SUBJECT: IBP GLASS BLOCK – MEETING IECC 2002 ENERGY REQUERMENTS FOR U-FACTOR AND SOLAR HEAT GAIN COEFFICIENT

2002 CODE REQUIREMENTS

Current environmental regulations for glazing products in Texas have strict requirements for Thermal Conductivity (U-factor) and Solar Heat Gain (SHGC).   Both must be certified by label from the National Fenestration Rating Council (NFRC). IBP has no glass block available today that do not exceed maximum SHGC of 0.40 for Texas. We have, however tested our window systems in accordance with NFRC requirements and received an NFRC label based on those tests for our IBP Series 8000 with aluminum frames.

IBP Series 8000 with aluminum frames: **SHGC =** 0.57   **U-Factor** = 0.65

MEETING THE REQUIREMENTS

This is how we can meet energy code requirements with IBP glass block windows:

Commercial Buildings

1. If total window and door area is less than 10% of total outside wall area, there is no restriction on SHGC or U-factor for windows.

2. If total window and door area is between 10% and 25%, and projection factor (PF) is 0.25 – 0.50, then SHGC must be less than 0.7, which we meet. This would require a 1'-7 overhang, including gutters, for a 1-story house with 5'-0 high windows and eaves 8-0' AFF. No overhang is required on North wall.

3. If total window and door area is between 25% and 40%, glass block may only be used on the North wall or on the South wall with a projection factor (PF) of 0.30 or more.

4. Glass block may also comply with the code by an area-weighted average method, where the SHGC of the glass block is averaged with the SHGC of other windows and doors. (See p. 3.)

Residential Buildings

1. Area-weighted average SHGC for all residential buildings must be no more than 0.40. This means that glass block windows must be averaged in with other windows and doors to be less than 0.40. This can often be achieved by averaging the relatively small area of glass blocks with other fenestration that is lower than 0.40. (See p. 3.)

2. Windows on the North wall are exempt from SHGC because they are shaded from the Sun. Windows on the South wall with a projection factor of 0.30 or greater are also considered shaded. For a 1-story house, this can often be achieved with a 1'-11 overhang, including gutters.

All exemptions and modes of compliance must be clearly marked on the drawings and approved by the building official to obtain a permit.

Calculating Area-weighted Averages

Use of area weighed averages means that some of the windows may have performance levels above required maximum values as long as the average for the building is at or below those required values.

To calculate the area-weighted average you need the area of each window and its NFRC or default table values for U-factor and SHGC.

Area weighted average SHGC

1. Multiply the SHGC by the area for each window or door.

2. Add all of these values for each non-exempt unit.

3. Add the areas of each non-exempt window and door.

4. Divide the sum from item 2 by the sum from item 3.

5. The result is the area-weighted SHGC for the house.

Example:

A house has 210 sq. ft. of 0.36 SHGC windows, 40 sq. ft. of 0.32 SHGC patio doors and 40 sq. ft of 0.57 SHGC glass block windows.

The area weighted average SHGC is:

$$\frac{(0.36 \times 210 + 0.32 \times 40 + 0.57 \times 40)}{(210 + 40 + 40)}$$

$$= 101.60 / 290 = 0.383$$

The attached spreadsheet is a convenient way to do these calculations:

Area-weighted average U-factor

Use the same procedure for area-weighted average U-factor.

Sample of Spreadsheet to Calculate Area-weighted Averages

AREA-WEIGHTED AVERAGE SHGC AND U-FACTOR CALCULATIONS

Unit	Qty	Width	Height	Area	SHGC	AxSHGC	Area	U	AxU	Exemption
Door 1	1	3.33	6.17	0.0	EX	0.0	20.5	0.3	6.2	1 Door
Door 2	1	3.33	6.17	20.5	0.28	5.8	20.5	0.4	8.2	
Win 1	5	3.33	5	83.3	0.39	32.5	83.3	0.66	54.9	
Win 2	2	3.33	5	0.0	EX	0.0	33.3	0.66	22.0	N Wall
Win 3	1	2.33	3	0.0	EX	0.0	7.0	0.66	4.6	S + Proj
Win 4	2	4.33	3	26.0	0.39	10.1	26.0	0.66	17.1	
Win 5	3	4.33	5	65.0	0.39	25.3	65.0	0.66	42.9	
Win 6	1	4.33	5	21.7	0.39	8.4	21.7	0.66	14.3	
IBP 1	2	4.08	4.08	33.3	0.57	19.0	33.3	0.65	21.6	
Subtotals				249.7		101.1	310.5		191.9	
1%	1			-2.5	0.57	-1.4	-3.1	0.65	-2.0	1% Exemption
Totals				247.2	0.40	99.7	270.8	0.64	173.2	

SOLAR HEAT GAIN COEFFICIENT EXEMPTIONS

1. Any windows or doors on "NORTH" side are exempt from SHGC requirements.

2. Any windows or doors on "SOUTH" side, which are shaded along their full width by a permanent overhang with a projection factor of 0.30 or greater are exempt from SHGC requirements.

3. If two sides are equally close to true North, designer may choose either side as "NORTH."

    EXAMPLES:

House 1 – side "A" is "NORTH," side "C" is "SOUTH."

House 2 – side "A" is considered "NORTH," side "C" is considered "SOUTH."

House 3 – side "A" or "B" may be considered "NORTH" (designer's option); opposite side shall be considered "SOUTH."

House 4 – side "B" is considered "NORTH," side "D" is considered "SOUTH."

HOUSE 1

HOUSE 2

HOUSE 3

HOUSE 4
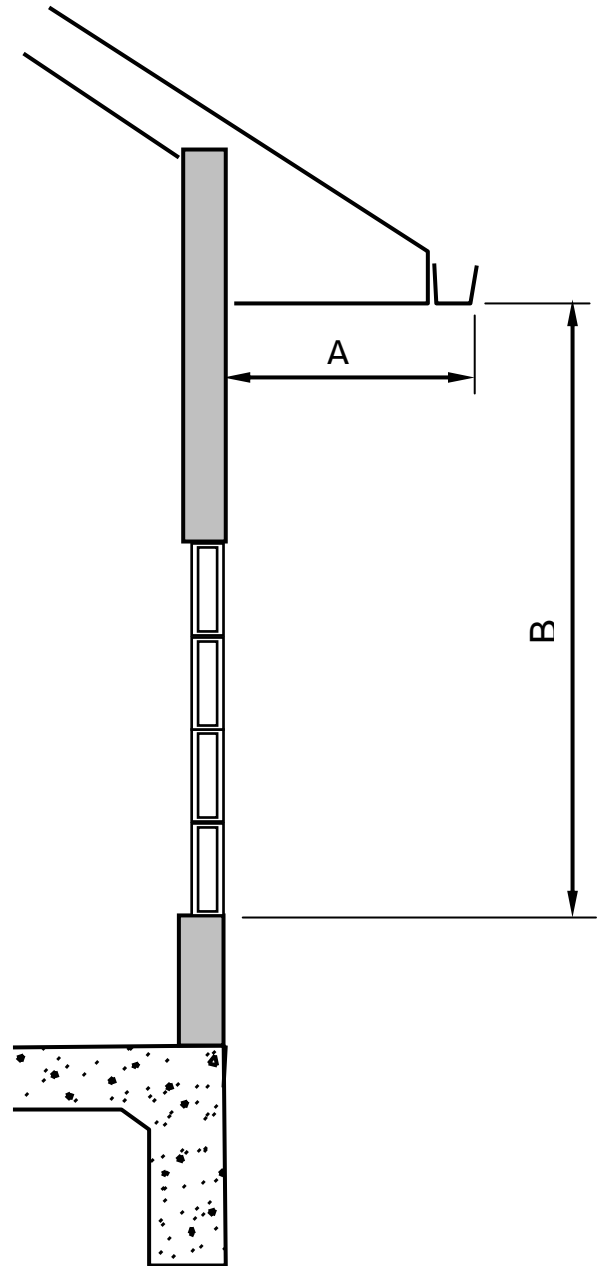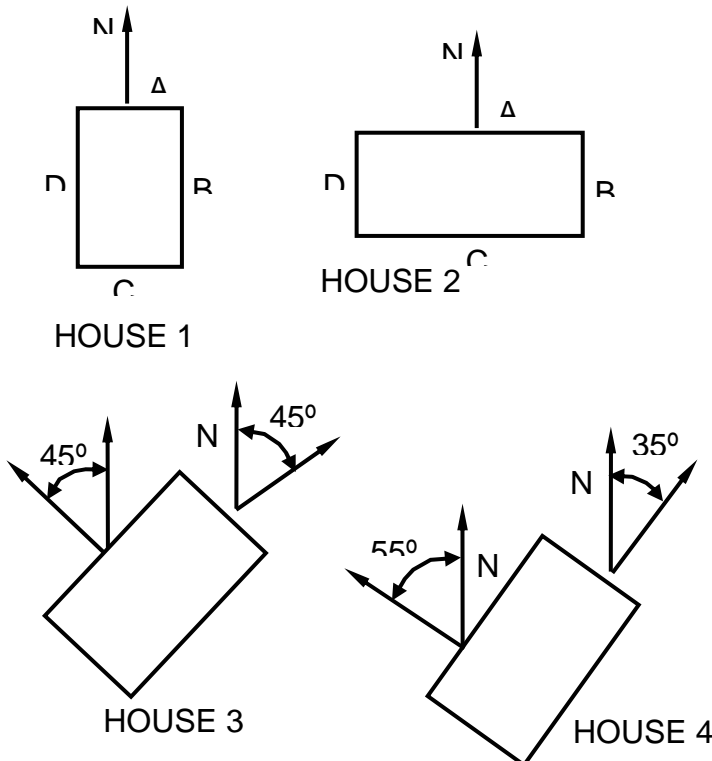
<u>Projection Factor</u>
Section at Window on South Wall with Overhang.
Projection Factor = Ratio A/B