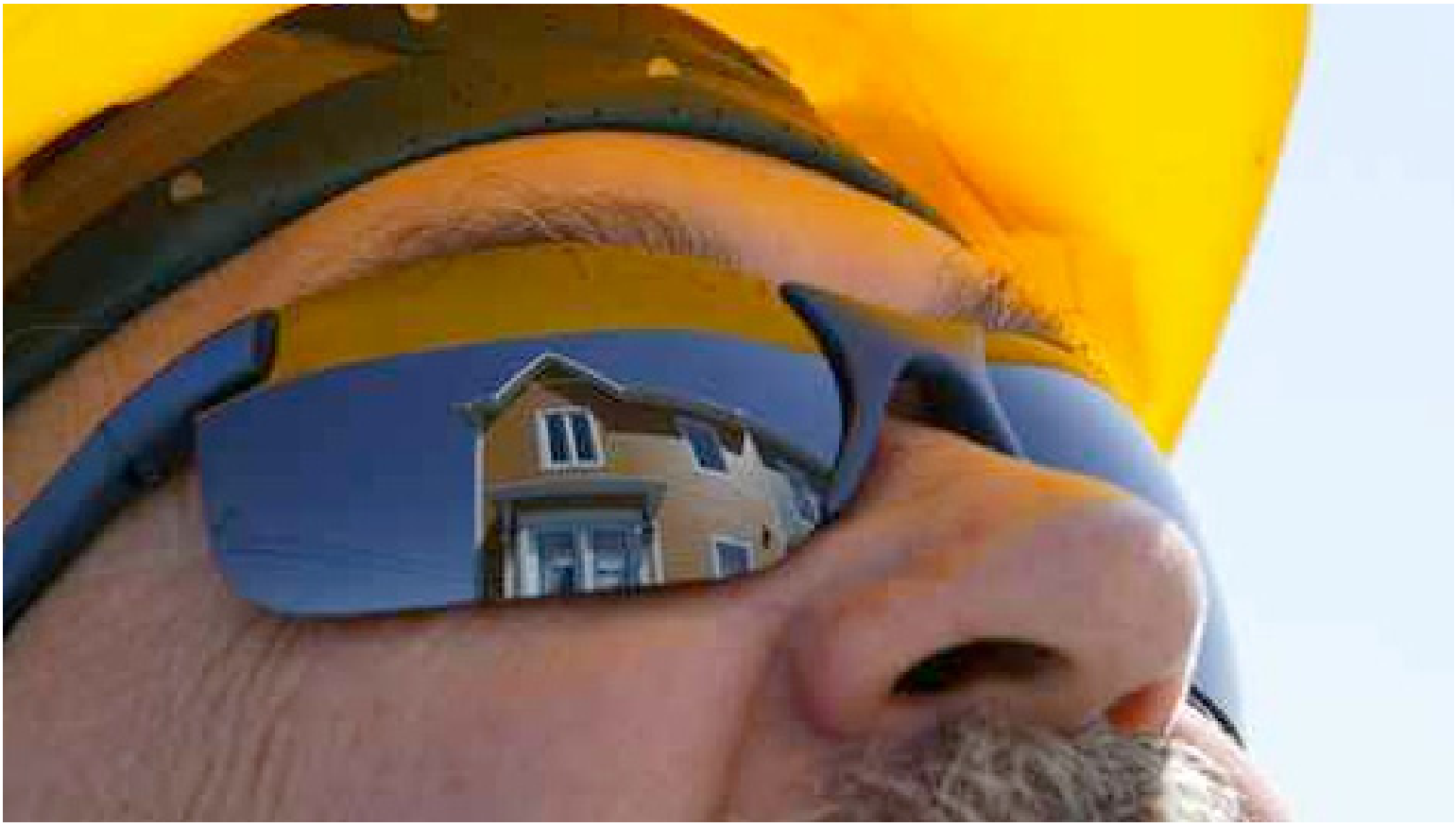

BSC Building America Quality Control Checklist

version 1.0 - October 3, 2008

INCLUDED IN THIS PACKAGE

- How to use the the BSC Building America QC Checklist
- Checklist Part 1: Pre-drywall Inspection
- Checklist Part 2: Finish Inspection
- Resource Appendix with BSC Information Sheets

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Building AMERICA
U.S. Department of Energy
Research Toward Zero Energy Homes

How to use the BSC-Building America QC Checklist

The Building America Quality Control Checklist has been developed by Building Science Corporation as both a guide to assist in the transition to high performance home building, and as a simplified tool to be used as part of any builder's on-site quality control procedures.There are two parts to this document: the checklist and the resource appendix.

The Checklist

The checklist contains the most critical points that should be verified during the construction of a high performance house. The checklist is not a substitute for good design and good workmanship but can be a common point of reference and part of a minimum standard of quality for high-performance construction.

The overall checklist is divided into a pre-drywall inspection and a final inspection. These two points correspond to the verification steps in many common energy efficiency programs. The each of the checklist divisions is further subdivided to more closely correspond to typical phases of the construction process.

The Resource Appendix

In the attached appendix, some of the checklist items are explained in more detail. While it is not possible to address every conceivable construction detail, common situations and the applicable building science principles are explained with helpful graphics, photographs, references to common building codes, and our suggestions for other electronic and printed resources that can be used for further research.

The appendix is divided into a series of short information sheets, each addressing one of the checklist items, which allows you to assemble packages of information for specific trades or construction phases.

The Building America Quality Control Checklist should be used at five key parts of the construction process.

Design

At the house design stage, the checklist can be used to assess the readiness of drawings prior to contract negotiations. The checklist and appendix also serves as a resouce for designers during detailing and material selection.

Contract Negotiation

During contract negotiation, the Checklist provides a clear, concise means of outlining the what work needs to be done to achieve performance targets like the BSC BA Minimum Performance Specification. The Checklist can be used as a short form of the BA High Performance Scopes of Work. The Checklist list should be discussed during negotiations and included in contract and scope of work documents.

Training

Conduct trade group meetings as recommended by the "BSC 7-Steps to High Performance Housing" document (www.buildingscience.com/QA). The QC Checklist is an important part of this meeting - use it to facilitate discussion between site supervision and all trades and crews with overlapping work by walking through construction steps and checklist verification points. The Checklist can be divided into sections. Use each Checklist section and the referenced Information Sheets in the Resource Appendix as handout information to each trade crew.

On-site Verification

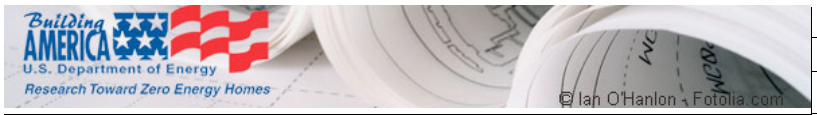
Give the checklist to both site supervision and trades. Everyone should have access to the same information about what is expected. During construction, the checklist is to be completed by the site supervisor. BSC recommends that digital photographs be taken to document checklist items as construction proceeds. The site supervisor should work to integrate the recommended verifications into their daily routine.

Buyer Assurance

The completed checklist is a confirmed record of the high quality of your construction. This record can be offered to the homebuyer as an important assurance of quality. Include the completed checklist in a homeowner manual that contains other important documents about the house and its systems.

Building Science Corporation will update this checklist from time-to-time. To make sure that you have the most up-to-date version, please check the quality assurance page on our website:

www.buildingscience.com/QA



Builder Name:	
Project:	
Lot Number:	

BSC Building America Quality Control Checklist

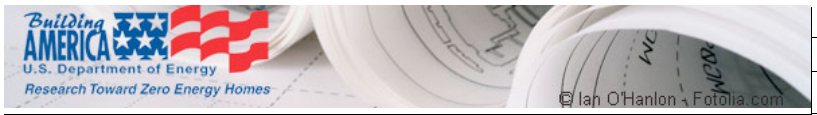
Part 1 - Pre-drywall Inspection

Foundations		Completion Verified
A drainage plane must be provided with sub-grade drainage for below grade spaces	ref: BSC Information Sheet 101	☐
Exterior or interior perimeter footing drainage system is installed		☐
Drainage membrane or draining insulation is installed around below grade walls		☐
Free-draining backfill is installed over perimeter drainage		☐
Sub-slab gravel bed is connected to perimeter drainage		☐
Perimeter drainage is connected to storm water drain or sloped to daylight		☐
A capillary break separating the entire foundation from the soil must be provided	ref: BSC Information Sheet 101	☐
A below-slab capillary break has been installed		☐
A capillary break has been installed on the foundation wall and footings (horizontal and vertical surfaces)		☐
Use soil gas resistant construction techniques	ref: BSC Information Sheet 110	☐
Floor openings, concrete joints, and foundation checks have been sealed against gas entry		☐
Floor drains and sumps have been sealed against gas entry		☐
Passive vent stack with "T" in sub-slab gravel bed has been installed		☐

Pre-Cladding		Completion Verified
Protect construction materials from moisture before installation	ref: n/a	☐
Keep all building materials dry during storage on-site		☐
Separate wood from concrete or masonry with appropriate capillary break	ref: n/a	☐
Sill plates separated from foundation wall with capillary break		☐
A drainage plane must be provided that is integrated with flashings	ref: BSC Information Sheets 300, 302	☐
Drainage plane has been installed in a continuous manner		☐
Sheet material has been properly lapped to drain water		☐
All flashing elements specified have been correctly installed		☐
Drainage plane overlaps flashing or connected by a transition membrane		☐
Drainage holes and through-wall flashing have been provided at brick seat		☐
A drainage plane must be accompanied by a drainage space	ref: BSC Information Sheet 300	☐
Materials to create drainage gap have been installed as specified		☐
Intentional drainage spaces are clear of construction debris		☐
Subsill flashing: windows and doors must be "pan-flashed"	ref: BSC Information Sheet 301	☐
All windows and door openings are "pan-flashed"		☐
Pan-flashing installed with end dams and positive slope towards the exterior		☐
Flashing materials are correctly lapped		☐
Reservoir claddings must be "uncoupled" from wall assemblies	ref: BSC Information Sheet 304	☐
Reservoir claddings (such as brick, stucco and fiber cement) are back-ventilated with min. 1/4" ventilation space (1" for brick) or are installed over a moisture-tolerant and vapor impermeable material		☐
A continuous air barrier must be provided	ref: BSC Information Sheets 403, 404, 405, 406	☐
Air sealing provided between bottom plates and floor deck		☐
Rim joists areas are caulked or sealed with sprayed foam		☐
Carrying beams running to outside walls and beam pockets are sealed		☐
Perimeter of windows and doors are sealed on the interior side with low-expansion foam or sealant		☐
Bathtubs on exterior walls have draftstopping materials installed behind tub		☐
Fireplace enclosures have draftstopping material installed to line enclosure		☐
Cantilevered floors (including floors over attached garages) are sealed with spray-foam or sealant as appropriate		☐
Bay and Bow Windows are sealed		☐
Walls and ceilings separating attached garages from living space are properly sealed by: installing gas-proof membrane, taping gypsum board, and sealing all penetrations		☐
Chimney chases and interior soffits running to exterior walls have been draftstopped and air sealed		☐
Electrical wiring or outlets on exterior walls and other penetrations have been sealed		☐
Only airtight-rated recessed lights installed in insulated ceilings		☐
Vapor control of wall, roof and foundation assemblies must be provided as specified	ref: BSC Information Sheet 311	☐
Materials with vapor permeability characteristics matching the products specified for each assembly in the construction documents have been installed		☐

Pre-insulation		Completion Verified
Wet rooms should have floor drainage	ref: BSC Information Sheet 305	☐
Floor drainage installed in bathrooms and showers		☐
Floor drainage installed in laundry rooms		☐
Floor drainage installed in mud rooms		☐
Install floor drain and drain pan where water heater is installed over living space		☐
Paper faced gypsum board should not be used in multi-family party walls or any part of the building constructed before the roof is applied	ref: n/a	☐
Plumbing should not be located in exterior walls	ref: n/a	☐
Make plumbing easy to inspect and repair and insulate plumbing pipes to keep them warm (above dewpoint temperatures)	ref: BSC Information Sheet 305	☐
Access panels for plumbing inspection have been installed where specified on plans.		☐
Pipe insulation has been installed on exposed hot and cold runs not located in walls.		☐

Pre-drywall		Completion Verified
Install insulation to meet HERS Insulation Installation Grade 1	ref: BSC Information Sheet 501	☐
Few installation defects, only very small gaps around wiring, electric outlets, etc. and incomplete fill amounts to 2% or less. Gaps running clear through the insulation amount to no more than 2% of the total surface area covered by the insulation. Wall cavity insulation is enclosed on all six sides and in substantial contact with the sheathing material on at least one side (interior or exterior) of the cavity.		☐
ENERGY STAR Thermal Bypass Inspection Checklist has been completed		☐



BSC Building America Quality Control Checklist

Builder Name:	
Project:	
Lot Number:	

Part 2 - Finish Inspection

Mechanical System Inspection

		Completion Verified
Sealed Combustion Equipment	ref: BSC Information Sheet 601	☐
Sealed combustion equipment provided as specified		☐
Sealed combustion equipment installed as specified		☐
Ventilation system design must have the capacity to meet the requirements of ASHRAE 62.2 and must be commissioned at 60% of ASHRAE 62.2	ref: BSC Information Sheet 610	☐
Ventilation system provided and installed as specified		☐
Ductwork to inside and outside are properly installed and connected		☐
Ventilation system control has been installed and commissioned as specified		☐
Air filter housings must be airtight to prevent bypass or leakage		☐
Interior spaces must be air pressure balanced (less than 3 Pascals between all spaces). Transfer grilles or jump ducts to be provided for any closed room without a return grille (except bathrooms, closets, pantries and laundry rooms)	ref: BSC Information Sheets 604	☐
Transfer grilles have been installed where indicated on the plans		☐
Duct systems properly sized and placed	ref: n/a	☐
Duct runs are placed where indicated on the drawings or layout has been revised with mechanical designer		☐
Conditioning system design loads must be determined according to ACCA Manual J and equipment must be sized using ACCA Manual S	ref: n/a	☐
Air conditioning system supplied and installed as specified		☐
Part load dehumidification must be provided in IRC Zones 1 and 2 ("Hot-Humid Climates") for buildings and units less than 2000 square feet	ref: BSC Information Sheet 620	☐
If included in the design, part-load dehumidification system has been provided and installed as specified		☐
Dehumidification system controls have been installed and commissioned as specified		☐
Ducts should be located inside the enclosure air barrier.	ref: BSC Information Sheet 602	☐
If located outside, leakage must be limited to 5% of the total air handling system rated air flow at high speed (nominal 400 CFM per ton) determined by pressurization testing at 25 Pa.		☐
Building cavities not used as part of the forced air supply or return system		
Supply and return ductwork sealed to be airtight	ref: BSC Information Sheet 603	☐
Ductwork has been air sealed at joint locations and equipment connections		☐
Ductwork is sealed to supply and return boots		☐
Protect ductwork during construction	ref: n/a	☐
Ductwork rough-in protected from construction debris		☐
Supply and return duct boots have been covered during interior finishing		☐
Exhaust vents and intake ducts correctly placed	ref: BSC Information Sheet 606	☐
Exhaust and intake ducts installed where indicated on plans		☐
Clothes dryers vented outdoors		☐

Landscaping

		Completion Verified
Provide strips around buildings free of planting and organic mulch	ref: n/a	☐
A 24" wide strip free of organic mulch and planting has been provided around buildings		☐
Bushes and trees are at least 36" away from building		☐
Site surface water is controlled by appropriate grading and landscape measures	ref: BSC Information Sheet 101	☐
Grade on all sides of building slopes away from building		
Patios and decks are installed lower than the finished floor and slope away from the building		☐
Garage floor is lower than the finished floor and slopes away from the building		☐
Driveway is lower than garage floor and slopes away from the building		☐
Finished grade is lower than main floor and slopes away from the building		☐
Stoops, porches and walkways are lower than the main finished floor and slope away from the building		☐

Exterior Finish

		Completion Verified
Separate wood from concrete or masonry with appropriate capillary break	ref: n/a	☐
Deck and stair posts held off concrete with metal brackets or other non-organic spacer		☐
Detail deck to house connection (including ledger to wall connection) to shed water away from house and to allow natural drying of assembly		☐
Install exterior flashing and drainage	ref: BSC Information Sheet 302	☐
Step flashing at all roof/wall intersections and terminated with "kickout" flashing or overhang		☐
Gutters and downspouts or other roof drainage system has been installed		
Select building materials that are insect resistant (steel framing, concrete framing, treated wood framing and sheathing, plastic or plastic composite cladding, cement or fiber cement cladding, brick or stucco cladding)	ref: n/a	☐
Insect resistant materials are installed where specified on the plans		☐

Pre-occupancy

		Completion Verified
Paper faced gypsum board should not be used in "wet areas"	ref: BSC Information Sheet 407	☐
Paper-faced gypsum board not used in bathrooms, showers, laundry rooms and mudrooms		☐
Raise gypsum board minimum of 1/2" above concrete slab		☐
An environmental separation between attached garages and living space must be provided, no air handling equipment located in garage	ref: BSC Information Sheet 305	☐
Walls and ceilings separating attached garages from living space are properly sealed by: installing gas-proof membrane, taping gypsum board, and sealing all penetrations		☐
Washers should be equipped with single throw shut off valves	ref: BSC Information Sheet 305	☐
Washing Machine connections are equipped with a single throw shut off valve		☐
No carpet in areas prone to get wet: bathrooms, laundry rooms, kitchens, and entryways	ref: BSC Information Sheet 305	☐
No carpet has been installed in bathrooms, laundry rooms, kitchens, and entryways		☐
Vapor open design of construction assemblies maintained	ref: BSC Information Sheet 311	☐
Vapor-permeable finish materials that do not interfere with vapor open design have been installed		☐

Resource Appendix

This appendix contains Building Science Information Sheets that provide more information for specific inspection points on the BSC Building America Quality Control Checklist. Each Information Sheet is a one or two page document that can easily be printed for use on site or attached to a trade scope of work or contract. The most current version of these document, and other building science information, can be found at www.buildingscience.com/QA

Foundations and Site Work

101 Groundwater Control
110 Soil Gas Control

Water Management and Vapor Control

301 Drainage Plane
302 Pan Flashing for Exterior Wall Openings
303 Common Flashing Details
304 Integrating Deck Ledger Board with Drainage Plane
305 Reservoir Claddings
306 Interior Water Management
311 Vapor Open Assemblies

Air Barriers

404 Air Sealing and Framing
405 Air Sealing Enclosure Penetrations
406 Air Sealing Windows
407 Air Barriers - Tub, Shower and Fireplace Enclosures

Thermal Control

501 Installation of Cavity Insulation
511 Basement Insulation
512 Crawlspace Insulation
513 Slab Edge Insulation

HVAC, Plumbing and Electrical

601 Sealed Combustion
602 Ducts in Conditioned Space
603 Duct Sealing
604 Transfer Ducts and Grills
606 Placement of Intake and Exhaust Vents
610 Ventilation System
620 Supplemental Humidity Control