

International Institute for
Bau-biologie® & Ecology

IBE 207.3

IBE 207.3 Wall Systems



**BRINGING TOGETHER TECHNOLOGY AND DESIGN
METHODS TO PROVIDE THE INFORMATION
NEEDED TO CREATE HEALTHY HOMES AND
WORKPLACES**



Wall Systems – IBE 207.3

Welcome

*Thank you for choosing IBE for your educational needs. Current environmental realities demand a new approach to ensuring that our homes, schools and office buildings support the health and wellness of all who dwell there. We strive to provide the latest information and cutting edge methodology on the vital, complex relationship between the natural and the built environments. May you find your educational experiences enlightening, and take this knowledge out into your community for the benefit of all. **Michael Conn**, Executive Director, Institute for Bau-Biologie & Ecology.*

Course Navigation

You will find that it is very easy to navigate through this course.

- Progress through the lessons using intuitive navigation tools. When you study, make sure to be aware of and use all supporting materials, such as pdf files, video and audio clips, links to other websites or relevant articles or papers, as well as the online forum.
- The last lesson will give you the option of downloading an electronic version (PDF) of the course. Please be aware that this information is copyright protected.
- When finished, you will be ready for the test. These tests are "open book" and are designed to help you evaluate your understanding of the subject.
- When you have finished the entire Course Pack, a Certificate of Completion is available online.

By using the Forum feature, students can share information and solve problems. We would like to see truly interactive discussions take place.

Please be advised that links to third party information may not reflect or support the Building Biology viewpoint. However, it might be of some interest to see how other people, groups, institutions, etc. argue the same subject.

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Table of Contents

Lesson 1 – Building Biology	3
Lesson 2 – Wall Systems Building Biology Evaluation	5
Lesson 3 – Light Frame Construction	7
Lesson 4 – Concrete Block	9
Lesson 5 – Adobe	10
Lesson 6 – Cob	12
Lesson 7 – Straw bale.....	15
Lesson 8 – Clay/Straw	17
Lesson 9 – Rammed Earth	19
Lesson 10 – Aerated Autoclaved Concrete	21
Lesson 11 – Pumicrete	23
Lesson 12 – Wood Insulated Concrete Forms (WICF)	25

Lesson 1 – Building Biology

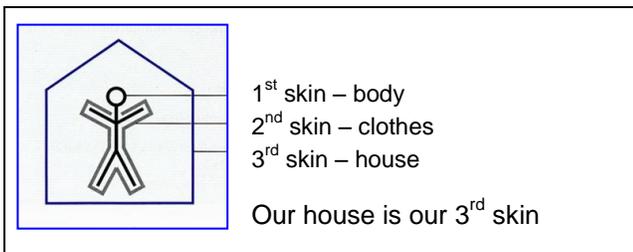
A specialized branch of Building Science

Biology is the branch of the natural sciences which studies living organisms and how they interact with each other and their environment. It follows that building biology is a specialized branch of building science that studies the inter relationship between human health, the built environment and planetary ecology. Wikipedia however currently defines Building Biology as a “pseudoscientific activity that investigates the indoor environment for a variety of irritants”.¹ Exemplified in this definition is both a general ignorance of what building biology is and a specific prejudice against natural building in a culture dominated by industrialized, proprietary and product based building. Through the IBE courses we explain how building biology is a holistic and scientific approach to creating shelter and the shortcomings of the current Wikipedia definition will become crystal clear.

Building the Bau-Biologie® Way

In other seminars we cover more about the diagnostics and cures for health threatening conditions in existing buildings. These sessions will cover an introduction to the Building Biology approach to new building and renovation of existing ones. The goal of IBE is to make the student aware that Building Biology is, in its very essence, a different approach in the creation of health enhancing and ecologically sustainable (regenerative) built environments when compared to what is currently being dubbed “green architecture” in the mainstream of North American Building.

The Bau-Biologie Aspect The Third Skin



Building biology uses the analogy of the house as the “third skin” of an individual.

Let us examine our own skin, the largest organ of the human body. A person can not live for very long if the pores of the skin are obstructed because vital “exchanges” essential to life occur through our skin.

This miraculous layer serves a multitude of life giving functions. It is our primary protective barrier against the elements. It absorbs the sun’s energy so that our body can create nutrients such as vitamin D. It is a permeable membrane that allows for the transpiration of moisture in order to regulate temperature and eliminate toxins. Our skin, through this transpiration is able to cool us, through evaporative cooling (otherwise known as perspiration) when we are too hot. It is also capable of shape shifting (Goosebumps and raised hairs) to conserve heat when we are cold. Through it we eliminate bodily toxins in the form of sweat and because of its permeable it has been used to absorb nutrients in a variety of transdermal medical applications.

Clothing, our second skin, should have certain qualities to promote comfort, well-being and health. It should act as an extension of our own skin, being an additional layer of protection against the element and further allowing for the wicking of moisture from our skin. It should allow for free movement and comfort. Natural and organic fabrics do this well while many synthetics cause static (more on that later), trap sweat and odor in and do not do a good job of preserving temperature, especially if they get wet. Just as every indigenous culture has fashioned garments that are a perfect response to their climate, out of natural fabrics at hand, so have they fashioned their homes.

Like our skin, and good clothing the walls of our need to perform multiple functions well in order to create a nurturing environment. Ideally they will protect us from a wide range of hostile external elements while absorbing beneficial ones, allow for the safe transfer of moisture while buffering from the temperature swings outside and preserving a constant temperature within. Just as is true with clothing, Building Biologists have come to the conclusion that natural, minimally processed building materials provide superior environments when compared to synthetic impermeable materials.

¹ http://en.wikipedia.org/wiki/Building_biology

25 Principles of Bau-Biologie®

The following list of twenty-five principles were developed, more than 40 years ago by Anton Schneider, Ph.D., founder of the *Institut für Baubiologie and Oekologie*. A few of these have since been focal points for the green building movement in this country. Many others remain largely unknown or misunderstood by North American building culture. The meaning of these principles and practical applications in building will be clarified within this seminar. They apply to planning, building and renovating homes and neighborhoods.

1. *Verify that the building site is geologically undisturbed*
2. *Place dwellings away from industrial centers and major traffic roads.*
3. *Place dwellings well apart from each other in spaciouly planned developments amidst green areas.*
4. *Plan homes and developments taking into consideration the human aspect and the needs of community, families, and individuals while respecting the natural environment.*
5. *Use natural and unadulterated building materials.*
6. *Use wall, floor and ceiling materials that allow the diffusion of moisture.*
7. *Allow natural self-regulation of indoor air humidity using hygroscopic materials*
8. *Consider sorption of building materials and plants (in- and outside), which allow filtration and neutralization of toxic airborne substances*
9. *Design for a balance between thermal mass and insulation in living spaces*
10. *Plan for optimal surface and air temperature.*
11. *Use thermal radiation for heating buildings employing solar energy as much as possible.*
12. *Assure health-promoting humidity levels and rapid desiccation of wet construction processes in new buildings.*
13. *Utilize building materials, which have neutral or pleasant natural scents and which do not emit toxic vapors*
14. *Provide for natural light and use illumination and color in accordance with nature.*
15. *Provide adequate protection from noise and infrasonic vibration or sound conducted through solids.*
16. *Avoid building materials that have elevated radioactivity levels.*
17. *Preserve the natural (DC) air electrical field and physiologically beneficial ion balance in space.*
18. *Preserve the natural (DC) magnetic field.*
19. *Minimize technical (AC) electric and (AC) magnetic fields.)*
20. *Minimize the alteration of vital cosmic and terrestrial radiation.*
21. *Utilize physiological knowledge in furniture and space design.*
22. *Consider proportion, harmonic orders, and shapes in design*
23. *Use building materials that do not contribute to environmental problems and high energy cost in the production process.*
24. *Do not support products or building materials that over-use limited and irreplaceable raw materials.*
25. *Support building activities and production of materials which do not have adverse side effects of any kind and which promote health and social well-being.*

Lesson 2 – Wall Systems Building Biology Evaluation

The following chart is a method of evaluating wall systems according to the Building Biology Principles as defined below. Though there are no “correct” answers, going through the exercise before you decide which type of wall system best fits your philosophical perspective may be helpful. See IBE 101, IBE 205.2, IBE 205.3 and IBE 205.4 for more information about material usage and selection.

Social Impact

- Promotes health and well-being at factory
- Production is non-polluting of air, earth, water
- Promotes health and well-being during construction
- Provides “right livelihood”, promotes skill building
- Involves community participation
- Supports local economy
- Natural and unadulterated

Health and Well-being of Occupant

- Vapor permeability/hygric capacity
 - Hygroscopic – self regulates indoor humidity
 - Non-toxic – does not emit toxic vapors
 - Sorptive – adsorbs/absorbs to neutralize toxins
 - Surface temperature – climatically appropriate
 - Acoustical protection
 - Non-radioactive
 - Preserves natural DC magnetic field
- ### Energy Efficiency
- Embodied Energy in production
 - Embodied energy – transport source to site
 - Balance of thermal mass and insulation
 - Energy costs to heat and cool
 - Climatic Suitability Range

Cradle-to-Cradle

- History of use
- Use of renewable and abundant resources
- Longevity with low maintenance
- Hygric capacity – longevity and stability of energy performance
- Re-usability – recyclable-adaptability

Unadulterated: not diluted, alloyed, doctored, loaded; thus made impure

Vapor permeability:

The rate of water vapor transmission per unit area per unit of vapor pressure differential

Hygric capacity:

Ability of the material to store water without deteriorating (protects building)

Hygroscopic: The ability of a material to absorb moisture and to release it again when conditions have changed to regulate the humidity (protects occupants).

Sorption is either:

Adsorption: process of solid *surface* taking up layers of gas from surrounding atmosphere.

Absorption:

Process when solids take up gases or liquids into the bulk of the material.

DC Magnetic field: Metal structures can amplify and distort the earth’s natural magnetic field, which can lead to a non-restful sleep. Use natural materials.

Embodied energy: the energy consumed by all of the processes associated with the production of a building, from the acquisition of natural resources to product delivery.

Chart to Evaluate Wall Systems									
	SCORE 4 = Excellent 3 = Good 2 = Fair 1 = Poor 0 = Unacceptable	NATURAL					INDUSTRIAL		
		Adobe	Clay Straw	Cob	Rammed Earth	Straw Bale	Pumice Crete	Aerated Autoclave Concrete (AAC)	Wood Insulated Concrete Form
SOCIAL IMPACT	Promotes health and well-being at factory(s)								
	Production is non-polluting of air, earth, water								
	Promotes health and well-being during construction								
	Provides “right livelihood”, promotes skill building								
	Involves community participation								
	Supports local economy								
	Natural and Unadulterated								
HEALTH AND WELL-BEING OF OCCUPANT	Vapor permeability/hygric capacity								
	Hygroscopic (self regulates indoor humidity maintaining healthy range)								
	Non-toxic (does not emit toxic vapors)								
	Sorptive (adsorbs/absorbs and neutralizes toxins)								
	Surface temperature (climatically appropriate)								
	Acoustical protection								
	Non-radioactive								
	Preserves natural DC magnetic fields (little or no metal)								
ENERGY EFFICIENCY	Embodied Energy BTU's in production								
	Embodied Energy source to site								
	Balance of thermal mass and insulation								
	Energy costs to heat and cool								
	Climatic Adaptability Range								
CRADLE TO CRADLE	History of use								
	Use of renewable and abundant resources								
	Longevity with low maintenance								
	Hygric capacity-re: longevity and stability of energy performance								
	Re-usability/recyclability/adaptability								
TOTAL									