Technical Note #1

Air Barriers

Abstract: This Technical Note defines the air barrier, explains the function of the air barrier and offers some history into the evolution of air barriers.

Air Barrier

An “air barrier” is a combination of materials designed and installed in such a manner in order to drastically reduce or even stop the flow of air into and through the building enclosure. The air barrier of a building is an “air barrier system”. The air barrier system is comprised of “air barrier assemblies”. Air barrier assemblies are comprised of “air barrier materials” and “air barrier accessories”.

Definitions

air barrier, n, a designed “plane” of reduced air flow.

air barrier material, n, a primary element that provides a continuous barrier to the movement of air.

air barrier accessory material, n, a transitional component of the air barrier that provides continuity.

air barrier assembly, n, the air barrier materials and accessories that provide a continuous barrier to the movement of air through portions of the building enclosure assembly.

air barrier system, n, a combination of air barrier assemblies that provide a continuous barrier to the movement of air through portions of the building enclosure assembly.

Function

The air barriers control both infiltration and exfiltration of air through the building enclosure assembly. Opponents of air barriers incorrectly assume that air flow through the building enclosure assembly is needed in order for the building enclosure assembly to dry out. Past and present building codes required that building exterior walls “breathe”. Proponents of air barriers recognize that air has the ability to transport exponentially more moisture into and through the building enclosure assembly than occurs through vapor migration and diffusion. They also recognize that unconditioned air that leaks into a building can negatively affect the designed or intended interior environment thus causing HVAC systems to run longer and/or more cycles than would be necessary if the building enclosure had an air barrier system. Lastly, they recognize that conditioned air that leaks out of a building through the building enclosure assembly will cause HVAC
systems to run longer and/or more cycles than would be necessary if the building enclosure had an air barrier system.

The inclusion of air barrier systems in building enclosure assemblies results in better performing building enclosure assemblies as they relate to moisture management. Referring to the dew point calculator in Figure A, exterior air that is 85˚ and 75% relative humidity has dew point temperature of 76˚. If this air is allowed to leak into a building enclosure assembly of a building that is being cooled to 74˚, it will get cooled below its dew point temperature within the building enclosure assembly thus resulting in condensation forming in the building enclosure assembly. If the interior air in a building is 70˚ and has a relative humidity of 40%, the dew point temperature of this air is 44˚. If this air leaks out through the building enclosure and it is 40˚ degrees outside, this air will be cooled below its dew point temperature within the building enclosure assembly thus resulting in condensation forming in the building enclosure assembly.

Air barriers substantially reduce and even eliminate this wetting mechanism in building enclosure assemblies.

The top reason for litigation in the building construction industry is moisture related problems in buildings. The inclusion of air barriers in building enclosure assemblies will reduce the amount of litigation in the industry due to these problems.

Buildings with air barriers are also more energy efficient than buildings that do not have air barriers. The Air Barrier Association of America has an online calculator that calculates the energy savings of a building based on the air tightness of the building.
enclosure assembly. The calculator was developed by Oakridge National Laboratory. The link for calculator is:

http://www.airbarrier.org/technical-information/energy-savings-and-moisture-transport-calculator/

Controlling the infiltration and exfiltration of air through the building enclosure assembly also increases occupant comfort by controlling drafts that cause discomfort as well as the infiltration of particulate matter that can irritate building occupants.

**History**

Air barriers have been included in building enclosure assemblies, intended or not, since the inception of building construction. In North America, air barriers were gained popularity in Canada in the 1970’s. It became a building code requirement in the 1980. Performance requirements were added in 1985. In the United States of America, Wisconsin was the first state to require air barriers in their building codes in 2001. Wisconsin was followed by Massachusetts in that year. This code change brought about the formation of the Air Barrier Association of America in that year in Massachusetts. AHSRAE 90.1 added air barrier requirements in the 2009 version. Finally, the International Energy Code added air barrier requirements in the 2012 version. Prior to the inclusion of code requirements, many building owners and designers recognized the benefits of including air barriers in the building enclosure assembly and did so.

**Summary**

This Technical Note contains information about the air barriers. This information may be used to design and construct building enclosure assemblies.

The information and suggestions contained in this Technical Note are based on the available data and the experience of the Technical Committee of the Air Barrier Association of America and is for guidance only. Please check with local authority having jurisdiction. The information contained herein must be used in conjunction with good technical judgment and a basic understanding of the properties of air barriers. Final decisions on the use of the information contained in this Technical Notes are not within the purview of the Air Barrier Association of America and must rest with project owners, architects, engineers, consultants and contractors.