

PROCESS

Building Science Institute, Ltd. Co. Process 005-2022 Quality Control Conformity Assessments for Verification Organizations

Related policies

[Building Science Institute, Ltd. Co. Policy 05-2021 Conflicts of Interest](#)

[Building Science Institute, Ltd. Co. Policy 08-2021 Terminology](#)

[Building Science Institute, Ltd. Co. Policy 09-2021 General Requirements for Verification Organizations](#)

[Building Science Institute, Ltd. Co. Policy 10-2021 Structural Requirements for Verification Organizations](#)

[Building Science Institute, Ltd. Co. Policy 11-2021 Resource Requirements for Verification Organizations](#)

[Building Science Institute, Ltd. Co. Policy 12-2021 Process Requirements for Verification Organizations](#)

This process applies to Building Science Institute, Ltd. Co. True North Quality Management Services Quality Assessors and Building Science Institute-credentialed Verification Organization Quality Assessment Designees, Verifiers, and Software Analysts.

Reference Documents

[Building Science Institute Policy 05-2021 Conflicts of Interest](#)

[Building Science Institute Policy 09-2021 General Requirements for Verification Organizations](#)

[Building Science Institute Policy 10-2021 Structural Requirements for Verification Organizations](#)

[Building Science Institute Policy 11-2021 Resource Requirements for Verification Organizations](#)

[Building Science Institute Policy 12-2021 Process Requirements for Verification Organizations](#)

[Building Science Institute Process 001-2021 Ethics Compliance & Homeowner Inquiry Resolution](#)

[Building Science Institute Process 002-2021 Building Science Education Training & Certification System](#)

[Building Science Institute Process 003-2021 Conformance Assessment Program Management](#)

[Building Science Institute Process 004-2021 Prepare & Plan a Conformity Assessment](#)

[Building Science Institute Process 006-2021 Assessment Report](#)

[Building Science Institute Process 007-2021 Conformity Assessment Follow-up & Closure](#)

[Building Science Institute Process 009-2021 Root Cause Analysis](#)

[Building Science Institute Procedure A-2021 Field Conformity Assessment](#)

[Building Science Institute Procedure B-2021 File Conformity Assessment](#)

[Building Science Institute Procedure C-2021 Organizational Conformity Assessment](#)

ANSI/RESNET/ICC 301-2019, including all addenda

ANSI/RESNET/ICC 380-2019, including all addenda

ANSI/RESNET/ACCA 310-2020

Level One: Is the Work Done?

Level One is the structured workflow process embedded in HouseRater. For each verification visit (airsealing, pre-drywall, final, etc), each element to be verified at that visit is identified in HouseRater. If the Verifier attempts to close the visit without verifying a required element, HouseRater prompts them to verify the element or manually override the prompt.

The manual override may be necessary in cases where the element is not present at the time of the verification visit, and will be added to the list of elements to be verified on the next visit or a re-verification visit scheduled when the element is present.

HouseRater flags the missing data.

Level Two: Is the Work Complete?

Level Two is the review by a Software Analyst of the data collected in HouseRater by a Verifier. The Software Analyst checks for flags created by missing data, based on program participation requirements.

If the Verifier work is not complete and required data is missing, a Field Verifier must collect and document the missing data in HouseRater.

Level Three: Does the Verifier Know What Data to Collect & Document?

When HouseRater flags missing data, it notifies the Quality Assessor or Quality Assessment Designee. The Quality Assessor or Quality Assessment Designee contacts the Verifier to discuss why the data was not collected and records the reasons given. These responses are tracked to identify if a systemic problem exists that needs correction. If the missing data causes a change in the ERI of more than 3 points or results in 1 non-conformance item on ENERGY STAR QA Checklists, the Quality Assessor or Quality Assessment Designee must perform an observation of the Verifier in conformance with Building Science Institute Procedure A-2021 Field Conformity Assessment.

This assessment identifies gaps between Verifier performance and conformance with ANSI/RESNET/ICC 301-2019, ANSI/RESNET/ICC 380-2019, ANSI/RESNET/ICC 310-2020, and ENERGY STAR Certification Protocols.

The following non-conformances **must** trigger that additional review, either remotely or in-person:

- Differences between field data collected and documentation that create more than 3 points difference on ERI
- Differences between field data & documentation collected and file data that create more than 3 points difference on ERI
- More than 5 non-conformance items on Building Science Institute Procedure A-2021 Field Conformity Assessment Checklist (data collected does not align with documentation collected)
- 1 non-conformance item on ENERGY STAR QA checklist
- Non-conformances that trigger additional reviews must undergo a root cause analysis in conformance with Building Science Institute [Process 09-2021 Root Cause Analysis](#)

Level Four: Is the Data Reasonable?

As data is collected and entered into HouseRater, validation checks are made on over 300 elements depending on as-built features. These validations checks are for reasonability. If entered data is outside the reasonability boundaries, that element is red-flagged which prevents certification.

The Software Analyst may manually override a red-flagged item in cases where the reasonability boundary does not represent the as-built element.

Level Five: Is the Data Unreasonable?

If a Software Analyst manually overrides a red-flagged item from Level Four, HouseRater notifies the Quality Assessor. The Quality Assessor must perform an observation of the Software Analyst in conformance with Building Science Institute Procedure B-2021 File Conformity Assessment. This is the Software Analyst equivalent of the Verifier field observation.

This assessment identifies gaps between Software Analyst performance and conformance with ANSI/RESNET/ICC 301-2019 and ENERGY STAR Certification Protocols.

The following non-conformances **must** trigger that additional review, either remotely or in-person:

- Differences between field data collected and documentation that create more than 3 points difference on ERI
- Differences between field data & documentation collected and file data that create more than 3 points difference on ERI
- More than 5 non-conformance items on Building Science Institute Procedure B-2021 File Conformity Assessment Checklists (data collected does not align with documentation collected)
- 1 non-conformance item on ENERGY STAR QA checklist
- Non-conformances that trigger additional reviews must undergo a root cause analysis in conformance with Building Science Institute [Process 09-2021 Root Cause Analysis](#)

Level Six: Can the Home be Certified as an ENERGY STAR New Home?

Prior to certification as an ENERGY STAR Certified Home, the Quality Assessor or Quality Assessment Designee reviews the HouseRater quality control dashboard to ensure the project does not have any outstanding issues, is under the correct program version based on permit date, and is eligible for the label and certificate.

Level Seven: Does the Process Work?

The Quality Assessor reviews a randomly selected sample of files through HouseRater. The number of files reviewed (sample size) is determined by the number of homes certified by each regional division of the verification organization (the population size) in a calendar year, and is proportional to the work performed by each Verifier and Software Analyst.

The sample size must be chosen to provide a 95% confidence level, a population proportion of 0.5, with a 5% margin of error to be considered statistically significant.

Population is the number of homes certified by each division of verification organization

Population proportion of failures is the number of failures divided by the population size. In the context of certifying homes, it is the fraction of homes that get certified as compliant when they do not comply. This parameter is generally unknown, but needed in order to calculate an appropriate sample size for a binomial distribution. As a consequence, the conservative choice of 0.5 is generally used, because it yields the largest sample size.

Z-score is a standardized value that represents the standard deviations of a member of population from the mean. The equation to calculate z-score is: $z = (\text{population} - \text{mean of population}) / \text{standard deviation of population}$. 95% of an evenly distributed population will have a z-score of 1.96.

Margin of error is how much error is allowed.

Confidence is the proportion of times the answer will be right.

For an online calculator for this equation, visit calculator.net/sample-size-calculator.html and enter the required data (confidence level, margin of error, population proportion, and population size) to calculate the required sample size.

Necessary sample size from a finite population that provides 95% confidence (+ 5% margin of error) that a randomly selected home from that population earned ENERGY STAR is calculated with this equation:

Sample size for finite population = $((Z\text{-score}^2 * \text{PopProp} * (1\text{-PopProp}) / \text{margin of error}^2) / (1 + (((Z\text{-score}^2 * \text{PopProp} * (1\text{-PopProp})) / \text{margin of error}^2) - 1) / \text{population}))$

For example, if a division of a verification organization performed 4,000 certifications in a calendar year:

Population = 4,000

Confidence Level = 1.96, the corresponding Z-score constant for 95%

Population proportion = 0.5

Margin of Error = 0.05, 5%

Sample Size $n = ((1.96^2 * 0.5 * (1-0.5)) / 0.05^2) / (1 + (((1.96^2 * 0.5 * (1-0.5)) / 0.05^2) - 1) / 4000))$

$n = ((3.8416 * 0.5 * 0.5) / 0.0025) / (1 + (((3.8416 * 0.5 * 0.5) / 0.0025) - 1) / 4000))$

$n = ((3.8416 * 0.25) / 0.0025) / (1 + (((3.8416 * 0.25) / 0.0025) - 1) / 4000))$

$n = (0.9604 / 0.0025) / (1 + (((0.9604 / 0.0025) - 1) / 4000))$

$n = 384.16 / (1 + ((384.16 - 1) / 4000))$

$n = 384.16 / (1 + (383.16 / 4000))$

$n = 384.16 / (1 + 0.09579)$

$n = 384.16 / 1.09579$

$n = 350.578122$

The number of file reviews required must be rounded to nearest whole number, e.g., 101.4 is rounded to 101 and 67.6 is rounded to 68. A number ending in > 0.5 is rounded up and <0.5 is rounded down.

A sample size of 351 files reviewed for conformance is required for a population of 4,000 energy ratings.

Non-conformances discovered through routine Quality Management work conducted by the Quality Assessor or Quality Assessment Designee may trigger an additional review of the responsible party's verification activities. The following non-conformances **must** trigger that additional review, either remotely or in-person:

- Differences between field data collected and documentation that create more than 3 points difference on ERI
- Differences between field data & documentation collected and file data that create more than 3 points difference on ERI
- More than 5 non-conformance items on Building Science Institute Procedure A-2021 Field Conformity Assessment and Procedure B-2021 File Conformity Assessment Checklists (data collected does not align with documentation collected)
- 1 non-conformance item on ENERGY STAR QA checklist
- Non-conformances that trigger additional reviews must undergo a root cause analysis in conformance with Building Science Institute [Process 09-2021 Root Cause Analysis](#)

This assessment identifies gaps between performance and conformance with ANSI/RESNET/ICC 301-2019, ANSI/RESNET/ICC 380-2019, ANSI/RESNET/ICC 310-2020, and ENERGY STAR Certification Protocols.

Level Eight: Are the Verifiers & Software Analysts Performing the Correct Procedures?

Annually (or more frequently if errors are discovered during the course of normal QA/QC Level 1 - 7 activities), each Verifier & Software Analyst must be observed performing field verification / software analysis on a dwelling unit by a Quality Assessor or Quality Assessment Designee.

Field Verifiers are observed for conformance in accordance with Building Science Institute Procedure A-2021 Field Conformity Assessment and Software Analysts are observed for conformance in accordance with Building Science Institute Procedure B-2021 File Conformity Assessment.

Verifiers are observed for both Building Science Institute procedures.

This assessment identifies gaps between performance and conformance with ANSI/RESNET/ICC 301-2019, ANSI/RESNET/ICC 380-2019, ANSI/RESNET/ICC 310-2020, ENERGY STAR Certification Protocols.

Level Nine: Does the Verification Organization's Quality Management System Conform with Building Science Institute Policies, Processes, & Procedures?

Annually (or more frequently if errors are discovered during the course of normal QA/QC activities warrant), the Building Science Institute's True North Quality Management Services Quality Assessors must perform an assessment of the verification organization's Quality Management System in accordance with Building Science Institute [Procedure C-2021 Organizational Annual Conformity Assessment](#).

This conformity assessment includes a review of conformance with Building Science Institute Policies [09-2021 General Requirements for Verification Organizations](#); [10-2021 Structural Requirements for Verification Organizations](#); [11-2021 Resource Requirements for Verification Organizations](#); [12-2021 Process Requirements for Verification Organizations](#); and ENERGY STAR® Certification Protocols and referenced standards.

Assessment Data Collection and Analysis

Energy simulation files for every ENERGY STAR® Certified Home shall be collected by the Building Science Institute through HouseRater.

HouseRater quality control checks include, but are not limited to, more than 300 checks for validity and reasonability on inspection requirements, program-level validations, project reasonability, climate, building, utilities, garages, floors, foundations, roofs, ceilings, doors, windows, walls, cooling systems, heating systems, duct systems, thermostats, infiltration, mechanical ventilation, water heating, rim joists, slabs, skylights, solar thermal systems, PV systems, clothes washers, clothes dryers, dishwashers, refrigerators, dehumidifiers, ranges, and lighting.

Documentation reviews are to identify gaps between site data and documentation collected, between site data & documentation collected and energy simulation files, for completion of ENERGY STAR checklists (National Rater Design Review, National Rater Field Checklist, etc.), and to ensure the verifier reviewed the National HVAC Design Report.

- For verification organizations with internal Quality Assessment Designees, the internal quality function must review the flagged items from the HouseRater quality control reports in conformance with Levels 3 & 5 QC.
 - True North QMS assessors assigned to the verification organization review the HouseRater quality control reports with the verification organization's internal quality function monthly.
- For verification organizations without internal Quality Assessment Designees, True North QMS assessors must review the flagged items from the HouseRater quality control reports on an on-going basis.

Verifiers must have their work observed either in real-time or through HouseRater on an on-going basis in conformance with Level 3 & 5 QC. A gap assessment between the verifier or software analyst's original work and file reviews / field observations by the Quality Assessor / Quality Assessment Designee shall be performed by the Quality Assessor / Quality Assessment Designee.

- For verification organizations with internal Quality Assessment Designees, the internal quality function must perform the observations in real-time or through HouseRater on an on-going basis.
 - File reviews are performed after all verification activities (site data collection and software analysis) have been performed and prior to certification of home, in conformance with Level 7 QC.
 - Each Verifier and Software Analyst must have 1 annual review of their verification activities, either remotely or in-person, in conformance with Level 8 QC.

- For verification organizations without internal Quality Assessment Designees, the assigned True North QMS Quality Assessor must perform the file reviews in real-time or through HouseRater on an on-going basis.
 - File reviews are performed after all verification activities (site and software analysis) have been performed and prior to certification of home, in conformance with Level 7 QC.
 - Each Verifier and Software Analyst must have 1 annual review of their verification activities, either remotely or in-person, in conformance with Level 8 QC.
- For multi-family projects, the dwelling units selected should be 1st floor units adjacent to garages or elevator shafts; upper floor units adjacent to stairwells or elevators; top floor units on corners of the building.

The assessment criteria are:

- Differences between field data collected and documentation that create more than 3 points difference on ERI
- Differences between field data & documentation collected and file data that create more than 3 points difference on ERI
- More than 5 non-conformance items on Building Science Institute Procedure A-2021 Field Conformity Assessment and Procedure B-2021 File Conformity Assessment Checklists (data collected does not align with documentation collected)
- 1 non-conformance item on ENERGY STAR QA checklist

If a Verifier or Software Analyst has more than 2 projects that are non-conforming in a 12 month period, that individual must be placed on suspension in conformance with Building Science Institute [Process 01-2021 Ethics Compliance & Homeowner Inquiry Resolution](#).

If a Verifier or Software Analyst has more than 3 projects that are non-conforming in an 18 month period, that individual must have their credential revoked per Building Science Institute [Process 01-2021 Ethics Compliance & Homeowner Inquiry Resolution](#).

If objective evidence shows conclusively that a Verifier or Software Analyst has deliberately conducted their verification activities to permit a home that does NOT meet the ENERGY STAR New Homes program requirements to become certified, that individual must have their credential revoked by the Building Science Institute.

On an annual basis, the Building Science Institute's True North Quality Management Services must assess (Level 9 QC) the verification organization's conformity, using Building Science Institute Procedure C-2021 Organizational Annual Conformity Assessment, against the following criteria:

- ENERGY STAR New Homes Certification Process requirements
- ANSI/RESNET/ICC 301-2019
- ANSI/RESNET/ICC 380-2019
- ANSI/RESNET/ACCA 310-2020
- ANSI/ACCA Standard 12 QH-2018
- Building Science Institute Policies [02-2021 Code of Ethics](#), [05-2021 Conflicts of Interest](#), [06-2021 Impartiality & Objectivity](#), [09-2021 General Requirements for Verification Organizations](#), [10-2021 Structural Requirements for Verification Organizations](#), [11-2021 Resource Requirements for Verification Organizations](#), [12-2021 Process Requirements for Verification Organizations](#)
- Building Science Institute Processes [01-2021 Ethics Compliance & Homeowner Inquiry Resolution](#), [02-2021 Building Science Education Training & Certification System](#), [08-2021 Sampling](#), [09-2021 Root Cause Analysis](#)
- Building Science Institute Procedures [A-2021 Field Conformity Assessment](#), [B-2021 File Conformity Assessment](#)

This is a document and record examination that includes, but is not limited to:

- Software files used to generate ERI for ENERGY STAR certification
- Verifier credentials
 - only verifiers/software analysts who have been credentialed to perform verifications in conformance with ENERGY STAR Certification Protocols are permitted to do verification work, including energy simulation files
 - rating organization must report list of verifiers/software analysts employed or contracted by them for inclusion in Building Science Institute database
- Training records
- Employee interviews

- Physical examination of ENERGY STAR certified homes
- Data analysis
- Performance reports by internal Quality Assessment Designees or True North QMS Assessors
- Customer feedback
- Observation of verification activities (on-site observations, performance testing, energy software analysis)
- Impartiality and independence of verification activities
- Confidentiality
- Administrative requirements
- Organization and management requirements
- Personnel
- Facilities and equipment
- Verification methods and procedures
- Handling verification items
- Verification records
- Certification reports and certificates
- Complaints and appeals
- General management system documentation
- Control of documents
- Control of records
- Management review
- Corrective actions
- Preventive actions

Remote observation of verification activities is permitted; a visual recording of the remote observation (with audio) is required to be kept for at least 3 years and made available to the Building Science Institute's True North QMS Quality Assessors.

Homes selected for file review and field observation should be as representative as possible across builders and communities.

For verification organizations with internal Quality Assessment Designees, during the annual conformity assessment the True North QMS Quality Assessors must observe and review documentation that the internal Quality Assessment Designees performed quality control per the Building Science Institute's quality assessment process.

On-site Assessment Management for Level 9 Quality Control Conformity Assessment

The Building Science Institute's True North Quality Management Services assessment team must confer periodically to:

- Exchange information
- Evaluate assessment progress
- Re-assign work between assessment team members as needed
- Review assessment findings
- Review any other appropriate information collected during the assessment against the assessment criteria
- Agree on the assessment conclusions
- Prepare recommendations if specified by assessment objectives
- Discuss assessment follow-up
- Prepare for meetings with the verification organization representatives (internal quality assessment function and/or verification activities manager)

The lead assessor must periodically communicate assessment progress and any concerns to the verification organization's representatives.

When available assessment evidence indicates the assessment objectives are unattainable, the lead assessor must report the reasons to the verification organization to determine appropriate action, which may include reconfirmation or modification of the assessment plan, changes to the assessment objectives or assessment scope, or termination of the assessment.

During the opening meeting, the lead assessor must address and obtain consensus with the auditee on these potential concerns:

- Assessment plan or schedule changes
- Non-conformity reporting
- Process for providing additional evidence to address a potential non-conformance

The lead assessor must emphasize the systems and processes are being assessed, not individual employees.

The final assessment team meeting is held after areas for improvement have been identified and before the exit meeting.

The assessment team:

- Decides the content of the report
- Summarizes all non-conformities
- Finalizes a list of improvement opportunities
- Decides on a list of positive practices and achievements

Opening Meeting

The purpose of the opening meeting is to:

- Confirm agreement of all parties to the assessment plan
- Introduce the assessment team
- Ensure that all planned assessment activities can be performed

The agenda of the opening meeting is:

1. Review of the assessment plan and assessment activities

- The lead assessor must confirm the assessment plan and other relevant arrangements such as:
 - Date and time for closing meeting
 - Interim meetings between the assessment team and the verification organization's management
 - Any late changes
- The lead assessor must present the methods used to conduct the assessment, including advising the auditee the assessment evidence will be based on a sample of information available
- The lead assessor must introduce the methods to manage risks to the verification organization which may result from the presence of the assessment team
- The lead assessor must confirm:
 - The assessment criteria
 - The formal communication channels between the assessment team and the verification organization's representatives
 - The verification organization representatives will be kept informed of the assessment progress during the assessment
 - The resources and facilities needed by the assessment team are available
 - Matters relating to confidentiality and information security
 - Relevant health, safety, emergency, and security procedures for the assessment team
 - Information on the method of reporting assessment findings
 - Information about termination conditions for the assessment
 - Information about the closing meeting
 - Information on how to deal with possible findings during the assessment
 - Information about feedback systems from the verification organization's representatives on the findings or assessment conclusions, including any complaints or appeals

1. Roles and responsibilities

- The lead assessor must chair the opening meeting

- Verification organization management must attend the opening meeting
- The verification organization's representatives and the lead assessor must achieve consensus on:
 - The individual who will represent the verification organization on all matters during the assessment
 - Assessor access to verification activities to be assessed
 - Facilities for assessment team use
 - Support personnel to be provided, such as escorts, specialists, verifiers, energy software analysts, etc.
 - Safety and regulatory requirements
 - Protection of proprietary information

Establishment of Objective Evidence

Evidence must be recorded and verifiable. Evidence must be verified by at least two of the following:

- Documents and records
- Verbal statements
- Repeated observations
- Measuring and testing
- Simulation

Assessment Conclusions

The conformity assessment conclusions address issues such as:

- The extent of conformance with the assessment criteria
- The robustness of the quality management system, including quality management system effectiveness in meeting objectives
- The effective implementation, maintenance, and improvement of the quality management system
- Achievement of assessment objectives
- Coverage of assessment scope
- Fulfillment of assessment criteria
- Root causes of findings

Exit and Closing Meetings

The closing meeting must be facilitated by the True North QMS lead assessor and is held to present the assessment findings and conclusions.

Verification organization management and those responsible for verification activities must attend.

The participants should agree on the time frame for an action plan to address assessment findings.

The lead assessor must:

- Advise the auditee the evidence collected was based on a sample of available information
- Explain the reporting method
- Explain the process of handling assessment findings and possible consequences
- Present the assessment findings and conclusions in a way they are understood and acknowledged by the auditee's management
- Explain processes for corrective action implementation, assessment complaint handling, and appeals

The lead assessor must also ensure there is an agenda for the exit meeting, keep an attendance record, and keep minutes of any discussions or agreements made during the meeting.

Approved by Building Science Institute Quality Council January 25, 2022

Not Voting: Brett Dillon, Chair

Approve: Erik Straite, Amber Wood, Brian Christensen, Kevin Burk

Reject: None

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