



Quality Assurance for ENERGY STAR Version 3

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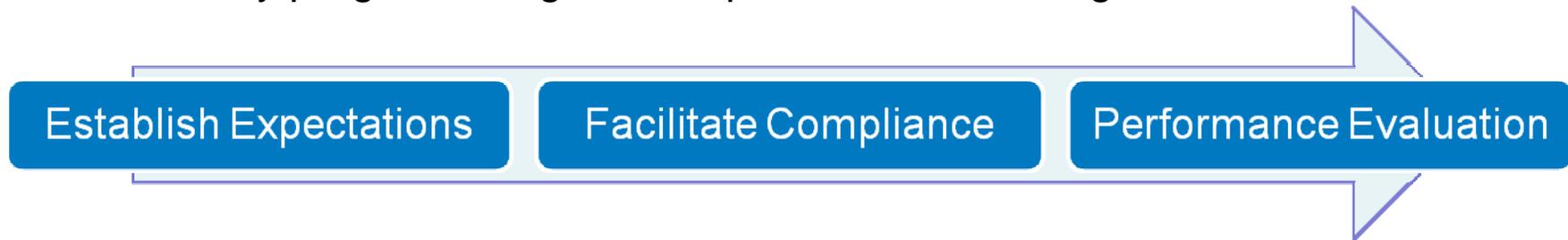
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Agenda

- Definition
- Comprehensive Program QA/QC
- QA/QC under ENERGY STAR Version 3
- Q&A

Defining Quality Assurance

- Definition - A program for the systematic monitoring and evaluation of the various aspects of a project, service, or facility to ensure that standards of quality are being met.
- A comprehensive approach to Quality Assurance must encompass:
 - Program design and address program technical standards which may consist of one or all of the following:
 - ENERGY STAR, Utility EE & DSM , and RESNET.
 - Impacts on program implementation
 - Compliance and performance evaluations whose results can be used to modify program design and implementation strategies.



Comprehensive Program QA/QC

Objectives of QA/QC Processes:

- Promote a mature, self-sustaining high-performance building industry
- Ensure that participants and subcontractors are qualified for the work they perform
- Ensure that incentives are paid for qualifying units
- Assess the accuracy of efficiencies reported to the program
- Identify and correct inconsistencies or errors for training and follow-up
- Ensure the integrity of the ENERGY STAR label and HERS rating
- Evaluate performance



Key QA elements

- **Incentive application review**
 - No duplicate incentive requests
 - Meets eligibility requirements
 - Complete documentation is provided
- **Data file review (rater data file, plans, TBC)**
 - Assess accuracy and completeness of rater data file
 - Confirm that modeling utilized worst-case
- **In-field inspections**
 - Verify efficiencies of modeled measures and accuracy of information reported to program
 - Assess accuracy of checklists
 - Identify missed opportunities for energy or material/labor savings
- **Key considerations for QA program design**
 - **What will you look for?**
 - Measures that most impact building performance
 - Measures that are variable or hardest to verify
 - Measures that you suspect to be the most frequently non-compliant
 - **How will you select homes for QA?**
 - Random sampling
 - Stratified sampling
 - Dynamic sampling
 - Higher rates of inspection for new partners and partners who failed measures

Key QC elements:

- **Participation agreements for builders, raters and providers**
 - Access to homes, plans, and ratings for inspections
 - Defined corrective action process for non-compliance
- **Annual program kickoff meetings**
- **Orientation meeting for new partners**
 - Establish program expectations
 - Initiate collaboration to achieve consistent compliance
 - For builders and subcontractors: Mandatory in-field training on first home
- **Provide technical support**
 - Facilitate HERS rater classes
 - Facilitate a regional HERS organization to identify and promote consistent use of best practices
 - Provide ongoing trainings on construction, verification, and business best practices
 - Program Account Management team
 - Leverage ENERGY STAR & building science resources

QA/QC under ENERGY STAR v.3

Implementation of Version 3

- Establish program expectations for:
 - Participants, Service Providers, and Utility Sponsors
 - Establish the reason(s) for participation in the ENERGY STAR for New Homes program:
 - Homebuilder (ENERGY STAR certification , federal tax credits, utility incentives, marketing and product differentiation, other)
 - Utility (good will, legislative mandate, other)
- Initiate a Pilot Study to determine Version 3 impacts which will:
 - Gather direct, local information that will provide for adequate planning and preparation for Version 3 implementation
 - Minimize program disruptions and ensure program goal achievement

Establish Requirements and Expectations

Quality Assurance Program requirements for utility sponsored programs should adequately define the measures and processes that must be applied to participating homes, including:

- Incentive eligibility criteria
- Measures that must be applied to homes and the efficiencies of those measures
- Inspection and testing protocols
- Modeling requirements (including software and versions)
- Required supporting documentation
- Evaluation, Measurement and Verification (EMV) reporting requirements

Training

- Prior to and during construction, provide on-site program training for all subcontractors (framing, HVAC, plumbing, electrical, etc.) to clearly address:
 - Expectations, roles and responsibilities
 - Program design
 - Implementation issues
 - Checklist verification and performance testing
 - Clearly define what role Quality Assurance plays in the program
 - Example: Analyzing which checklist items most frequently required corrections suggests measures that are particularly challenging and should be addressed with additional training.

Version 3 Implementation – Checklists

Prerequisite for qualification is that the home must comply with the following requirements:

- Thermal Enclosure System Rater Checklist
- HVAC System Quality Installation Contractor Checklist
- HVAC System Quality Installation Rater Checklist
- Water Management System Builder Checklist
- Water Management System Rater Checklist

To be eligible for qualification, a home must meet the other requirements listed in the national program requirements, including all requirements by a Rater.

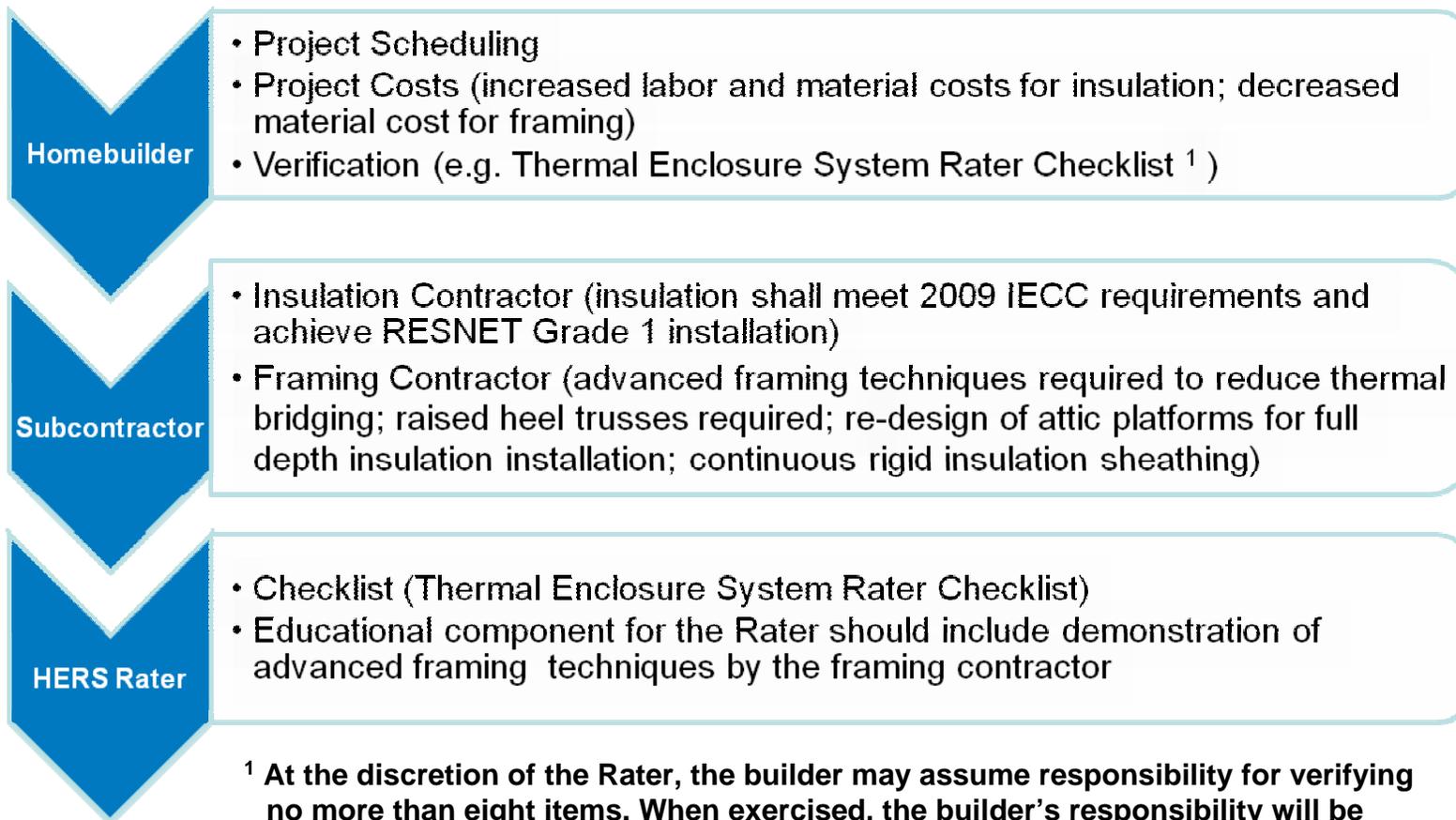
Thermal Enclosure System Rater Checklist

Core components:

1. High Performance Windows
2. Quality Installed Insulation
3. Fully Aligned Air Barriers
4. Reduced Thermal Bridging
5. Air Sealing



Thermal Enclosure System Rater Checklist - Version 3 Impacts



¹ At the discretion of the Rater, the builder may assume responsibility for verifying no more than eight items. When exercised, the builder's responsibility will be formally acknowledged by signing off on the checklist for the item(s) they verified.

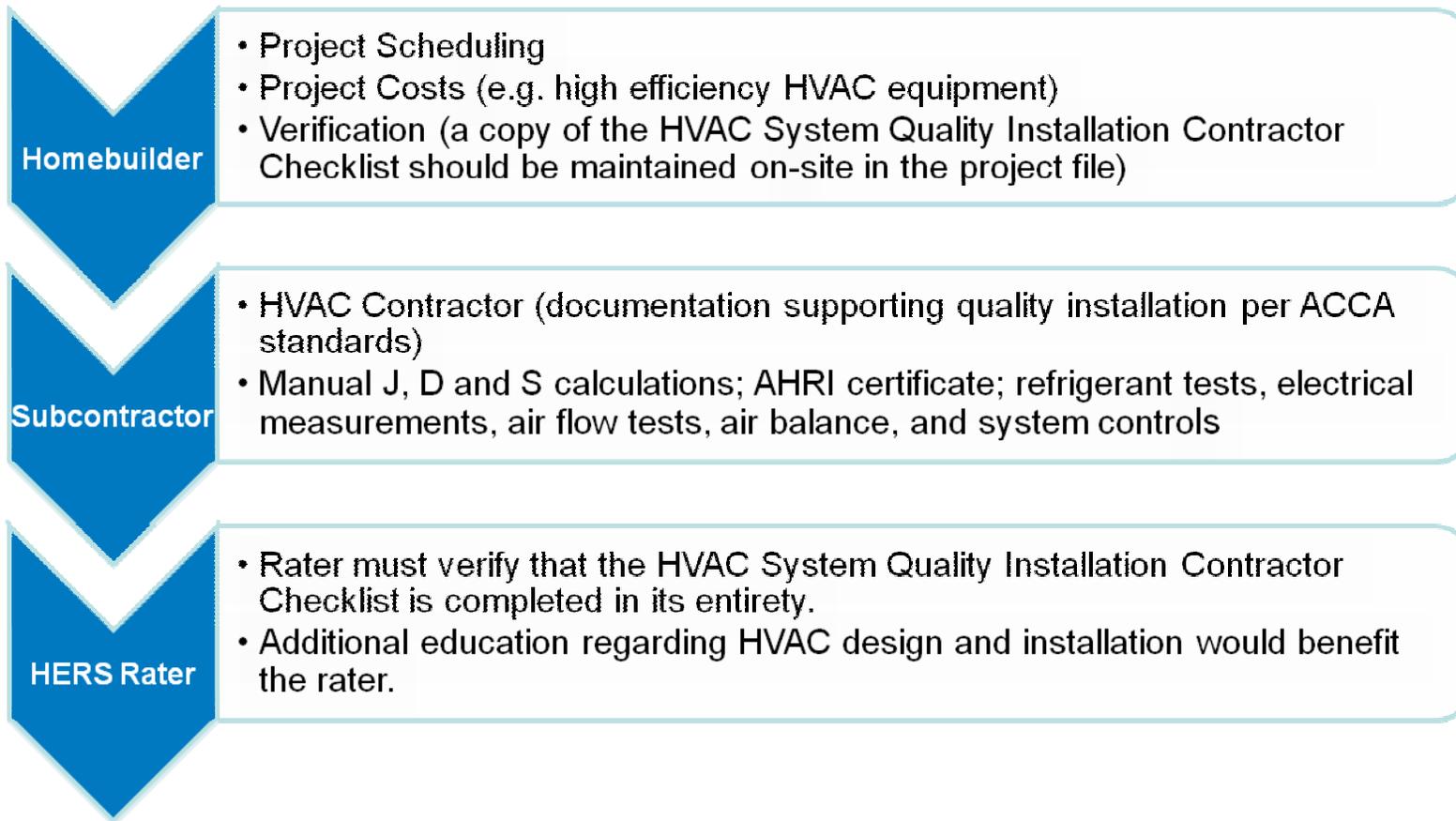
HVAC System Quality Installation Contractor Checklist

Requirements:

1. Whole Building Mechanical Ventilation Design
2. Heating and Cooling System Design
3. Selected Cooling Equipment (if applicable)
4. Selected Heat Pump Equipment (if applicable)
5. Selected Furnace (if applicable)
6. Refrigerant Tests
7. Refrigerant Calculations
8. Electrical Measurements
9. Air Flow Tests
10. Air Balance
11. System Controls
12. Drain Pan



HVAC System Quality Installation Contractor Checklist - Version 3 Impacts



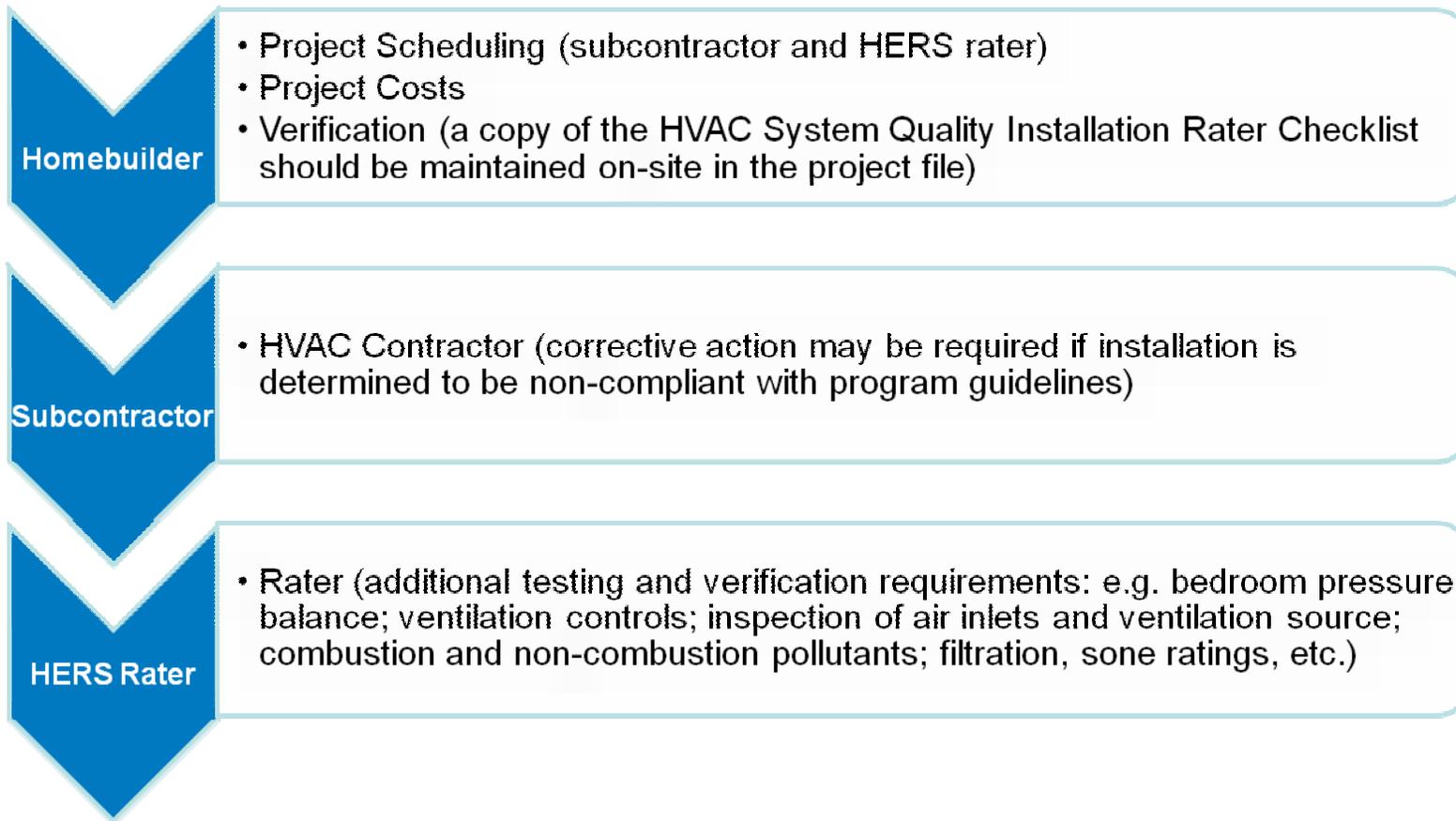
HVAC System Quality Installation Rater Checklist

Requirements:

1. Review of HVAC System Quality Installation Contractor Checklist
2. Duct Quality Installation
3. Duct Insulation
4. Duct Leakage
5. Whole Building Delivered Ventilation
6. Ventilation Controls
7. Air Inlets and Ventilation Source
8. Local Mechanical Exhaust
9. Ventilation and Exhaust Fan Ratings
10. Combustion and Non-combustion Pollutants
11. Filtration



HVAC System Quality Installation Rater Checklist - Version 3 Impacts



Water Management System Builder Checklist - Version 3 Impacts

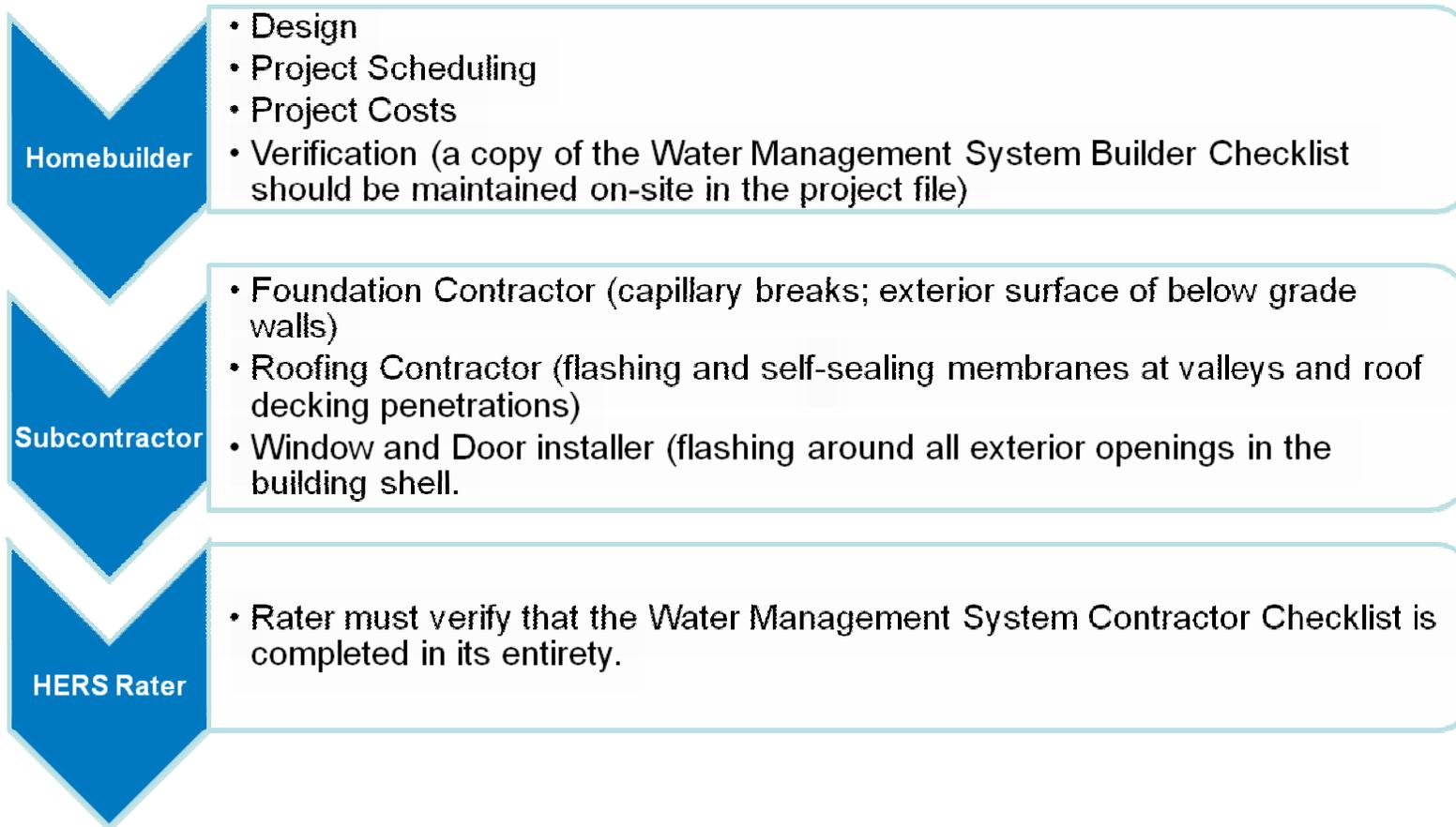
Requirements:

1. Water Managed Foundation Assembly
2. Water Managed Roof Assembly
3. Water Managed Building Materials

Water management should be incorporated into the project at the design stage and verified throughout the construction cycle.



Water Management System Builder Checklist



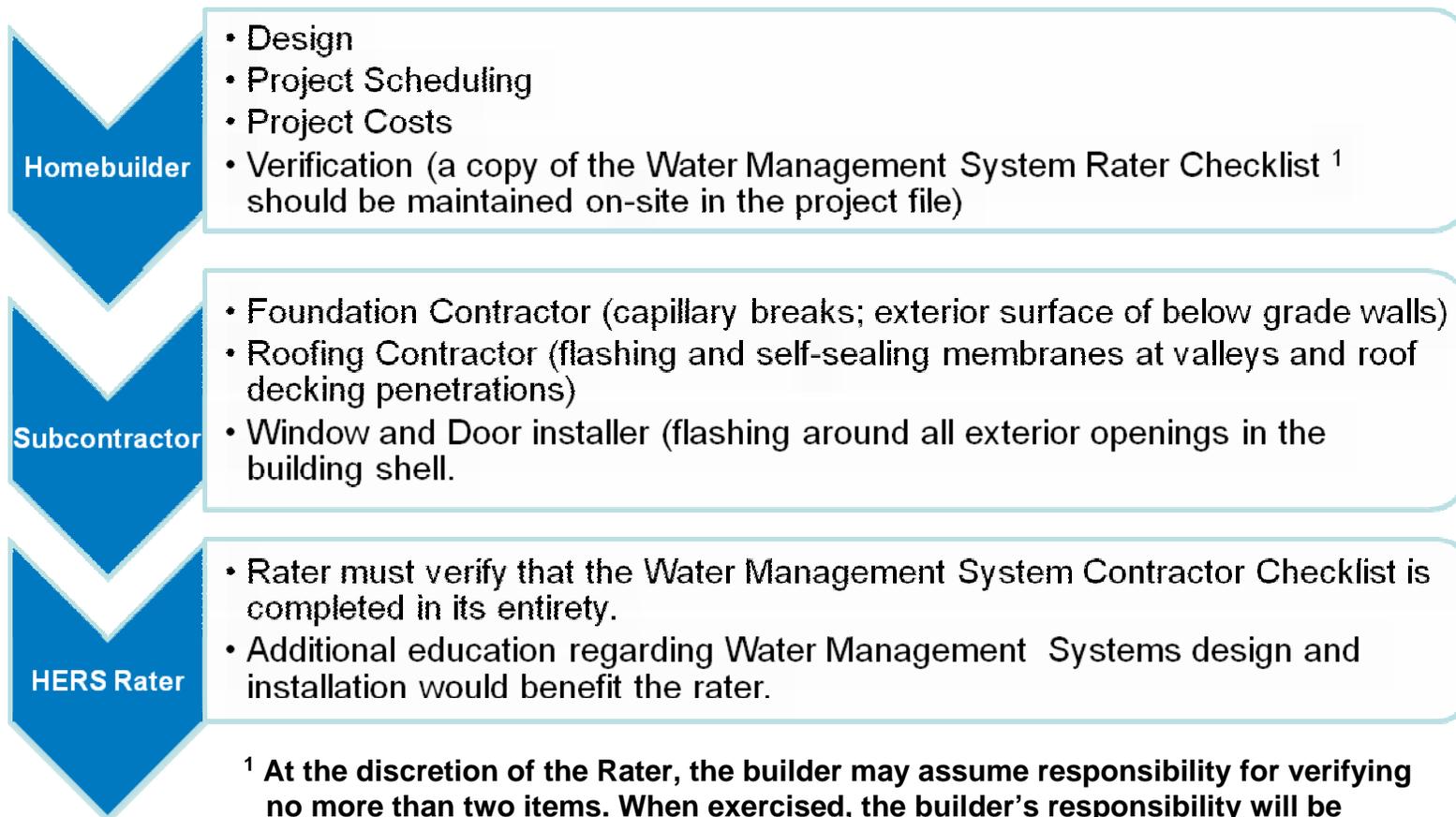
Water Management System Rater Checklist - Version 3 Impacts

Requirements:

1. Review of Water Managed System Builder Checklist
2. Water Managed Foundation Assembly
3. Water Managed Roof Assembly
4. Water Managed Building Materials



Water Management System Rater Checklist



¹ At the discretion of the Rater, the builder may assume responsibility for verifying no more than two items. When exercised, the builder’s responsibility will be formally acknowledged by signing off on the checklist for the item(s) they verified.

Quality Assurance On-site Inspections

- On-site inspections provide a quick and reliable snapshot of the construction quality and program compliance of the project.
 - On-site inspections verify a number of the rated features contained in the data file for the home.
 - Thermal Enclosure Systems inspections will verify the accuracy of submitted TES forms (e.g. fully aligned air barriers, reduced thermal bridging, air sealing, etc.).
 - Duct leakage and air leakage testing can proactively identify deficiencies prior to and after encapsulation without the need for future destructive corrections.
 - Floor plans and elevations should be collected when available. This information is typically uploaded as supporting document in PDF format.
 - The plans, combined with the inspection data and photos of the home, allow the program to independently generate HERS Indices for the homes.

Adapting and Improving Quality Assurance

- Quality Assurance procedures should include established mechanisms for evolving program designs based on the results of on-site inspections and plan analysis.
- Continued outreach and training opportunities ensure that expectations are being met, program compliance is achieved and program goals are being met.
- The Quality Assurance program should also include procedures for addressing non-compliant participants, subcontractors and HERS raters.
- If program requirements are not being met these procedures typically include the following:
 - Probation
 - Suspension
 - Expulsion

Questions & Answers



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