Doors**

**21 IRC**

- Min 36 in.-deep landing at top & bottom each stairway EXC **F21,27** \_\_\_ 311.7.6
  - Door at top of interior stairs (including stairs to a garage) provided door does not swing over stairs \_\_\_ 311.7.6X
- Max 12 ft. 7 in. vertical between landings or floor levels \_\_\_ **311.7.3<sup>26</sup>**
- Max 2% slope on walking surface of treads & landings \_\_\_ 311.7.7

**Stairs & Ramps: Scope of Code Requirements**

- Egress by stair or ramp required from all habitable levels \_\_\_ 311.4
- Stairways not within or serving a building, porch, or deck are not within scope of code \_\_\_ **311.7X1<sup>27</sup>**
- Stairways to crawlspaces & non-habitable attics not in scope \_\_\_ **311.7X2&3<sup>27</sup>**

**Stair Dimensions**

- Min width 36 in. **F23** measured above handrail height EXC \_\_\_ 311.7.1
  - Spiral stairways \_\_\_ 311.7.1X
- If handrail on one side, min width 31½ in. measured at or below handrail height, 27 in. if handrails on both sides EXC \_\_\_ 311.7.1
  - Spiral stairways \_\_\_ 311.7.1X
- Min headroom 6 ft. 8 in. **F23** EXC \_\_\_ 311.7.5.3
  - Floor openings above stair OK to project max 4¾ in. into required headroom at the side of a flight of stairs \_\_\_ 311.7.5.3
  - Spiral stairways \_\_\_ 311.7.5.3

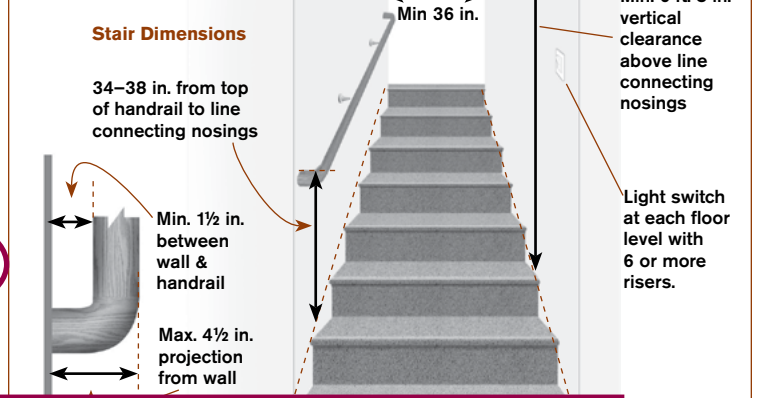
**Treads & Risers**

- Riser height max 7¾ in., tread depth min 10 in. **F24** \_\_\_ 311.7.5.1
- Tallest riser max ¾ in. taller than shortest riser **F24** \_\_\_ 311.7.5.1
- Deepest tread max ¾ in. more than shortest **F24** \_\_\_ 311.7.5.2
- Tread depth min 11 in. if no nosing projection on treads **F24** \_\_\_ 311.7.5.3X
- Measure rise & run exclusive of carpets, rugs, or runners \_\_\_ 311.7.5
- Risers vertical or sloped from tread above max 30° from vertical \_\_\_ 311.7.5.1
- Open riser treads must prevent passage of 4 in. sphere EXC \_\_\_ 311.7.5.1
  - No limit on opening size when ≤ 30 in. above floor or ground \_\_\_ 311.7.5.1
  - No limit on opening size on spiral stairways \_\_\_ 311.7.5.1X

**26.** Changed from 12 ft. 4 in. in previous code edition. The purpose of the change was to match a commonly used type of floor truss that slightly exceeded the previous maximum elevation change.

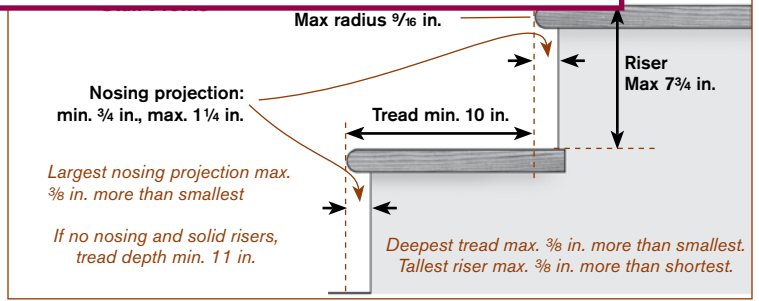
**27.** Clarification regarding items that are outside the scope of the code.

**FIG. 23**



Code changes are highlighted in the text and the change is further explained in the footnotes at the bottom of each page.

**21 IRC**  
311.7.5.3  
311.7.5.3  
311.7.5.3  
311.7.5.3



In general, concrete >2,500 psi requires special inspections and tests conducted by an approved agency, except for concrete that supports light-frame construction ≤3 stories above grade plane. The IRC does not address the question of testing for areas requiring >2,500 psi concrete in **T17**; pumped concrete will be >2,500 psi. Environmental, climate, or soils issues may necessitate testing even for buildings within the scope of the IRC, and testing is required for commercial construction. A design professional will specify which tests are needed, and building jurisdictions typically have a list of approved agencies qualified to perform special testing. ICC provides certification for special inspectors of concrete work.

**Special Inspections**

- Approved agency to be independent
- Special inspections of concrete
  - Fully supported footings support of light-frame construction, per on specified compressive strength
  - Nonstructural slabs supported
  - Prescriptive concrete foundations
  - Patios, sidewalks & driveways
- No welding of reinforcing bars

**21 IBC**

The section on concrete includes requirements from the International Building Code and from the American Concrete Institute where they also apply to residential construction.

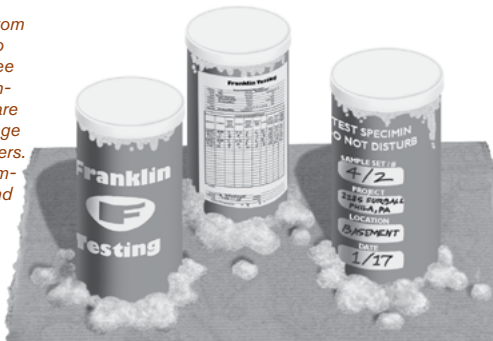
TABLE 17 CONCRETE COMPRESSIVE STRENGTH T402.2 & 404.1.3.3.1			
Type or Location of Construction	Min Compressive Strength <sup>A</sup>		
	Weathering Potential (from T2)		
	Negligible	Moderate	Severe
Basement walls, foundation & other concrete not exposed to weather	2,500	2,500	2,500 <sup>B</sup>
Basement slabs and interior slabs on grade, exterior walls & slabs exposed to the weather	2,500	2,500	2,500 <sup>B</sup>
Exterior walls & slabs exposed to the weather	2,500	3,000 <sup>C</sup>	3,000 <sup>C</sup>
Exposed to the weather	2,500	3,000 <sup>C,D,E</sup>	3,500 <sup>C,D,E</sup>
Walls, B & C	2,500		
Walls, C & D	3,000		

<sup>A</sup> Must be air-entrained per note C or subject to freeze-thaw during construction.  
<sup>B</sup> C. Must be air-entrained. Total air content by volume min 5% max 7%.  
<sup>C</sup> D. Max cementitious materials content per ACI 332 T5.4.2 or ACI 318 T26.4.2.2(b)  
<sup>E</sup> Steel-trowel finished garage slab OK to reduce air-entrainment to ≥3% if concrete is ≥4,000 psi.

FIG. 46

Test Cylinders

Strength tests are taken from the average of at least two 6×12 in. cylinders (or three 4×8 cylinders). Extra cylinders are usually made. Care must be taken in the storage and transporting of cylinders. They must be kept at a temperature between 60°F and 80°F and be taken to the lab within 48 hours.



**Testing**

**ACI 318-19**

- Strength test = average of at least two 6×12 cylinders or three 4 × 8 cylinders from same sample & tested at 28 days **F46** \_\_\_\_\_ 26.12.1.1(a)
- Samples min once per day, once per 150 cu. yards & once for each 5,000 sq. ft. of slabs or walls **F46** \_\_\_\_\_ 26.12.2.1(a)
- Min of 5 randomly selected batches for testing \_\_\_\_\_ 26.12.2.1(b)
- If total quantity < 50 cu. yds, BO may accept other evidence of satisfactory strength & waive testing \_\_\_\_\_ 26.12.2.1(c)
- If strength test fails, core testing per ASTM C42 \_\_\_\_\_ 26.12.6.1