

Residential Load Calcs and Duct Design for Building Departments

I-REN Training

Handouts

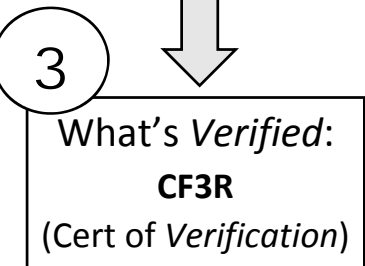
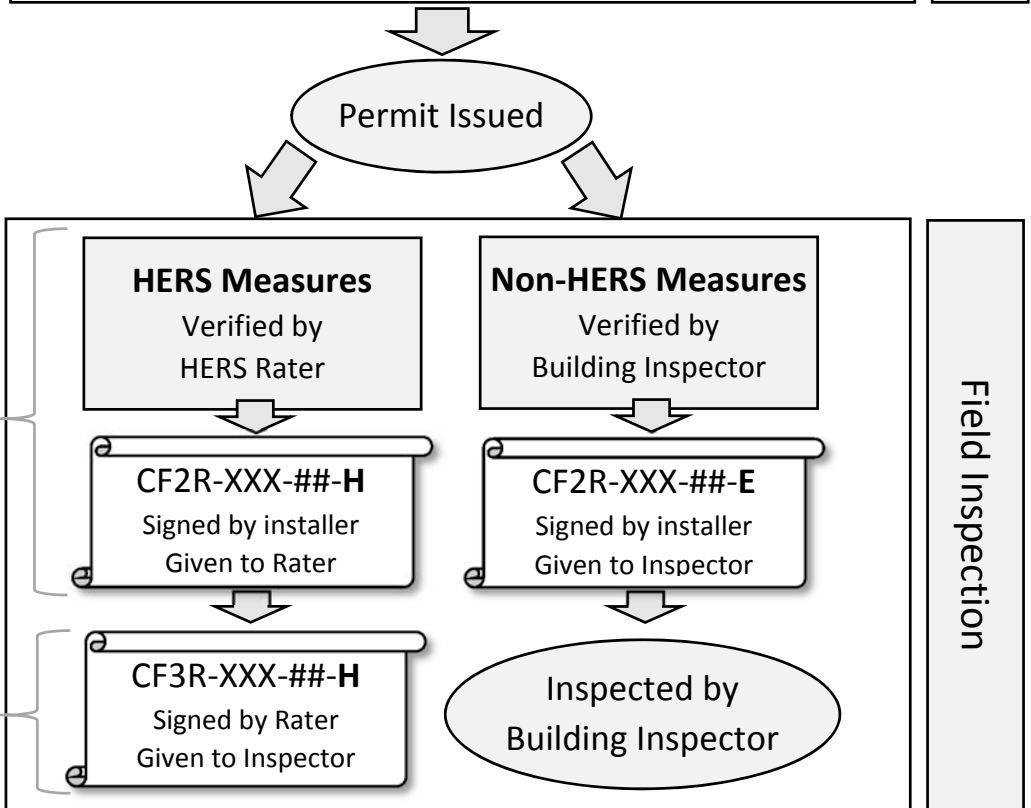
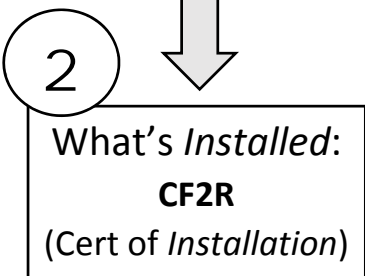
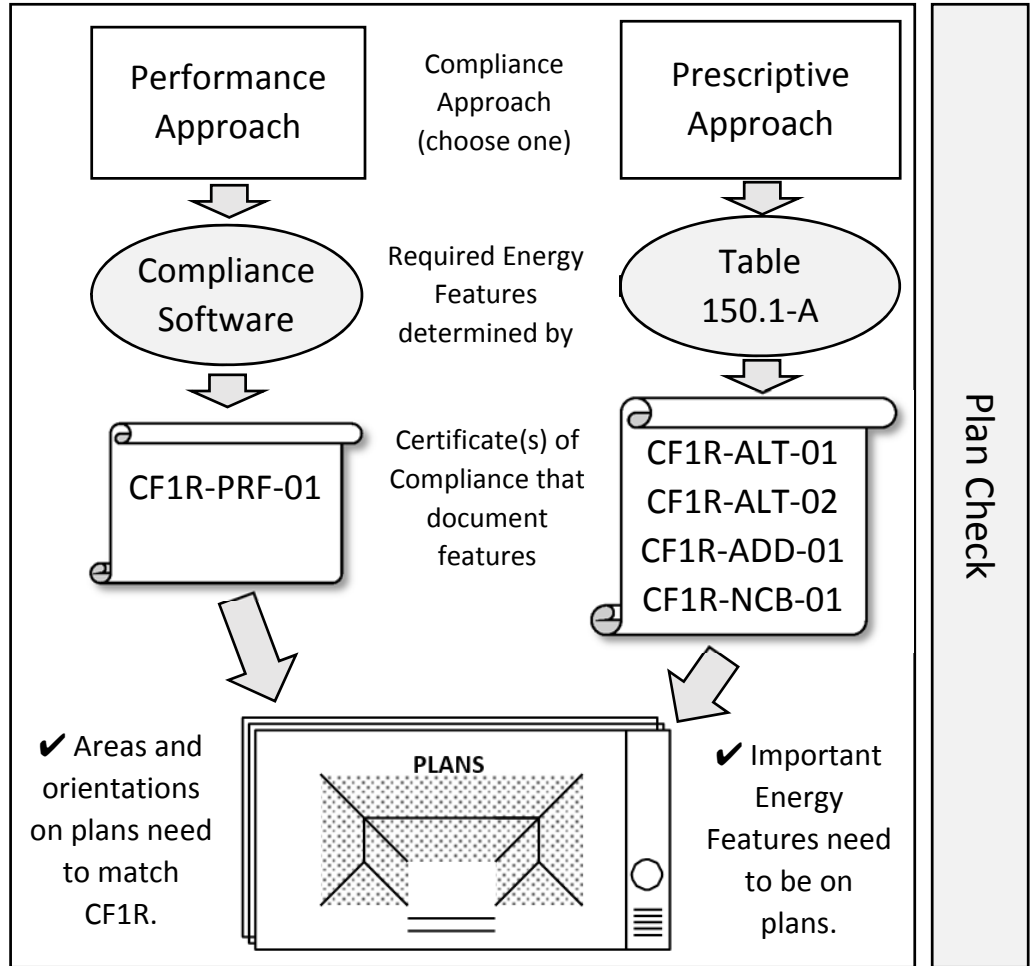
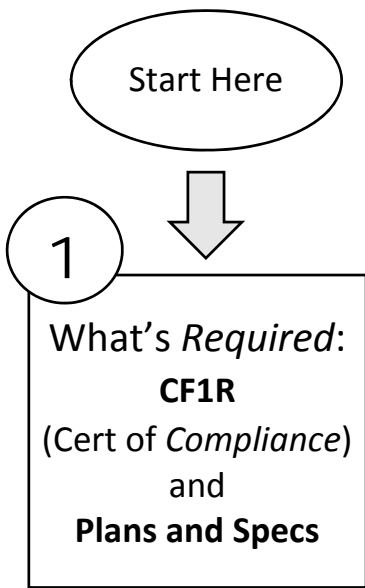
1. Compliance Process for Residential New Construction and Additions
(Flow chart)
2. Plan Check and Field Inspection Checklist for Residential Load Calcs and
Duct Design

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Handout 1:
Compliance Process
for Residential New
Construction and Additions
(Flow chart)

Compliance Process for Residential New Construction and Additions



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Handout 2:

Plan Check and Field
Inspection Checklist for
Residential Load Calcs
and Duct Design



Load Calc and Duct Design Checklist for Building Departments

Code References:

Title 24, Part 6, **Section 150.0(h)1** (load calculations per Manual J)

Title 24, Part 11, **Section 4.507.2** (Manuals J/S/D)

Plan Check:

- Duct layout/Plans Provided– Can be schematic, unless required otherwise. Should reasonably show duct layout, duct sizes and target airflow at each register.
- Room-by-room Load Calculations - Manual J
 - Room-by-room loads – (Not block loads)
 - Summary (e.g., Short J Summary) – Showing design temps and room by room loads for heating and cooling.
 - Detail – Shows all surface areas and associated loads for each room
 - Indoor design temps (Set by Title 24):
 - Heating: 68 degF
 - Cooling: 75 degF
 - Outdoor design temps (from Reference Appendix JA2):
 - Heating: Winter Median of Extremes: _____
 - Cooling:
 - 1% Dry Bulb: _____ (don't allow arbitrarily raising due to "microclimates" without prior approval)
 - 1% Mean coincident Wet Bulb: _____ (rarely an issue in dry climates)
 - Building Features- for new homes and additions, should match CF1R
 - Conditioned floor area: _____
 - Window areas, U-factor, SHGC, orientations
 - Infiltration, new construction 5 ACH50 or less. Existing homes watch for excessively high values (>10 ACH50)
 - Walls, floors, ceilings – R-values
 - Duct R-value, location and leakage
- Equipment Selection - Manual S (Should match CF2R-MCH-01 after install)
 - Manual S report, if available: Make/Model
 - AHRI Certificates for actual equipment combination: efficiencies
 - Design capacities
 - Cooling: outdoor temperature, CFM, indoor WB ~60-65 degF
 - Heating: gas furnace use output, heat pump ask for balance point diagram (17 degF and 47 degF)
 - Allowed Oversizing/Undersizing Met? See Manual S Report for allowed percentages.

Field Inspection:

- Installed building features should match CF-1R
- Installed equipment should match CF-1R and Manual S reports
- Installed ducts should reasonably match duct design layout.



Residential HVAC Design Detailed Plan Check Checklist

(This Optional Checklist provides more detail and is Based on ANSI/RESNET/ACCA 310 HVAC Design Report)

Item	Checked	Value/Notes
1. Design Basis & Architectural Scope	✓	
1.1 Design description (optional):		
1.2 Designer company:		
1.3 Software name and version used to complete design:		
1.4 Architectural plan name or address of the property:		
1.5 Architectural options accounted for in the design (master plans)		
1.6 Other architectural options that the design can be used with		
2. Dwelling-Unit Mechanical Ventilation System Design		
2.1 Unique name or ID for each system:		
2.2 Vent. equipment manufacturer:		
2.3 Specified system type:		
2.4 Specified control location:		
2.5 Ventilation zone name(s) served by system:		
2.6 Ventilation zone name:		
2.7 Design basis:		
2.8 Floor area (sq. ft.) and # bedrooms in vent. zone:		
2.9 Ventilation design airflow rate (CFM):		
2.10 Vent. runtime per cycle & cycle time (mins):		
2.11 Time-averaged mechanical vent. rate (CFM):		
3. Heat Gain & Heat Loss Loads		
3.1 Design basis for the loads:		
3.3 Indoor design temperatures used in loads (°F): Heating Season:		
3.4 Outdoor design temperatures used in loads (°F):		
3.5 Outdoor design temperature location & data source:		
3.6 Name of heated or cooled zone:		
3.7 Occupants & total occup. internal gains (Btuh):		
3.8 Total non-occupant internal gains (Btuh):		
3.9 Conditioned floor area (sq. ft.):		
3.10 Window area (sq. ft.):		
3.11 Predominant window SHGC:		
3.12 Predominant insulation nominal R-value:		
3.13 Infiltration rate (Qualitative or ACH50):		
3.14 Time-averaged mechanical vent. rate (CFM):		
3.15 Heat gain (kBtuh):		
3.16 Maximum - Minimum total heat gain (kBtuh):		
3.17 Total heat loss (kBtuh):		
4. Heating & Cooling Equipment Selection		
4.1 Unique name or ID for each system:		
4.2 Zone that system serves (See Item 3.6):		
4.3 Equipment type:		
Cooling Equipment		
4.4 Evaporator / fan coil mfr. & model #:		
4.5 Condenser mfr. & model #:		
4.6 AHRI ref. #, or check box for alt. OEM doc.:		
4.7 If AC / HP, rated cooling efficiency:		



4.8 If HP, rated heating efficiency:		
4.9 If HP, ratio of max. to min. rated capacity: Not available		
4.10 If AC / HP, blower fan motor & speed type:		
4.11 If AC / HP, compressor speed type:		
4.12 If AC / HP, meter device type:		
4.13 If TXV or EEV, OEM subcooling target (°F):		
4.14 Filter performance metric and rating:		
Heating Equipment		
4.15 Unique name or ID for each system:		
4.16 Zone that system serves (See Item 3.6):		
4.17 Equipment type: N/A		
4.18 Equipment manufacturer & model #:		
4.19 AHRI ref. #, or check box for alt. OEM doc		
4.20 If furnace or boiler, rated heating efficiency:		
4.21 If furnace, blower fan motor & speed type:		
4.22 If furnace or boiler, heating capacity type:		
4.23 If furnace or boiler, venting type:		
4.24 Filter performance metric and rating:		
5. Duct Design		
5.1 Unique name or ID for each system: 1		
5.2 Zone that system serves (See Item 3.6): Sys Block 1		
Design Values for Cooling and Heating Mode		
5.3 Design blower fan airflow (CFM):		
5.4 Design blower fan speed setting:		
5.5 Design external static pressure (IWC):		