

2013 HERS Mandatory Measures

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Certified Program:



2014 CABEC Conference

HERS Mandatory Measures

2013 Compliance Requirements

Mandatory
Measures

Prescriptive
Approach

Performance
Approach

Certified Program:



HERS Mandatory Measures

Mandatory Measures

All Projects

§ 110

Non-Residential

§ 120

Low-Rise
Residential

§ 150

Certified Program:



HERS Mandatory Measures

Low-Rise Residential

New
Construction

§150.0(m)

Additions

§150.2(a)

Alterations

§150.2(b)1

§150.2(b)2.A

Certified Program:



HERS Mandatory Measures

Low-Rise / High-Rise Residential, Hotel & Motel

Recirculating Hot Water Systems

§110.3

Certified Program:



HERS Mandatory Measures

New Construction

- Duct Leakage (§150.0(m)11)
- Duct System & Filter Grille Sizing (§150.0(m)13)
- Whole Building Ventilation - ASHRAE 62.2 (§150.0(o))

Conditional Requirements

- Ducts in Conditioned Space (§150.0(m)1)

•Additions and Alterations

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HERS Mandatory Measures

New Construction – Duct Leakage

- Nominal Airflow (Largest Value Below)
 - 400 cfm/ton Cooling Capacity (Condenser), or
 - 21.7 cfm/ton Heating Output Capacity, or
 - Actual measured airflow
 - Fan Flow Meter
 - Flow Grid
 - Powered Flow Capture Hood
 - Traditional Flow Hood

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HERS Mandatory Measures

Nominal Airflow Example

- 4 ton split system air conditioner with 60,000 BTU output furnace and a measured airflow of 1620 cfm.
 - Cooling Airflow = (4 tons x 400 cfm/ton) = 1600 cfm
 - Heating Airflow = 21.7 cfm x (60,000/1,000) = 1,302 cfm
 - Measured Airflow = 1,620 cfm
- Duct leakage based on highest value - 1,620 cfm

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New Construction – Duct Leakage

- Contractor Verification
 - Single Family & Townhouses
 - Contractor Installation Certificate (CF-2R)
 - 6% Nominal airflow at completion or
 - 4% Nominal airflow at rough installation
 - No Air Handler Installed
 - Duct boots installed but no register
 - Separate testing for supply and return

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HERS Mandatory Measures

New Construction – Duct Leakage

- HERS Rater Verification
 - Single Family & Townhouses
 - HERS Field Verification Certificate (CF-3R)
 - System must be completely finished
 - 6% Nominal Airflow
 - Central Fan Integrated Ventilation
 - Fresh air ducting to outside
 - Field verification of duct installation

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HERS Mandatory Measures

New Construction – Duct Leakage

- HERS Rater Verification
 - Field Verification
 - No Cloth back rubber adhesive tape
 - Three CEC approved cloth back rubber adhesive tapes, or
 - Mastic and drawbands
 - System entirely ducted. No building cavities used for air distribution.
 - Return fully ducted

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HERS Mandatory Measures

New Construction – Duct Leakage

- Contractor Verification
 - Multi-Family Low-Rise Residential
 - Contractor Installation Certificate (CF-2R)
 - 12% Nominal airflow at completion or
 - 6% Nominal airflow leakage to the outside
 - Blower Door and Duct Pressurization
 - No rough test available

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HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

- Applies to systems “ with forced air ducts that supply cooling to an occupiable space”.
- **Single Family, Townhouse and Multi-Family**
 - ≤ 350 cfm/ton Cooling Capacity (Condenser)
 - Measured at return air grille with filter installed
 - ≤ 0.58 watts/cfm Fan Efficacy

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HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

- **Single Family, Townhouse and Multi-Family**
 - Multi-zone systems
 - Airflow must comply for every zone configuration
 - Exception – Airflow may comply at maximum airflow and maximum compressor speed if a multi-speed or variable speed compressor is installed.

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HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

- Filter Grille Sizing – 2 Optional Approaches
 - Return grille shall have permanent label (§150.0(m)12A)
 - Grilles design air flow rate, and
 - Maximum allowable clean filter pressure drop of 12.5 Pascal's at AHRI Standard 680, and

HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

- Option 1 (Table 150.0-C)

TABLE 150.0-C: Return Duct Sizing for Single Return Duct Systems

<p>Return duct length shall not exceed 30 feet and shall contain no more than 180 degrees of bend. If the total bending exceeds 90 degrees, one bend shall be a metal elbow.</p> <p>Return grille devices shall be labeled in accordance with the requirements in Section 150.0(m)12A to disclose the grille's design airflow rate and a maximum allowable clean-filter pressure drop of 12.5 Pa (0.05 inches water) for the air filter media as rated in accordance with AHRI Standard 680 for the design airflow rate for the return grille.</p>		
System Nominal Cooling Capacity (Ton)*	Minimum Return Duct Diameter (inch)	Minimum Total Return Filter Grille Gross Area (inch ²)
1.5	16	500
2.0	18	600
2.5	20	800
<p>*Not applicable to systems with nominal cooling capacity greater than 2.5 tons or less than 1.5 ton</p>		

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HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

- Option 1 (Table 150.0-C)
 - Limited to single return systems
 - Limited to systems 1.5 - 2.5 tons cooling capacity
 - Return grille limited to:
 - 30 ft
 - Total 180° bends in duct
 - Metal elbow required when bends exceed 90°

HERS Mandatory Measures

New Construction – Option 1 Table 150.0-C

Cooling (tons)	Return Diameter (in.)	Filter Grille Area (in ²)
1.5	16	500
2.0	18	600
2.5	20	800

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HERS Mandatory Measures

New Construction – Option 2 Table 150.0-D

TABLE 150.0-D: Return Duct Sizing for Multiple Return Duct Systems

System Nominal Cooling Capacity (Ton)*	Return Duct 1 Minimum Diameter (inch)	Return Duct 2 Minimum Diameter (inch)	Minimum Total Return Filter Grille Gross Area (inch ²)
1.5	12	10	500
2.0	14	12	600
2.5	14	14	800
3.0	16	14	900
3.5	16	16	1000
4.0	18	18	1200
5.0	20	20	1500

*Not applicable to systems with nominal cooling capacity greater than 5.0 tons or less than 1.5 tons.

Each return duct length shall not exceed 30 feet and shall contain no more than 180 degrees of bend. If the total bending exceeds 90 degrees, one bend shall be a metal elbow.

Return grille devices shall be labeled in accordance with the requirements in Section 150.0(m)12A to disclose the grille's design airflow rate and a maximum allowable clean-filter pressure drop of 12.5 Pa (0.05 inches water) for the air filter media as rated in accordance with AHRI Standard 680 for the design airflow rate for the return grille.

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New Construction - Duct System and Filter Grille Sizing

- Option 2 (Table 150.0-D)
 - Limited to dual return systems
 - Limited to systems 1.5 - 5.0 tons cooling capacity
 - Each return grille limited to:
 - 30 ft
 - Total 180° bends in duct
 - Metal elbow required when bends exceed 90°

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HERS Mandatory Measures

New Construction – Option 2 Table 150.0-D

Cooling (tons)	Return Diameter (in.)		Filter Grille Area (in ²)
	Return Duct 1	Return Duct 2	
1.5	12	10	500
2.0	14	12	600
2.5	14	14	800
3.0	16	14	900
3.5	16	16	1,000
4.0	18	18	1,200
5.0	20	20	1,500

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HERS Mandatory Measures

New Construction - Duct System and Filter Grille Sizing

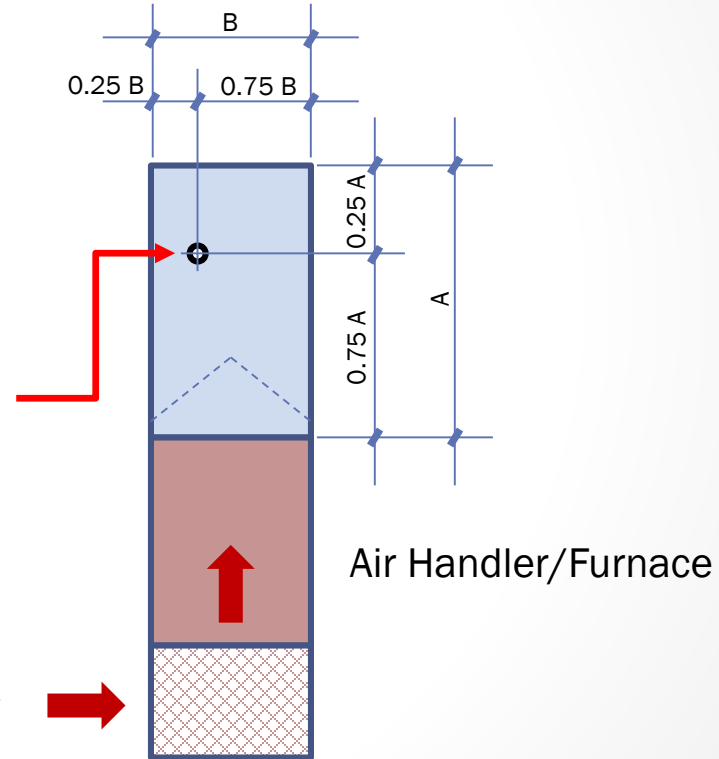
- Static Pressure Probe
 - Single Family, Townhouse and Multi-Family
 - Contractor shall install a permanent static (PSPP) or provide a hole for a static pressure probe (HSPP) in the supply plenum downstream of the evaporator coil.
 - Exception – When it is not physically possible to install the measurement hole for the probe. (Exception to §150.0(m)13A.
 - RA 3.3.1.1 – Alternative location required for PSPP or HSPP

HERS Mandatory Measures

New Construction

- Static Pressure Probe

5/16" Diameter Hole or
Permanent Static Pressure Probe
(12 point Label)



HERS Mandatory Measures

New Construction – Whole Building Ventilation

- **Single Family and Townhouses**
 - Minimum ventilation rate
 - $(\text{Conditioned Area} \times 0.01) + ((\text{No. of Bedrooms} + 1) \times 7.5)$
- **Multi-Family**
 - Minimum ventilation rate
 - $(\text{Conditioned Area} \times 0.03) + ((\text{No. of Bedrooms} + 1) \times 7.5)$

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New Construction – Whole Building Ventilation

- Ventilation may be continuous for:
 - Exhaust Fans
 - Supply Fans
 - Balanced Fans
- Ventilation may be intermittent for Central Fan Integrated Ventilation.

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New Construction – Whole Building Ventilation

- Measured by HERS Rater in field using one of the following:
 - Powered Flow Capture Hood
 - Traditional Flow Capture Hood
 - CEC Approved Flow Measurement Device
- Small exhaust fans with excessive duct runs may not comply.
- Fan selection and duct design following manufacturers design guidelines

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HERS Mandatory Measures

New Construction – Ducts in Conditioned Space (§150.0(m)1)

- Ducts must be insulated with minimum R-6 duct insulation or located entirely within directly conditioned space.
- Projects claiming “ducts entirely within directly conditioned space” are subject to HERS Field Verification and leakage not to exceed 25 cfm to the outside.

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HERS Mandatory Measures

Additions & Alterations

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Additions & Alterations

- Duct Leakage – Duct Modifications
 - When more than 40 lin. ft of ductwork installed or replaced in unconditioned space or indirectly conditioned space.
 - 15% duct leakage; or
 - 10% leakage to the outside; or
 - All accessible leaks shall be sealed and tested if compliance cannot be achieved using either option above.
 - Exceptions:
 - Ductwork with constructed or sealed with asbestos.
 - Historic Structures approved by building official.

HERS Mandatory Measures

Additions & Alterations

- Duct Leakage – Altered Space Conditioning System
 - Not allowed if duct alterations are involved.
 - Replacement of any of the following:
 - Air Handler
 - Outdoor condensing unit on AC or HP
 - Cooling Coil
 - Heating Coil

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HERS Mandatory Measures

Additions & Alterations

- Duct Leakage – Altered Space Conditioning System
 - 15% duct leakage; or
 - 10% leakage to the outside; or
 - All accessible leaks shall be sealed and tested if compliance cannot be achieved using either option above.

HERS Mandatory Measures

Additions & Alterations

- Duct Leakage – Altered Space Conditioning System
 - Exceptions:
 - Ductwork was previously sealed and confirmed by a HERS Rater.
 - Duct systems with less than 40 ft of ductwork in unconditioned space.
 - Ductwork with constructed or sealed with asbestos.
 - Historic Structures approved by building official.

HERS Mandatory Measures

Additions & Alterations

- Duct Leakage – Entirely New Duct System
 - Existing HVAC equipment may remain.
 - At least 75% new duct material.
 - Existing registers and duct boots may remain.
 - Reused parts must be accessible and sealed to prevent air leakage.

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HERS Mandatory Measures

Additions & Alterations

- Duct Leakage – Entirely New Duct System
 - Leakage at 6%
 - No increase for multi-family
 - If leakage exceeds 6%
 - Fog test distribution system. If leakage limited to existing air handler then system passes.
 - No optional approaches

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HERS Mandatory Measures

Additions & Alterations

- Entirely New Ductwork
 - Airflow must achieve 350 cfm/ton
 - Fan wattage must not exceed 0.58 watts/cfmor
 - New ductwork must meet requirements of return grille sizing in Tables 150.0-C or 150.0-D for single zone systems only.

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HERS Mandatory Measures

Additions

- > 1,000 sf must meet ASHRAE Whole Building Ventilation airflow requirements.
- Installed fan must provide required airflow for the entire addition and existing combined.
- Airflow must be verified by a HERS Rater.

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HERS Mandatory Measures

Alterations

- Performance Approach §105.2(b)2 Exception 3
 - The following Mandatory Measures do not apply to alterations
 - §150.0(m)12 – Air Filtration Pressure Drop
 - §150.0(m)13 – Return Grille Sizing
 - §150.0(m)15 – Zone Controlled Fan Flow and Fan Efficacy

HERS Mandatory Measures

Additions & Alterations (Prescriptive Only)

- Refrigerant Charge
 - Altered Space Conditioning System – Mechanical System
 - Limited to Climate Zones 2 & 8-15
 - When refrigerant containing components are installed or replaced
 - Compressor, or
 - Condensing Coil, or
 - Evaporator Coil, or
 - Refrigerant Metering (Fixed orifice or TXV), or
 - Refrigerant piping

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HERS Mandatory Measures

Additions & Alterations (Prescriptive Only)

- Refrigerant Charge
 - Includes ducted split systems, ducted package systems and mini-split systems
 - HERS Refrigerant charge verification
 - Includes 300 cfm/ton air flow or Remedial Actions (RA3.2.2.7.3)

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HERS Mandatory Measures

Additions & Alterations (Prescriptive Only)

- Refrigerant Charge – Remedial Actions
 - Replace Air Filter
 - Open registers and remove any obstructions
 - Replace crushed, blocked or restricted ducts where possible
 - Clean evaporator coil
 - Set fan to high speed and confirm proper operation per mfg.
 - Check return grille and filter size. If possible increase size of return grille and filter to improve airflow.

HERS Mandatory Measures

Additions & Alterations (Prescriptive Only)

- Refrigerant Charge – Remedial Actions
 - Reference Appendix RA 3.2.2.7.3.1
 - “Alteration of the return duct system to bring the system airflow rate into compliance is expected to be attainable for systems with ducts in an attic space with sufficient clearances for accommodating improvements to the return duct system.”

HERS Mandatory Measures

Residential & Non-Residential

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HERS Mandatory Measures

Multi-Family Water Heating (§150.0(n)2 & §110.3(c)5)

- Low-Rise Residential, High-Rise Residential, Hotels & Motels
- Central Hot Water System with 8 or more units
- Compliance requires field verification by a HERS Rater for the following items:
 - Systems with electric trace heating must incorporate automatic shut off.
 - When the system serves a public lavatory a tempering valve must be installed to limit lavatory temperature to 110 deg. F.
 - Tank must be internally insulated to R-12 or have a combined interior and exterior insulation of R-16.

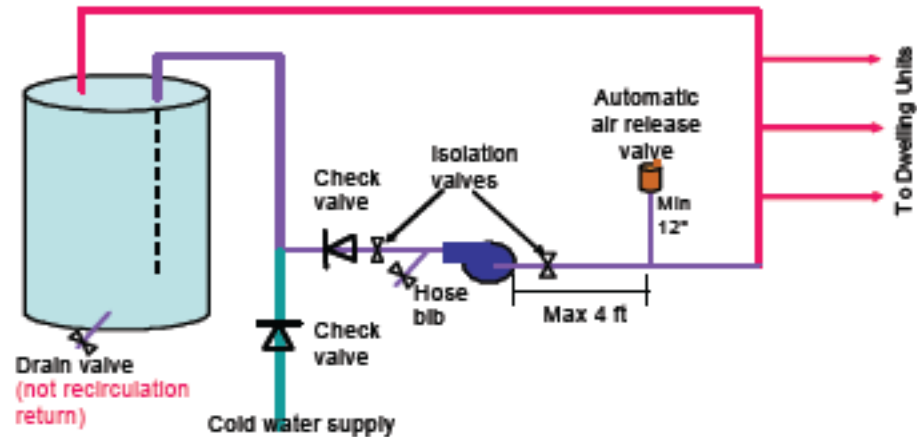
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HERS Mandatory Measures

Multi-Family Water Heating

- Provide following controls:



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HERS Mandatory Measures



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