

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE BILL

No. 583

Session of  
1977

INTRODUCED BY GURZENDA, KURY, SWEENEY, MURRAY, MELLOW,  
MESSINGER, ROSS, O'PAKE, ORLANDO, STAUFFER, GEKAS, NOLAN,  
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LEWIS AND COPPERSMITH, MARCH 28, 1977

AS REPORTED FROM COMMITTEE ON MINES AND ENERGY MANAGEMENT,  
AS AMENDED, HOUSE OF REPRESENTATIVES, SEPTEMBER 25, 1978

AN ACT

1 ~~Amending the act of April 9, 1929 (P.L.177, No.175), entitled~~ <—  
2 ~~"An act providing for and reorganizing the conduct of the~~  
3 ~~executive and administrative work of the Commonwealth by the~~  
4 ~~Executive Department thereof and the administrative~~  
5 ~~departments, boards, commissions, and officers thereof,~~  
6 ~~including the boards of trustees of State Normal Schools, or~~  
7 ~~Teachers Colleges; abolishing, creating, reorganizing or~~  
8 ~~authorizing the reorganization of certain administrative~~  
9 ~~departments, boards, and commissions; defining the powers and~~  
10 ~~duties of the Governor and other executive and administrative~~  
11 ~~officers, and of the several administrative departments,~~  
12 ~~boards, commissions, and officers; fixing the salaries of the~~  
13 ~~Governor, Lieutenant Governor, and certain other executive~~  
14 ~~and administrative officers; providing for the appointment of~~  
15 ~~certain administrative officers, and of all deputies and~~  
16 ~~other assistants and employes in certain departments, boards,~~  
17 ~~and commissions; and prescribing the manner in which the~~  
18 ~~number and compensation of the deputies and all other~~  
19 ~~assistants and employes of certain departments, boards and~~  
20 ~~commissions shall be determined," requiring the Department of~~  
21 ~~General Services to conduct cost analyses to utilize energy~~  
22 ~~conservation building standards and the utilization of~~  
23 ~~abundant fossil fuels or renewable resources in all new~~  
24 ~~public buildings prior to construction.~~  
25 PROVIDING FOR THE REGULATION FOR ENERGY CONSERVATION PURPOSES OF <—  
26 THE CONSTRUCTION OF BUILDINGS, THE ESTABLISHMENT OF A  
27 BUILDING ENERGY CONSERVATION COMMITTEE AND A BOARD ON  
28 VARIANCES, APPEALS AND FOR PENALTIES.  
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22 SECOND CLASS A.  
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25 SECTION 505. DISPOSITION OF FINES.  
26 CHAPTER 6. REPORT TO GENERAL ASSEMBLY  
27 SECTION 601. REPORT TO GENERAL ASSEMBLY  
28 SECTION 602. EFFECTIVE DATE.

29 The General Assembly of the Commonwealth of Pennsylvania  
30 hereby enacts as follows:

31 ~~Section 1. Paragraph (9) of section 2401.1, act of April 9,~~ <—  
32 ~~1929 (P.L.177, No.175), known as "The Administrative Code of~~  
33 ~~1929," added July 22, 1975 (P.L.75, No.45) is amended to read:~~  
34 ~~Section 2401.1. Specific Powers of the Department of General~~  
35 ~~Services. In addition to all other powers and duties set forth~~  
36 ~~in this act, the Department of General Services shall have the~~  
37 ~~power, and its duty shall be:~~

38 \* \* \*

39 ~~(9) To formulate and establish minimum specifications and~~  
40 ~~standards for construction, room design, materials and utilities~~  
41 ~~and to conduct appropriate costing analyses to make mandatory~~  
42 ~~standards at least as energy conserving as "ASHRAE 90-75" and~~  
43 ~~its subsequent revisions and to utilize where environmentally~~

~~acceptable coal and abundant nonrenewable energy resources, and  
renewable energy resources such as solar and solid waste over  
other exhaustible and vulnerable fossil fuels for all projects  
to be constructed by or the construction of which is subsidized  
in whole or in part by the Commonwealth and to be used by any  
department, board, agency, commission, or State supported  
institution, agency, or project; prior to construction for this  
purpose, the Department of General Services may establish a  
laboratory for testing new construction materials, procedures  
and systems and shall issue reports on the results of any such  
laboratory tests and shall request the approval of utilizing  
other nonrenewable and nonabundant fossil fuels as primary  
energy sources by the General Assembly prior to construction.~~

~~\* \* \*~~

~~Section 2. For the purposes of this amendatory act the  
following words and phrases as used in this amendatory act shall  
have the following meanings:~~

~~Appropriate Costing Analyses shall be defined as the initial  
cost of a building considered jointly with the long term  
operating and maintenance cost.~~

~~ASHRAE 90-75 is the consensus standards for energy  
conservation in new building designs of the American Society of  
Heating, Refrigerating and Air Conditioning Engineers, Inc.~~

~~Fossil Fuels fuels which contain the remains of ancient  
plant and animal life (e.g. coal, oil, oil shale, tar sands,  
natural gas).~~

~~Renewable Resources is defined to be capable of being  
replaced by natural ecological cycles or sound management  
practices.~~

~~Section 3. This act shall take effect immediately.~~

## GENERAL PROVISIONS

## SECTION 101. SHORT TITLE.

THIS ACT SHALL BE KNOWN AND MAY BE CITED AS THE "BUILDING ENERGY CONSERVATION ACT."

## SECTION 102. LEGISLATIVE FINDINGS AND DECLARATION OF PURPOSE.

(A) FINDINGS.--THE LEGISLATURE HEREBY DETERMINES THAT:

(1) ENERGY SHORTAGES IN THE DOMESTIC SUPPLY PRESENT FAR-REACHING PROBLEMS THAT PROMISE TO PERSIST. THESE ENERGY SHORTAGES AFFECT THE CONTINUED EFFICIENT OPERATION OF THE COMMONWEALTH'S ECONOMY AND SOCIAL STRUCTURE.

(2) IT IS THE COMMONWEALTH'S RESPONSIBILITY TO PROVIDE FOR ENERGY CONSERVATION THROUGH REGULATION OF DESIGN AND CONSTRUCTION STANDARDS.

(3) THE LEGISLATURE INTENDS, BY THIS ACT, TO RESPOND TO THESE SHORTAGES BY DEVISING A SPECIFIC RESPONSIBLE ENERGY CONSERVATION POLICY FOR BUILDING SYSTEMS.

(B) PURPOSE.--THE PURPOSE OF THIS ACT IS TO GRANT TO THE COMMONWEALTH OF PENNSYLVANIA AND DIRECT IT TO EXERCISE SPECIFIC AUTHORITY IN BUILDING CONSTRUCTION TO ASSURE THAT SUCH CONSTRUCTION IS PERFORMED USING MATERIALS AND TECHNIQUES THAT WILL PROVIDE FOR ENERGY CONSERVATION IN THE FUTURE OPERATION AND MAINTENANCE OF SAID BUILDINGS.

## SECTION 103. DEFINITIONS.

THE FOLLOWING WORDS AND PHRASES WHEN USED IN THIS ACT SHALL HAVE, UNLESS THE CONTEXT CLEARLY INDICATES OTHERWISE, THE MEANINGS GIVEN TO THEM IN THIS SECTION:

"BUILDING." ANY STRUCTURE THAT PROVIDES FACILITIES OR SHELTER FOR PUBLIC ASSEMBLY OR FOR EDUCATIONAL, BUSINESS, MERCANTILE, INSTITUTIONAL, WAREHOUSE OR RESIDENTIAL OCCUPANCY,

1 OR INDUSTRIAL USE INCLUDING, BUT NOT LIMITED TO, THOSE PORTIONS  
2 OF FACTORY AND INDUSTRIAL OCCUPANCY SUCH AS OFFICE SPACE EXCEPT  
3 FOR:

4 (1) BUILDINGS AND STRUCTURES OR PORTIONS THEREOF WHOSE  
5 PEAK DESIGN RATE OF ENERGY USAGE IS LESS THAN ONE WATT PER  
6 SQUARE FOOT OR 3.4 BTU/HR PER SQUARE FOOT OF FLOOR AREA FOR  
7 ALL PURPOSES.

8 (2) STRUCTURES OR THOSE PORTIONS OF STRUCTURES USED FOR  
9 MANUFACTURING OR PROCESSING AND WHOSE MANUFACTURING OR  
10 PROCESSING PROCEDURES REQUIRE THE USE OF SUBSTANTIAL HEAT  
11 PRODUCING ENERGY OR COOLING TO CREATE THEIR PRODUCT.

12 (3) BUILDINGS WHICH ARE NEITHER HEATED NOR COOLED.

13 (4) HISTORIC BUILDINGS.

14 (5) BUILDINGS OWNED BY THE FEDERAL GOVERNMENT.

15 "CONSTRUCTION." THE ERECTION, FABRICATION OR RENOVATION OF A  
16 BUILDING.

17 "DEPARTMENT." THE PENNSYLVANIA DEPARTMENT OF LABOR AND  
18 INDUSTRY EXCEPT THAT FOR ALL UNITS SUBJECT TO THE ACT OF MAY 11,  
19 1972 (P.L.286, NO.70), KNOWN AS THE "INDUSTRIALIZED HOUSING  
20 ACT," ALL UNITS SUBJECT TO THE ACT OF MAY 11, 1972 (P.L.281,  
21 NO.69), KNOWN AS THE "UNIFORM STANDARDS CODE FOR MOBILE HOMES,"  
22 AND ALL BUILDINGS CLASSIFIED AS USE GROUP R-3, HEREIN,  
23 DEPARTMENT MEANS THE PENNSYLVANIA DEPARTMENT OF COMMUNITY  
24 AFFAIRS.

25 "DESIGN." CALCULATIONS AND RESULTANT DRAWINGS AND  
26 SPECIFICATIONS WHICH ARE USED FOR THE CONSTRUCTION OF A  
27 BUILDING.

28 "HISTORIC BUILDING." ANY BUILDING DETERMINED BY THE STATE  
29 HISTORIC PRESERVATION OFFICER TO MEET THE CRITERIA FOR LISTING  
30 ON THE NATIONAL REGISTER OF HISTORIC PLACES BUT ONLY TO THE

EXTENT THAT COMPLIANCE WITH THIS ACT WOULD PREVENT PRESERVATION  
OF THE HISTORIC OR ARCHITECTURAL INTEGRITY OF THE BUILDING.

"LICENSED DESIGN PROFESSIONAL." A PERSON LICENSED AS AN  
ARCHITECT OR PROFESSIONAL ENGINEER PURSUANT TO THE APPROPRIATE  
LICENSURE ACT.

"LIFE-CYCLE COST." THE COST OF A BUILDING INCLUDING ITS  
INITIAL COST, THE COST OF THE ENERGY CONSUMED OVER ITS ECONOMIC  
LIFE AND THE COST OF ITS OPERATION AND MAINTENANCE.

"MUNICIPALITY." A CITY, BOROUGH, INCORPORATED TOWN OR  
TOWNSHIP.

"PERFORMANCE STANDARDS." PARAMETERS WITHIN WHICH DESIGNERS  
OF BUILDINGS SHALL WORK. THE SPECIFIC PRACTICES THAT A DESIGNER  
EMPLOYS SHALL NOT BE PRESCRIBED AS LONG AS THE RESULT IS WITHIN  
THE PARAMETERS ESTABLISHED BY THE STANDARDS.

"RENOVATION." (A) THE REHABILITATION OF AN EXISTING  
BUILDING WHICH REQUIRES MORE THAN 25% OF THE GROSS FLOOR AREA OR  
VOLUME OF THE ENTIRE BUILDING TO BE REBUILT. COSMETIC WORK SUCH  
AS PAINTING, WALL COVERING, WALL PANELING, FLOOR COVERING, AND  
SUSPENDED CEILING WORK SHALL NOT BE INCLUDED; OR

(B) ANY ADDITION TO AN EXISTING BUILDING: PROVIDED, HOWEVER,  
THAT THE PROVISIONS OF THIS ACT SHALL ONLY APPLY TO SUCH PORTION  
OF THE BUILDING BEING RENOVATED AND NOT TO THE ENTIRE BUILDING.

## CHAPTER 2

### ENERGY CONSERVATION STANDARDS

#### SUBCHAPTER A

##### GENERAL PROVISIONS

###### SECTION 201. PROVISIONS.

EXCEPT FOR USE GROUP R-3, THE FOLLOWING PROVISIONS REGULATE  
THE DESIGN AND CONSTRUCTION OF THE EXTERIOR ENVELOPES AND  
SELECTION OF HVAC, SERVICE WATER HEATING, ELECTRICAL

1 DISTRIBUTION, AND ILLUMINATION SYSTEMS AND EQUIPMENT REQUIRED  
2 FOR THE PURPOSE OF EFFECTIVE USE OF ENERGY AND SHALL GOVERN THE  
3 CONSTRUCTION OF ALL BUILDINGS, OR PORTIONS THEREOF, AS PROVIDED  
4 HEREIN.

5 THE PROVISIONS REGULATING THE CONSTRUCTION OF BUILDINGS  
6 CLASSIFIED AS USE GROUP R-3 ARE CONTAINED IN SUBCHAPTER J,  
7 SECTION 240.

8 SUBCHAPTER B  
9 PLANS AND SPECIFICATIONS

10 SECTION 202. SUBMISSION.

11 (A) PLANS.--PLANS, SPECIFICATIONS, COMPUTATIONS WHERE  
12 NECESSARY, AND ANY CHANGES THERETO TOGETHER WITH THE NECESSARY  
13 CERTIFICATION REQUIRED BY SECTION 305 SHALL BE SUBMITTED FOR ALL  
14 BUILDINGS EXCEPT THOSE CLASSIFIED AS USE GROUP R-3 TO INDICATE  
15 CONFORMANCE WITH THIS CHAPTER AND OTHER APPLICABLE CHAPTERS OF  
16 THIS ACT, EXCEPT AS PROVIDED IN SUBSECTIONS (B) AND (C).

17 (B) STANDARD DESIGN.--WHENEVER A PERSON IS CONSTRUCTING A  
18 BUILDING IN ACCORDANCE WITH PLANS, SPECIFICATIONS AND  
19 COMPUTATIONS WHICH HE HAS SUBMITTED WITHIN THE PREVIOUS TWO  
20 YEARS, SUCH PLANS NEED NOT BE RESUBMITTED BUT SUCH PERSON SHALL  
21 INDICATE UPON THE CERTIFICATE REQUIRED BY SECTION 305 THAT THEY  
22 MEET THE STANDARDS CURRENTLY IN EFFECT AND IDENTIFY THE  
23 PREVIOUSLY SUBMITTED PLANS, SPECIFICATIONS AND COMPUTATIONS.

24 (C) PRESCRIPTIVE STANDARDS.--WHEN THE PRESCRIPTIVE STANDARDS  
25 PROVIDED IN THE ENERGY CONSERVATION MANUAL ESTABLISHED BY  
26 SECTION 303 ARE EMPLOYED IN THE CONSTRUCTION OF A BUILDING ONLY  
27 SUCH INFORMATION AS SHALL BE REQUIRED BY THE DEPARTMENT SHALL BE  
28 SUBMITTED. THE PRESCRIPTIVE STANDARDS APPLICABLE TO USE GROUP R-  
29 3, BUILDINGS ARE CONTAINED IN SECTION 240.

30 SECTION 203. CONTENTS.



1 THE PLANS AND SPECIFICATIONS, WHERE REQUIRED BY SECTION 202,  
2 SHALL SHOW IN SUFFICIENT DETAIL ALL PERTINENT DATA AND FEATURES  
3 OF THE BUILDING AND THE EQUIPMENT AND SYSTEMS AS HEREIN  
4 GOVERNED, INCLUDING BUT NOT LIMITED TO: EXTERIOR ENVELOPE  
5 COMPONENT MATERIALS, U VALUES OF ELEMENTS, R VALUES OF  
6 INSULATING MATERIALS, SIZE AND TYPE OF APPARATUS AND EQUIPMENT,  
7 EQUIPMENT AND SYSTEM CONTROLS AND OTHER PERTINENT DATA TO  
8 INDICATE CONFORMANCE WITH THE REQUIREMENTS HEREIN.

9 SUBCHAPTER C

10 DEFINITIONS RELATING TO

11 ENERGY CONSERVATION STANDARDS

12 SECTION 204. DEFINITIONS RELATING TO STANDARDS.

13 THE FOLLOWING WORDS AND PHRASES WHEN USED IN THIS CHAPTER  
14 SHALL HAVE, UNLESS THE CONTEXT CLEARLY INDICATES OTHERWISE, THE  
15 MEANINGS GIVEN TO THEM IN THIS SECTION:

16 "COEFFICIENT OF BEAM UTILIZATION" (CBU). THE RATIO OF THE  
17 LUMINOUS FLUX (LUMENS) REACHING A SPECIFIED AREA DIRECTLY FROM A  
18 FLOODLIGHT OR PROJECTOR TO THE TOTAL BEAM LUMINOUS FLUX.

19 "COEFFICIENT OF PERFORMANCE" (COP) - COOLING. THE RATIO OF  
20 THE RATE OF NET HEAT REMOVAL TO THE RATE OF TOTAL ENERGY INPUT,  
21 EXPRESSED IN CONSISTENT UNITS AND UNDER DESIGNATED RATING  
22 CONDITIONS.

23 "COEFFICIENT OF PERFORMANCE" (COP) - HEAT PUMP, HEATING. THE  
24 RATIO OF THE RATE OF NET HEAT OUTPUT TO THE RATE OF TOTAL ENERGY  
25 INPUT, EXPRESSED IN CONSISTENT UNITS AND UNDER DESIGNATED RATING  
26 CONDITIONS.

27 THE RATE OF NET HEAT OUTPUT SHALL BE DEFINED AS THE CHANGE IN  
28 THE TOTAL HEAT CONTENTS OF THE AIR ENTERING AND LEAVING THE  
29 EQUIPMENT NOT INCLUDING SUPPLEMENTARY HEAT.

30 TOTAL ENERGY INPUT SHALL BE DETERMINED BY COMBINING THE

1 ENERGY INPUTS TO ALL ELEMENTS, EXCEPT SUPPLEMENTARY HEATERS, OF  
2 THE HEAT PUMP, INCLUDING, BUT NOT LIMITED TO, COMPRESSORS,  
3 PUMPS, SUPPLY AIR FANS, RETURN AIR FANS, OUTDOOR AIR FANS,  
4 COOLING TOWER FANS AND THE HEATING, VENTILATING AND AIR  
5 CONDITIONING SYSTEM EQUIPMENT CONTROL CIRCUIT.

6 "COEFFICIENT OF UTILIZATION" (CU). THE RATIO OF THE LUMINOUS  
7 FLUX (LUMENS) FROM A LUMINAIRE RECEIVED ON THE WORK PLANE TO THE  
8 LUMENS EMITTED BY THE LUMINAIRE'S LAMPS ALONE.

9 "COLOR RENDITION." GENERAL EXPRESSION FOR THE EFFECT OF A  
10 LIGHT SOURCE ON THE COLOR. APPEARANCE OF OBJECTS IN CONSCIOUS OR  
11 SUBCONSCIOUS COMPARISON WITH THEIR COLOR APPEARANCE UNDER A  
12 REFERENCE LIGHT SOURCE.

13 "DEGREE DAY, HEATING." A UNIT, BASED UPON TEMPERATURE  
14 DIFFERENCE AND TIME, USED IN ESTIMATING FUEL CONSUMPTION AND  
15 SPECIFYING NOMINAL HEATING LOAD OF A BUILDING IN WINTER. FOR ANY  
16 ONE DAY, WHEN THE MEAN TEMPERATURE IS LESS THAN 65 F., THERE  
17 EXIST AS MANY DEGREE DAYS AS THERE ARE FAHRENHEIT DEGREES  
18 DIFFERENCE IN TEMPERATURE BETWEEN THE MEAN TEMPERATURE FOR THE  
19 DAY AND 65 F.

20 "ENERGY EFFICIENCY RATIO" (EER). THE RATIO OF NET COOLING  
21 CAPACITY IN BTUH TO TOTAL RATE OF ELECTRIC INPUT IN WATTS UNDER  
22 DESIGNATED OPERATING CONDITIONS.

23 "EQUIVALENT SPHERE ILLUMINATION" (ESI). THE LEVEL OF SPHERE  
24 ILLUMINATION WHICH WOULD PRODUCE TASK VISIBILITY EQUIVALENT TO  
25 THAT PRODUCED BY A SPECIFIC LIGHTING ENVIRONMENT.

26 "EXTERIOR ENVELOPE." THE ELEMENTS OF A BUILDING WHICH  
27 ENCLOSE CONDITIONED SPACES THROUGH WHICH THERMAL ENERGY MAY BE  
28 TRANSFERRED TO OR FROM THE EXTERIOR.

29 "FLOODLIGHTING." A LIGHTING SYSTEM DESIGNATED TO LIGHT AN  
30 AREA USING PROJECTOR TYPE LUMINAIRES USUALLY CAPABLE OF BEING

1 POINTED IN ANY DIRECTION.

2 "FLOOR AREA, GROSS." GROSS FLOOR AREA SHALL BE THE FLOOR  
3 AREA WITHIN THE PERIMETER OF THE OUTSIDE WALLS OF THE BUILDING  
4 UNDER CONSIDERATION, WITHOUT DEDUCTION FOR HALLWAYS, STAIRS,  
5 CLOSETS, THICKNESS OF WALLS, COLUMNS OR OTHER FEATURES.

6 "ILLUMINATION." THE DENSITY OF THE LUMINOUS FLUX INCIDENT ON  
7 A SURFACE. IT IS THE QUOTIENT OF THE LUMINOUS FLUX BY THE AREA  
8 OF THE SURFACE WHEN THE LATTER IS UNIFORMLY ILLUMINATED.

9 "LIGHT LOSS FACTOR" (LLF). A FACTOR USED IN CALCULATING THE  
10 LEVEL OF ILLUMINATION AFTER A GIVEN PERIOD OF TIME AND UNDER  
11 GIVEN CONDITIONS. IT TAKES INTO ACCOUNT TEMPERATURE AND VOLTAGE  
12 VARIATIONS, DIRT ACCUMULATION ON LUMINAIRE AND ROOM SURFACES,  
13 LAMP DEPRECIATION, MAINTENANCE PROCEDURES AND ATMOSPHERE  
14 CONDITIONS.

15 "LUMINAIRE." A COMPLETE LIGHTING UNIT CONSISTING OF A LAMP  
16 OR LAMPS TOGETHER WITH THE PARTS DESIGNED TO DISTRIBUTE THE  
17 LIGHT, TO POSITION AND PROTECT THE LAMPS AND TO CONNECT THE  
18 LAMPS TO THE POWER SUPPLY.

19 "MULTIGLAZING." AN ARRANGEMENT WHEREBY TWO OR MORE SHEETS OF  
20 GLAZING MATERIAL ARE AFFIXED IN OR ON TO A WINDOW FRAME TO  
21 CREATE ONE OR MORE CLOSED INSULATING AIR SPACES. MULTIGLAZING  
22 CAN BE ACHIEVED BY INSTALLING A PREASSEMBLED SEALED INSULATING  
23 GLASS UNIT, CONSISTING OF TWO OR MORE LAYERS OF GLAZING  
24 MATERIALS WITH INSULATING, CLOSED AIR SPACE IN BETWEEN, OR BY  
25 AFFIXING ONE OR MORE ADDITIONAL GLAZING MATERIALS ONTO A SINGLE  
26 GLAZED WINDOW SASH, CREATING ONE OR MORE CLOSED INSULATING AIR  
27 SPACES.

28 "PACKAGED TERMINAL AIR CONDITIONER." A FACTORY SELECTED  
29 COMBINATION OF HEATING AND COOLING COMPONENTS, ASSEMBLIES OR  
30 SECTIONS, INTENDED TO SERVE A ROOM OR ZONE.

1 "POWER." IN CONNECTION WITH MACHINES, POWER IS THE TIME RATE  
2 OF DOING WORK. IN CONNECTION WITH THE TRANSMISSION OF ENERGY OF  
3 ALL TYPES, POWER REFERS TO THE RATE AT WHICH ENERGY IS  
4 TRANSMITTED; IN CUSTOMARY UNITS, IT IS MEASURED IN WATTS (W) OR  
5 BRITISH THERMAL UNITS PER HOUR (BTUH) AND IN SI UNITS IS  
6 MEASURED IN WATTS (W).

7 "REFLECTANCE." THE RATIO OF THE LIGHT REFLECTED BY A SURFACE  
8 TO THE LIGHT FALLING UPON IT.

9 "REHEAT." THE APPLICATION OF SENSIBLE HEAT TO SUPPLY AIR  
10 THAT HAS BEEN PREVIOUSLY COOLED BELOW THE TEMPERATURE OF THE  
11 CONDITIONED SPACE BY EITHER MECHANICAL REFRIGERATION OR THE  
12 INTRODUCTION OF OUTDOOR AIR TO PROVIDE COOLING.

13 "RESIDENTIAL BUILDINGS." ALL BUILDINGS AND STRUCTURES OR  
14 PARTS THEREOF SHALL BE CLASSIFIED IN THE RESIDENTIAL (R) USE  
15 GROUP IN WHICH FAMILIES OR HOUSEHOLDS LIVE, OR IN WHICH SLEEPING  
16 ACCOMMODATIONS ARE PROVIDED FOR INDIVIDUALS WITH OR WITHOUT  
17 DINING FACILITIES, EXCLUDING THOSE THAT ARE CLASSIFIED AS  
18 INSTITUTIONAL BUILDINGS. RESIDENTIAL BUILDINGS SHALL BE  
19 CLASSIFIED AS FOLLOWS:

20 (1) USE GROUP R-1 STRUCTURES. THIS USE GROUP SHALL INCLUDE  
21 ALL HOTEL AND MOTEL BUILDINGS, LODGING HOUSES, BOARDING HOUSES  
22 AND DORMITORY BUILDINGS ARRANGED FOR THE SHELTER AND SLEEPING  
23 ACCOMMODATION OF MORE THAN 20 INDIVIDUALS.

24 (2) USE GROUP R-2 STRUCTURES. THIS USE GROUP SHALL INCLUDE  
25 ALL MULTIPLE-FAMILY DWELLINGS HAVING MORE THAN TWO DWELLING  
26 UNITS; AND SHALL ALSO INCLUDE ALL DORMITORIES, BOARDING AND  
27 LODGING HOUSES ARRANGED FOR SHELTER AND SLEEPING ACCOMMODATION  
28 BY MORE THAN FIVE AND NOT MORE THAN 20 INDIVIDUALS.

29 (3) USE GROUP R-3 STRUCTURES. THIS USE GROUP SHALL INCLUDE  
30 ALL BUILDINGS ARRANGED FOR THE USE OF ONE OR TWO FAMILY DWELLING

1 UNITS INCLUDING NOT MORE THAN FIVE LODGERS OR BOARDERS PER  
2 FAMILY.

3 "RESISTANCE, THERMAL" (R). A MEASURE OF THE ABILITY TO  
4 RETARD THE FLOW OF HEAT. THE R VALUE IS THE RECIPROCAL OF A HEAT  
5 TRANSFER COEFFICIENT, AS EXPRESSED BY U. ( $R = 1/U$ ).

6 "THERMAL TRANSMITTANCE" (U). OVERALL COEFFICIENT OF HEAT  
7 TRANSMISSION OR THERMAL TRANSMITTANCE (AIR TO AIR) EXPRESSED IN  
8 UNITS OF BTU PER HOUR PER SQUARE FOOT PER DEGREE F. IT IS THE  
9 TIME RATE OF HEAT FLOW. THE U VALUE APPLIES TO COMBINATIONS OF  
10 DIFFERENT MATERIALS USED IN SERIES ALONG THE HEAT FLOW PATH AND  
11 ALSO TO SINGLE MATERIALS THAT COMPRISE A BUILDING SECTION AND  
12 INCLUDE CAVITY AIR SPACES AND SURFACE AIR FILMS ON BOTH SIDES.

13 "THERMAL TRANSMITTANCE" (UO). OVERALL (AVERAGE) HEAT  
14 TRANSMISSION OR THERMAL TRANSMITTANCE OF A GROSS AREA OF THE  
15 EXTERIOR BUILDING ENVELOPE, EXPRESSED IN UNITS OF BTU PER HOUR  
16 PER SQUARE FOOT PER DEGREE F.

17 THE UO VALUE APPLIES TO THE COMBINED EFFECT OF THE TIME RATE  
18 OF HEAT FLOWS THROUGH THE VARIOUS PARALLEL PATHS, SUCH AS  
19 WINDOWS, DOORS AND OPAQUE CONSTRUCTION AREAS, COMPRISING THE  
20 GROSS AREA OF ONE OR MORE EXTERIOR BUILDING COMPONENTS, SUCH AS  
21 WALLS, FLOOR OR ROOF/CEILING.

22 "THERMOSTAT." AN INSTRUMENT WHICH MEASURES CHANGES IN  
23 TEMPERATURE AND CONTROLS DEVICES FOR MAINTAINING A DESIRED  
24 TEMPERATURE.

25 "VEILING REFLECTIONS." REGULAR REFLECTIONS SUPERIMPOSED UPON  
26 DIFFUSE REFLECTIONS FROM AN OBJECT THAT PARTIALLY OR TOTALLY  
27 OBSCURE THE DETAILS TO BE SEEN BY REDUCING THE CONTRAST. THIS  
28 SOMETIMES IS CALLED "REFLECTED GLARE."

29 "WINDOW MANAGEMENT." ANY ONE OR COMBINATION OF ACTS AND  
30 ACTIVITIES WHOSE PURPOSE IS TO TAKE MAXIMUM ADVANTAGE OF THE

1 ENERGY CONSERVING ASPECTS OF UTILIZING SOLAR ENERGY TO HEAT A  
2 BUILDING AND/OR UTILIZE SOLAR ILLUMINATION WITHIN A BUILDING TO  
3 AUGMENT ENERGY-CONSUMING LIGHTING SYSTEMS. SUCH ACTS AND  
4 ACTIVITIES INCLUDE, BUT ARE NOT LIMITED TO, BUILDING-WINDOW  
5 SITING AND ORIENTATION, SELECTION OF GLAZING MATERIALS, DESIGN  
6 OF OVERHANGS, SUN SCREENS OR PLACEMENT OF SHRUBBERY.

7 "WORK PLANE." THE PLANE AT WHICH WORK USUALLY IS DONE AND AT  
8 WHICH THE ILLUMINATION IS SPECIFIED AND MEASURED. UNLESS  
9 OTHERWISE INDICATED, THIS IS ASSUMED TO BE A HORIZONTAL PLANE 30  
10 IN. (0.76 M) ABOVE THE FLOOR.

11 "ZONE." A SPACE OR GROUP OF SPACES WITHIN A BUILDING WITH  
12 HEATING OR COOLING REQUIREMENTS SUFFICIENTLY SIMILAR SO THAT  
13 COMFORT CONDITIONS CAN BE MAINTAINED THROUGHOUT BY A SINGLE  
14 CONTROLLING DEVICE.

#### 15 SUBCHAPTER D

#### 16 BUILDING ENVELOPE

#### 17 SECTION 205. GENERAL PROVISIONS.

18 (A) PURPOSE OF SUBCHAPTER.--THE INTENT OF THIS SUBCHAPTER IS  
19 TO PROVIDE MINIMUM REQUIREMENTS FOR EXTERIOR ENVELOPE  
20 CONSTRUCTION IN THE INTEREST OF ENERGY CONSERVATION.

21 IN ADDITION TO THE CRITERIA SET FORTH IN THIS SUBCHAPTER  
22 PROVISIONS SHALL BE MADE TO MAXIMIZE THE ENERGY CONSERVING  
23 BENEFITS OF SOLAR DAYLIGHT AND PASSIVE SOLAR HEAT GAIN THROUGH  
24 WINDOW MANAGEMENT. THE PROPOSED DESIGN MAY ALSO TAKE INTO  
25 CONSIDERATION THE THERMAL MASS OF THE BUILDING IN CONSIDERING  
26 ENERGY CONSERVATION. THE ADMINISTERING AGENCY SHALL PROVIDE THE  
27 GUIDELINES NECESSARY TO IMPLEMENT THESE PROVISIONS.

28 (B) THERMAL PERFORMANCE.--ALL BUILDINGS AND STRUCTURES THAT  
29 ARE HEATED OR MECHANICALLY COOLED SHALL BE CONSTRUCTED SO AS TO  
30 PROVIDE THE REQUIRED THERMAL PERFORMANCE OF THE VARIOUS

1 COMPONENTS.

2 THE REQUIRED THERMAL TRANSMITTANCE VALUE (UO) OF ANY ONE  
3 COMPONENT, SUCH AS ROOF/CEILING, WALL OR FLOOR MAY BE INCREASED  
4 AND THE UO VALUE FOR OTHER COMPONENTS DECREASED PROVIDED THAT  
5 THE OVERALL HEAT GAIN OR LOSS FOR THE ENTIRE BUILDING ENVELOPE  
6 DOES NOT EXCEED THE TOTAL RESULTING FROM CONFORMANCE TO THE  
7 REQUIRED UO VALUES.

8 (C) DIFFERENT REQUIREMENTS.--A BUILDING THAT IS DESIGNED TO  
9 BE BOTH HEATED AND COOLED SHALL MEET THE MORE STRINGENT OF THE  
10 HEATING OR COOLING REQUIREMENTS OF THE EXTERIOR ENVELOPE AS  
11 PROVIDED IN THIS SUBCHAPTER WHEN REQUIREMENTS DIFFER.

12 (D) EXTERIOR WALLS.--FOR THE PURPOSE OF THIS SUBCHAPTER THE  
13 GROSS AREA OF EXTERIOR WALLS CONSISTS OF ALL OPAQUE WALL AREAS,  
14 INCLUDING FOUNDATION WALLS ABOVE GRADE, PERIPHERAL EDGES OF  
15 FLOORS, WINDOW AREAS INCLUDING SASH, AND DOOR AREAS, WHERE SUCH  
16 SURFACES ARE EXPOSED TO OUTDOOR AIR AND ENCLOSE A HEATED OR  
17 MECHANICALLY COOLED SPACE.

18 (E) ROOF ASSEMBLY.--FOR THE PURPOSE OF THIS SUBCHAPTER A  
19 ROOF ASSEMBLY SHALL BE CONSIDERED AS ALL COMPONENTS OF THE  
20 ROOF/CEILING ENVELOPE THROUGH WHICH HEAT FLOWS, THEREBY CREATING  
21 A BUILDING TRANSMISSION HEAT LOSS OR GAIN, WHERE SUCH ASSEMBLY  
22 IS EXPOSED TO OUTDOOR AIR AND ENCLOSSES A HEATED OR MECHANICALLY  
23 COOLED SPACE.

24 THE GROSS AREA OF A ROOF ASSEMBLY CONSISTS OF THE TOTAL  
25 INTERIOR SURFACE OF SUCH ASSEMBLY, INCLUDING SKYLIGHTS, EXPOSED  
26 TO THE HEATED OR MECHANICALLY COOLED SPACE.

27 WHERE AIR CEILING PLENUMS ARE EMPLOYED, THE ROOF OR CEILING  
28 ASSEMBLY SHALL:

29 (1) FOR THERMAL TRANSMITTANCE PURPOSES NOT INCLUDE THE  
30 CEILING PROPER NOR THE PLENUM SPACE AS PART OF THE ASSEMBLY.

(2) FOR GROSS AREA PURPOSES BE BASED UPON THE INTERIOR  
FACE OF THE UPPER PLENUM SURFACE.

SECTION 206. CRITERIA FOR RESIDENTIAL BUILDINGS.

(A) APPLICABILITY.--THE REQUIREMENTS HEREIN SHALL APPLY TO  
ALL BUILDINGS AND STRUCTURES OR PORTIONS THEREOF OF USE GROUPS  
R-1, R-2 AND R-3 THAT ARE HEATED OR MECHANICALLY COOLED WHEN NOT  
MORE THAN 3 STORIES OR 40 FEET IN HEIGHT.

(B) WALLS.--THE GROSS AREA OF EXTERIOR WALLS ABOVE GRADE,  
INCLUDING FOUNDATION WALLS, SHALL HAVE A COMBINED THERMAL  
TRANSMITTANCE VALUE (UO) NOT EXCEEDING THOSE SPECIFIED IN TABLE  
1.

TABLE 1  
MAXIMUM ALLOWABLE "UO" VALUES FOR  
GROSS EXTERIOR WALL ASSEMBLIES

	DETACHED	ALL OTHER
ANNUAL HEATING DEGREE DAYS*	ONE & TWO FAMILY	RESIDENTIAL
4000	0.25	0.31
5000	0.23	0.29
6000	0.22	0.27
7000	0.20	0.26

\*AS SPECIFIED IN CHAPTER 43 ASHRAE HANDBOOK-SYSTEMS.

(C) ROOF/CEILING.--THE ROOF/CEILING ASSEMBLIES SHALL HAVE A  
COMBINED THERMAL TRANSMITTANCE VALUE (UO) NOT TO EXCEED 0.05  
EXCEPT THAT ROOF/CEILING ASSEMBLIES IN WHICH THE FINISHED  
INTERIOR SURFACE IS ESSENTIALLY THE UNDERSIDE OF THE ROOF DECK,  
SUCH AS A WOODEN CATHEDRAL CEILING, MAY HAVE A "UO" VALUE NOT TO  
EXCEED 0.08. THESE VALUES PRESUME NO SIGNIFICANT THERMAL  
TRANSMISSION THROUGH FRAMING MEMBERS, SKYLIGHTS OR OTHER  
INTERRUPTIONS IN THE ROOF ENVELOPE. IF SUCH INTERRUPTIONS OCCUR,  
CALCULATIONS MUST BE MADE SHOWING CONFORMANCE TO THE REQUIRED



1 "UO" VALUES.

2 (D) FLOORS OVER UNHEATED SPACES.--THE FLOOR OF A HEATED OR  
3 MECHANICALLY COOLED SPACE LOCATED OVER AN UNHEATED SPACE SHALL  
4 HAVE A COMBINED THERMAL TRANSMITTANCE VALUE (UO) NOT TO EXCEED  
5 0.08.

6 (E) SLAB-ON GRADE FLOORS.--

7 (1) FOR SLAB-ON GRADE FLOORS, THE PERIMETER OF THE FLOOR  
8 SHALL BE INSULATED WITH A MATERIAL HAVING A THERMAL  
9 RESISTANCE VALUE (R) NOT LESS THAN THOSE SPECIFIED IN TABLE  
10 2.

11 TABLE 2

12 MINIMUM ALLOWABLE "R" VALUES OF PERIMETER

13 INSULATION FOR SLAB-ON GRADE FLOORS

14	ANNUAL HEATING DEGREE DAYS	HEATED SLAB	UNHEATED SLAB
15	4000*	5.5	3.5
16	5000	6.3	4.2
17	6000	7.0	4.9
18	7000	7.8	5.5

19 \*TABLE VALUES MAY BE INTERPOLATED.

20 (2) THE INSULATION SHALL EXTEND DOWNWARD FROM THE TOP OF  
21 THE SLAB FOR A MINIMUM DISTANCE OF 24 INCHES OR DOWNWARD TO  
22 THE BOTTOM OF THE SLAB THEN HORIZONTALLY BENEATH THE SLAB FOR  
23 A MINIMUM TOTAL DISTANCE OF 24 INCHES.

24 SECTION 207. OTHER BUILDINGS.

25 (A) COVERAGE.--THE HEATING AND COOLING REQUIREMENTS HEREIN  
26 SHALL GOVERN ALL BUILDINGS AND STRUCTURES OR PORTIONS THEREOF  
27 OTHER THAN DEFINED BY SECTION 206.

28 (B) HEATING CRITERIA FOR WALLS.--ALL BUILDINGS AND  
29 STRUCTURES THAT ARE HEATED SHALL HAVE A COMBINED THERMAL  
30 TRANSMITTANCE VALUE (UO) FOR THE GROSS AREA OF EXTERIOR WALLS

1 NOT EXCEEDING THOSE SPECIFIED IN TABLE 3.

2 TABLE 3

3 MAXIMUM ALLOWABLE "UO" VALUES

4 FOR GROSS EXTERIOR WALL ASSEMBLIES

5 3 STORIES OR MORE THAN

6 ANNUAL HEATING DEGREE DAYS 40 FT. OR LESS 3 STORIES OR  
7 40 FT.

8 4000 0.31 0.38

9 5000 0.29 0.36

10 6000 0.27 0.33

11 7000 0.26 0.31

12 (C) HEATING CRITERIA FOR ROOF/CEILING.--ALL BUILDINGS AND  
13 STRUCTURES THAT ARE HEATED SHALL HAVE COMBINED THERMAL  
14 TRANSMITTANCE VALUE (UO) FOR ROOF/CEILING ASSEMBLIES NOT  
15 EXCEEDING THOSE SPECIFIED IN TABLE 4.

16 TABLE 4

17 MAXIMUM ALLOWABLE "UO" VALUES

18 FOR ROOF/CEILING ASSEMBLIES

19 ANNUAL HEATING DEGREE DAYS MAXIMUM UO

20 4000\* 0.092

21 5000 0.084

22 6000 0.076

23 7000 0.068

24 \*TABLE VALUES MAY BE INTERPOLATED.

25 (D) HEATING CRITERIA FOR FLOORS OVER UNHEATED SPACES.--THE  
26 FLOOR OF A HEATED SPACE LOCATED OVER AN UNHEATED SPACE SHALL  
27 HAVE A THERMAL TRANSMITTANCE VALUE (UO) NOT EXCEEDING 0.08.

28 (E) HEATING CRITERIA FOR SLAB-ON GRADE FLOORS.--FOR SLAB-ON  
29 GRADE FLOORS, THE PERIMETER OF THE FLOOR SHALL BE INSULATED WITH  
30 A MATERIAL HAVING A THERMAL RESISTANCE VALUE (R) NOT LESS THAN

1 THOSE SPECIFIED IN TABLE 5.

2 THE INSULATION SHALL EXTEND DOWNWARD FROM THE TOP OF THE SLAB  
3 FOR A MINIMUM DISTANCE OF 24 INCHES OR DOWNWARD TO THE BOTTOM OF  
4 THE SLAB THEN HORIZONTALLY BENEATH THE SLAB FOR A MINIMUM TOTAL  
5 DISTANCE OF 24 INCHES.

6 TABLE 5

7 MINIMUM ALLOWABLE "R" VALUES OF PERIMETER

8 INSULATION FOR SLAB-ON GRADE FLOORS

9	ANNUAL HEATING DEGREE DAYS	HEATED SLAB	UNHEATED SLAB
10	4000*	5.5	3.5
11	5000	6.3	4.2
12	6000	7.0	4.9
13	7000	7.8	5.5

14 \*TABLE VALUES MAY BE INTERPOLATED.

15 (F) COOLING CRITERIA FOR WALLS.--ALL BUILDINGS AND  
16 STRUCTURES THAT ARE MECHANICALLY COOLED SHALL HAVE AN OVERALL  
17 THERMAL TRANSFER VALUE FOR THE GROSS AREA OF EXTERIOR WALLS NOT  
18 EXCEEDING 33.5 BTU'S PER HOUR PER SQUARE FOOT BASED ON THE  
19 FOLLOWING EQUATION:

$$20 \text{ OTTV} = \frac{(\text{UW} \times \text{AW} \times \text{TDEQ}) + (\text{AF} \times \text{SF} \times \text{SC}) + (\text{UF} \times \text{AF} \times \text{DELTA T})}{21 \text{ AO}}$$

22 OTTV = OVERALL THERMAL TRANSFER VALUE WHERE:

23 UW = THE THERMAL TRANSMITTANCE OF ALL ELEMENTS OF THE OPAQUE  
24 WALL AREA BTU/H. FT<sup>2</sup>.F (W/M<sup>2</sup>K)

25 AW = OPAQUE WALL AREA, FT<sup>2</sup> (M<sup>2</sup>)

26 UF = THE THERMAL TRANSMITTANCE OF THE FENESTRATION AREA  
27 BTU/H. FT<sup>2</sup>.F (W/M<sup>2</sup>K)

28 AF = FENESTRATION AREA, FT<sup>2</sup> (M<sup>2</sup>)

29 TDEQ = VALUE GIVEN IN THE FOLLOWING TABLE, F, (C):

30 TABLE FOR TEMPERATURE DIFFERENCE

1	WALL CONSTRUCTION-MASS PER UNIT AREA		TDEQ	
2	LB/FT2	KG/M2	F	C
3	0-25	0-125	44	24.5
4	26-40	126-195	37	21.0
5	41-70	196-345	30	17.0
6	71 AND ABOVE	346 AND ABOVE	23	13.0

7 WEIGHT OF WALL CONSTRUCTION SHALL BE DETERMINED FROM THE  
8 1972 ASHRAE HANDBOOK OF FUNDAMENTALS, CHAPTER 22.

9 SC = SHADING COEFFICIENT OF THE FENESTRATION

10 DELTA T = TEMPERATURE DIFFERENCE BETWEEN EXTERIOR AND INTERIOR  
11 DESIGN CONDITIONS, F, FOR WHICH THE FOLLOWING  
12 TEMPERATURES SHALL APPLY:

13		INDOOR	OUTDOOR
14		F C	
15	WINTER	72 22.0	97 1/2%*
16	SUMMER	78 25.5	2 1/2%*

17 \* VALUES FROM 1972 ASHRAE HANDBOOK OF  
18 FUNDAMENTALS, CHAPTER 33.

19 SF = SOLAR FACTOR VALUE GIVEN BTU/H.FT2 (W/M2).  
20 (USE 127 BTU/H.FT2)

21 AO = GROSS AREA OF EXTERIOR WALLS, FT2 (M2). THE GROSS  
22 AREA OF EXTERIOR WALLS CONSISTS OF ALL OPAQUE WALL  
23 AREAS (INCLUDING FOUNDATION WALLS, BETWEEN FLOOR SPAN-  
24 DRELS, PERIPHERAL EDGES OF FLOORS, ETC.), WINDOW  
25 AREAS (INCLUDING SASH), AND DOOR AREAS, WHERE SUCH  
26 SURFACES ARE EXPOSED TO OUTDOOR AIR AND ENCLOSE A  
27 HEATED AND/OR MECHANICALLY COOLED SPACE (INCLUDING  
28 INTERSTICIAL AREAS BETWEEN TWO SUCH SPACES).

29 NOTE: WHERE MORE THAN ONE TYPE OF WALL AND/OR FENESTRATION  
30 IS USED, THE RESPECTIVE TERM OR TERMS SHALL BE EXPANDED

1 INTO SUB-ELEMENTS, AS:

2 (UW X AW X TDEQ) + (UW2 X AW2 X TDEQ2), ETC.

3 (G) COOLING CRITERIA FOR ROOF/CEILINGS.--ALL BUILDINGS AND  
4 STRUCTURES THAT ARE MECHANICALLY COOLED SHALL HAVE A COMBINED  
5 THERMAL TRANSMITTANCE VALUE (UO) FOR ROOF/CEILING ASSEMBLIES THE  
6 SAME AS SPECIFIED IN TABLE 4 FOR HEATING.

7 SECTION 208. AIR LEAKAGE.

8 (A) APPLICATION.--THE REQUIREMENTS OF THIS SECTION SHALL  
9 APPLY TO ALL BUILDINGS AND STRUCTURES AND APPLY ONLY TO THOSE  
10 LOCATIONS SEPARATING OUTDOOR AMBIENT CONDITIONS FROM INTERIOR  
11 SPACES THAT ARE HEATED OR MECHANICALLY COOLED AND ARE NOT  
12 APPLICABLE TO SEPARATION OF INTERIOR SPACES FROM EACH OTHER.

13 (B) STANDARD.--COMPLIANCE WITH THE CRITERIA FOR AIR LEAKAGE  
14 SHALL BE DETERMINED BY ASTM E-283, STANDARD METHOD OF TEST FOR  
15 RATE OF AIR LEAKAGE THROUGH EXTERIOR WINDOWS, CURTAIN WALLS AND  
16 DOORS, AT A PRESSURE DIFFERENTIAL OF 1.567 LB/FT2 WHICH IS  
17 EQUIVALENT TO THE EFFECT OF A 25 M.P.H. WIND.

18 (C) ACCEPTANCE CRITERIA.--THE FOLLOWING CRITERIA SHALL  
19 REPRESENT THE MAXIMUM ALLOWABLE AIR LEAKAGE:

20 (1) THE AIR INFILTRATION RATE FOR WINDOWS SHALL NOT  
21 EXCEED 0.5 CFM PER FOOT OF SASH CRACK.

22 (2) THE AIR INFILTRATION RATE FOR SLIDING GLASS DOORS IN  
23 RESIDENTIAL BUILDINGS SHALL NOT EXCEED 0.5 CFM PER SQUARE  
24 FOOT OF DOOR AREA.

25 (3) THE AIR INFILTRATION RATE FOR SWINGING DOORS IN  
26 RESIDENTIAL BUILDINGS SHALL NOT EXCEED 1.25 CFM PER SQUARE  
27 FOOT OF DOOR AREA.

28 (4) THE AIR INFILTRATION RATE FOR SWINGING, REVOLVING OR  
29 SLIDING DOORS IN OTHER THAN RESIDENTIAL BUILDINGS SHALL NOT  
30 EXCEED 11 CFM PER LINEAL FOOT OF DOOR CRACK.

(D) CAULKING AND SEALANTS.--EXTERIOR JOINTS AROUND WINDOWS AND DOOR FRAMES, BETWEEN WALL CAVITIES AND WINDOW OR DOOR FRAMES, BETWEEN WALL AND FOUNDATION, BETWEEN WALL AND ROOF, BETWEEN WALL PANELS, AT PENETRATIONS OR UTILITY SERVICES THROUGH WALLS, FLOORS AND ROOFS, AND ALL OTHER OPENINGS IN THE EXTERIOR ENVELOPE SHALL BE CAULKED, GASKETED, WEATHERSTRIPPED, OR OTHERWISE SEALED.

## SUBCHAPTER E

### WARM AIR HEATING, VENTILATING AND AIR CONDITIONING

#### SYSTEMS AND EQUIPMENT

##### SECTION 209. GENERAL PROVISIONS.

THIS SUBCHAPTER APPLIES TO AIR DUCT SYSTEMS EMPLOYING MECHANICAL MEANS FOR THE MOVEMENT OF AIR USED FOR WARM AIR HEATING, VENTILATING, AIR CONDITIONING SYSTEMS, EXHAUST SYSTEMS AND COMBINATION HEATING AND AIR CONDITIONING SYSTEMS, EXCEPT THAT THIS SUBCHAPTER SHALL NOT APPLY TO SYSTEMS FOR THE REMOVAL OF FLAMMABLE VAPORS OR RESIDUES OR TO SYSTEMS FOR CONVEYING DUST, STOCK OR REFUSE BY MEANS OF AIR CURRENTS. HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS OF ALL BUILDINGS AND STRUCTURES OR PORTIONS THEREOF SHALL BE DESIGNED AND INSTALLED FOR EFFICIENT USE OF ENERGY AS HEREIN PROVIDED. FOR SPECIAL APPLICATIONS SUCH AS HOSPITALS, LABORATORIES, THERMALLY SENSITIVE EQUIPMENT, COMPUTER ROOMS, AND MANUFACTURING PROCESSES, THE DESIGN CONCEPTS AND PARAMETERS SHALL CONFORM TO THE REQUIREMENTS OF THE APPLICATION AT MINIMUM ENERGY LEVELS.

##### SECTION 210. DESIGN REQUIREMENTS.

IN DETERMINING DESIGN CONDITIONS FOR CALCULATIONS UNDER THIS SECTION THE FOLLOWING DESIGN TEMPERATURES SHALL APPLY:

- (1) OUTDOOR DESIGN TEMPERATURE SHALL BE SELECTED FOR LISTED LOCATIONS IN CHAPTER 33 OF THE ASHRAE HANDBOOK OF

FUNDAMENTALS, FROM COLUMNS OF 97 1/2% VALUES FOR HEATING AND  
2 1/2% VALUES FOR COOLING.

(2) INDOOR DESIGN TEMPERATURE SHALL BE 70 DEGREES F. FOR  
HEATING AND 78 DEGREES F. FOR COOLING.

(3) INDOOR DESIGN RELATIVE HUMIDITY FOR HEATING SHALL  
NOT EXCEED 30%. FOR COOLING, THE ACTUAL DESIGN RELATIVE  
HUMIDITY WITHIN THE COMFORT ENVELOPE AS DEFINED IN ASHRAE  
STANDARD 55-74 "THERMAL ENVIRONMENTAL CONDITIONS FOR HUMAN  
OCCUPANCY" SHALL BE SELECTED FOR THE MINIMUM TOTAL HEATING,  
VENTILATING, AND AIR CONDITIONING SYSTEM ENERGY USE.

SECTION 211. COOLING WITH OUTDOOR AIR.

(A) FAN SYSTEM DESIGN.--EACH FAN SYSTEM SHALL BE DESIGNED TO  
USE UP TO AND INCLUDING 100% OF THE FAN SYSTEM CAPACITY FOR  
COOLING WITH OUTDOOR AIR AUTOMATICALLY WHENEVER ITS USE WILL  
RESULT IN LOWER USAGE OF ENERGY THAN WOULD BE REQUIRED UNDER ITS  
NORMAL OPERATION.

(B) EXCEPTIONS.--COOLING WITH OUTDOOR AIR IS NOT REQUIRED  
UNDER ANY ONE OR MORE OF THE FOLLOWING CONDITIONS:

(1) FAN SYSTEM CAPACITY LESS THAN 5,000 CFM OR 134,000  
BTU/HR TOTAL COOLING CAPACITY.

(2) THE QUALITY OF THE OUTDOOR AIR IS SO POOR AS TO  
REQUIRE EXTENSIVE TREATMENT OF THE AIR.

(3) THE NEED FOR HUMIDIFICATION OR DEHUMIDIFICATION  
REQUIRES THE USE OF MORE ENERGY THAN IS CONSERVED BY OUTDOOR  
AIR COOLING.

(4) THE USE OF OUTDOOR AIR COOLING MAY AFFECT THE  
OPERATION OF OTHER SYSTEMS (SUCH AS RETURN OR EXHAUST AIR  
FANS OR SUPERMARKET REFRIGERATION) SO AS TO INCREASE THE  
OVERALL ENERGY CONSUMPTION OF THE BUILDING.

(5) INTERNAL/EXTERNAL ZONE HEAT RECOVERY OR OTHER ENERGY

1 RECOVERY IS USED.

2 (6) WHEN ALL SPACE COOLING IS ACCOMPLISHED BY A  
3 CIRCULATING LIQUID WHICH TRANSFERS SPACE HEAT DIRECTLY OR  
4 INDIRECTLY TO A HEAT REJECTION DEVICE SUCH AS A COOLING TOWER  
5 WITHOUT THE USE OF A REFRIGERATION SYSTEM.

6 SECTION 212. MECHANICAL VENTILATION.

7 EACH MECHANICAL VENTILATION SYSTEM SHALL BE EQUIPPED WITH A  
8 READILY ACCESSIBLE MEANS FOR EITHER SHUT-OFF OR VOLUME REDUCTION  
9 AND SHUT-OFF WHEN VENTILATION IS NOT REQUIRED.

10 SECTION 213. SIMULTANEOUS HEATING AND COOLING.

11 SYSTEMS THAT EMPLOY BOTH HEATING AND COOLING SIMULTANEOUSLY  
12 IN ORDER TO ACHIEVE COMFORT CONDITIONS WITHIN A SPACE SHALL BE  
13 LIMITED TO THOSE SITUATIONS WHERE MORE EFFICIENT METHODS OF  
14 HEATING AND AIR CONDITIONING CANNOT BE EFFECTIVELY UTILIZED TO  
15 MEET SYSTEM OBJECTIVES. SIMULTANEOUS HEATING AND COOLING BY  
16 REHEATING OR RECOOLING SUPPLY AIR OR BY CONCURRENT OPERATION OR  
17 INDEPENDENT HEATING AND COOLING SYSTEMS SERVING A COMMON ZONE  
18 SHALL BE RESTRICTED AS SPECIFIED HEREIN.

19 SECTION 214. RECOVERED ENERGY.

20 RECOVERED ENERGY, PROVIDED THE NEW ENERGY EXPENDED IN THE  
21 RECOVERY PROCESS IS LESS THAN THE AMOUNT RECOVERED, MAY BE USED  
22 FOR CONTROL OF TEMPERATURE AND HUMIDITY. NEW ENERGY IS DEFINED  
23 AS ENERGY, OTHER THAN RECOVERED, UTILIZED FOR THE PURPOSE OF  
24 HEATING OR COOLING.

25 SECTION 215. NEW ENERGY.

26 (A) PREVENTION OF EXCESS HUMIDITY.--NEW ENERGY MAY BE USED,  
27 WHEN NECESSARY, TO PREVENT RELATIVE HUMIDITY FROM RISING ABOVE  
28 60% FOR COMFORT CONTROL OR TO PREVENT CONDENSATION ON TERMINAL  
29 UNITS OR OUTLETS.

30 (B) CONTROL OF TEMPERATURE.--NEW ENERGY MAY BE USED FOR



1 CONTROL OF TEMPERATURE IF MINIMIZED AS SPECIFIED IN SECTIONS 216  
2 THROUGH 220.

3 SECTION 216. REHEAT SYSTEMS.

4 SYSTEMS EMPLOYING REHEAT AND SERVING MULTIPLE ZONES, OTHER  
5 THAN THOSE EMPLOYING VARIABLE AIR VOLUME FOR TEMPERATURE  
6 CONTROL, SHALL BE PROVIDED WITH CONTROL THAT WILL AUTOMATICALLY  
7 RESET THE SYSTEM COLD AIR SUPPLY TO THE HIGHEST TEMPERATURE  
8 LEVEL THAT WILL SATISFY THE ZONE REQUIRING THE COOLEST AIR.  
9 SINGLE ZONE REHEAT SYSTEMS SHALL BE CONTROLLED TO SEQUENCE  
10 REHEAT AND COOLING.

11 SECTION 217. DUAL DUCT AND MULTIZONE SYSTEMS.

12 THESE SYSTEMS SHALL BE PROVIDED WITH CONTROL THAT WILL  
13 AUTOMATICALLY RESET THE COLD DECK AIR SUPPLY TO THE HIGHEST  
14 TEMPERATURE THAT WILL SATISFY THE ZONE REQUIRING THE COOLEST AIR  
15 AND THE HOT DECK AIR SUPPLY TO THE LOWEST TEMPERATURE THAT WILL  
16 SATISFY THE ZONE REQUIRING THE WARMEST AIR.

17 SECTION 218. RECOOLING SYSTEMS.

18 SYSTEMS IN WHICH HEATED AIR IS RECOOLED DIRECTLY OR  
19 INDIRECTLY, TO MAINTAIN SPACE TEMPERATURE, SHALL BE PROVIDED  
20 WITH CONTROL THAT WILL AUTOMATICALLY RESET THE TEMPERATURE TO  
21 WHICH THE SUPPLY AIR IS HEATED TO THE LOWEST LEVEL THAT WILL  
22 SATISFY THE ZONE REQUIRING THE WARMEST AIR.

23 SECTION 219. MULTIPLE ZONES.

24 FOR SYSTEMS WITH MULTIPLE ZONES, ONE OR MORE ZONES MAY BE  
25 CHOSEN TO REPRESENT A NUMBER OF ZONES WITH SIMILAR HEATING OR  
26 COOLING CHARACTERISTICS. A MULTIPLE ZONE HEATING, VENTILATING  
27 AND AIR CONDITIONING SYSTEM THAT EMPLOYS REHEATING OR RECOOLING  
28 FOR CONTROL OF NOT MORE THAN 5,000 CFM OR 20% OF THE TOTAL  
29 SUPPLY AIR OF THE SYSTEM, WHICHEVER IS LESS, SHALL BE EXEMPT  
30 FROM THE SUPPLY AIR TEMPERATURE RESET REQUIREMENTS OF SECTIONS

1 216 THROUGH 218.

2 SECTION 220. CONCURRENT OPERATION.

3 CONCURRENT OPERATION OF INDEPENDENT HEATING AND COOLING  
4 SYSTEMS SERVING COMMON SPACES, AND REQUIRING THE USE OF NEW  
5 ENERGY FOR HEATING OR COOLING SHALL BE MINIMIZED BY ONE OR BOTH  
6 OF THE FOLLOWING:

7 (1) BY PROVIDING SEQUENTIAL TEMPERATURE CONTROL OF BOTH  
8 HEATING AND COOLING CAPACITY IN EACH ZONE.

9 (2) BY LIMITING THE HEATING ENERGY INPUT, THROUGH  
10 AUTOMATIC RESET CONTROL OF THE HEATING MEDIUM TEMPERATURE (OR  
11 ENERGY INPUT RATE), TO ONLY THAT NECESSARY TO OFFSET HEAT  
12 LOSS DUE TO TRANSMISSION AND INFILTRATION AND, WHERE  
13 APPLICABLE, TO HEAT THE VENTILATION AIR SUPPLY TO THE SPACE.

14 SECTION 221. EQUIPMENT PERFORMANCE REQUIREMENTS.

15 (A) APPLICATION.--THE REQUIREMENTS OF THIS SECTION APPLY TO  
16 EQUIPMENT AND COMPONENT PERFORMANCE FOR HEATING, VENTILATING AND  
17 AIR CONDITIONING SYSTEMS. WHERE EQUIPMENT EFFICIENCY LEVELS ARE  
18 SPECIFIED, DATA FURNISHED BY THE EQUIPMENT SUPPLIER OR CERTIFIED  
19 UNDER A NATIONALLY RECOGNIZED CERTIFICATION PROGRAM OR RATING  
20 PROCEDURE SHALL BE USED TO SATISFY THESE REQUIREMENTS.

21 (B) SYSTEMS EQUIPMENT - ELECTRICAL.--HEATING VENTILATING AND  
22 AIR CONDITIONING SYSTEMS EQUIPMENT WHOSE ENERGY INPUT IN THE  
23 COOLING MODE IS ENTIRELY ELECTRIC SHALL SHOW A COEFFICIENT OF  
24 PERFORMANCE (COP) AND ENERGY EFFICIENCY RATIO (EER) NOT LESS  
25 THAN THE VALUES SPECIFIED IN TABLE 6. THESE REQUIREMENTS APPLY  
26 TO, BUT ARE NOT LIMITED TO, UNITARY COOLING EQUIPMENT (AIR AND  
27 WATER SOURCE); PACKAGED AIR CONDITIONERS; AND ROOM AIR  
28 CONDITIONERS. THESE REQUIREMENTS DO NOT APPLY TO EQUIPMENT USED  
29 IN AREAS HAVING OPEN REFRIGERATED FOOD DISPLAY CASES. FOR  
30 DETERMINING COEFFICIENT OF PERFORMANCE (COP), THE RATE OF NET

1 HEAT REMOVAL SHALL BE DEFINED AS THE CHANGE IN THE TOTAL HEAT  
 2 CONTENTS OF THE AIR ENTERING AND LEAVING THE EQUIPMENT (WITHOUT  
 3 REHEAT). TOTAL ENERGY INPUT SHALL BE DETERMINED BY COMBINING THE  
 4 ENERGY INPUTS TO ALL ELEMENTS OF THE EQUIPMENT, INCLUDING BUT  
 5 NOT LIMITED TO, COMPRESSORS, PUMPS, SUPPLY-AIR FANS, COOLING  
 6 TOWER FANS AND THE SYSTEM EQUIPMENT CONTROL CIRCUIT.

7 TABLE 6

8 MINIMUM EER AND COP FOR ELECTRIC HEATING, VENTILATING  
 9 AND AIR CONDITIONING SYSTEM EQUIPMENT

10 STANDARD RATING CAPACITY	EER	COP
11 UNDER 65,000 BTU/HR (19,050 WATTS)	6.1	1.8
12 65,000 BTU/HR (19,050 WATTS) AND OVER	6.8	2.0

13 (C) OTHER SYSTEM EQUIPMENT.--HEAT OPERATED COOLING EQUIPMENT  
 14 SHALL SHOW A COEFFICIENT OF PERFORMANCE (COP) IN THE COOLING  
 15 MODE NOT LESS THAN THE VALUES SPECIFIED IN TABLE 7. THESE  
 16 REQUIREMENTS APPLY TO, BUT ARE NOT LIMITED TO, ABSORPTION,  
 17 ENGINE-DRIVEN AND TURBINE-DRIVEN EQUIPMENT. THE COEFFICIENT OF  
 18 PERFORMANCE (COP) IS DETERMINED EXCLUDING THE ELECTRICAL  
 19 AUXILIARY INPUTS.

20 TABLE 7

21 MINIMUM COP FOR HEATING, VENTILATING AND AIR CONDITIONING  
 22 SYSTEM HEAT OPERATED COOLING EQUIPMENT

23 HEAT SOURCE	MINIMUM COP
24 DIRECT FIRED (GAS, OIL)	0.40
25 INDIRECT FIRED (STEAM, HOT WATER)	0.65

26 (D) SYSTEM COMPONENTS.--HEATING, VENTILATING AND AIR  
 27 CONDITIONING SYSTEM COMPONENTS WHOSE ENERGY INPUT IN THE COOLING  
 28 MODE IS ENTIRELY ELECTRIC SHALL SHOW A COEFFICIENT OF  
 29 PERFORMANCE (COP) AND ENERGY EFFICIENCY RATIO (EER) NOT LESS  
 30 THAN THE VALUES SPECIFIED IN TABLE 8. FOR DETERMINING

1 COEFFICIENT OF PERFORMANCE (COP), THE RATE OF HEAT REMOVAL IS  
 2 DEFINED AS THE DIFFERENCE IN TOTAL HEAT CONTENTS OF THE WATER OR  
 3 REFRIGERANT ENTERING OR LEAVING THE COMPONENT. TOTAL ENERGY  
 4 INPUT SHALL BE DETERMINED BY COMBINING THE ENERGY INPUTS TO ALL  
 5 ELEMENTS AND ACCESSORIES OF THE COMPONENT, INCLUDING BUT NOT  
 6 LIMITED TO, COMPRESSORS, INTERNAL CIRCULATING PUMPS, CONDENSER-  
 7 AIR FANS, EVAPORATIVE-CONDENSER COOLING HEATER PUMPS, PURGE, AND  
 8 THE COMPONENT CONTROL CIRCUIT.

9 TABLE 8

10 MINIMUM COP FOR ELECTRICALLY DRIVEN HEATING, VENTILATING  
 11 AND AIR CONDITIONING SYSTEM COMPONENTS

12 COMPONENT	13 CONDENSING MEANS	14 AIR	15 WATER	16 EVAPORATION
		ERR COP	EER COP	EER COP
14 SELF-CONTAINED	CENTRIFUGAL	7.5 2.2	12.9 3.8	
15 WATER CHILLERS				
	POSITIVE			
	DISPLACEMENT	7.2 2.1	10.9 3.2	
18 CONDENSERLESS	POSITIVE			
19 WATER CHILLERS	DISPLACEMENT	8.9 2.6	10.9 3.2	
20 COMPRESSOR AND				
21 CONDENSER UNITS	POSITIVE			
22 65,000 BTU/HR.	DISPLACEMENT	7.8 2.3	11.3 3.3	11.3 3.3
23 (19,050 WATTS)				
24 AND OVER				

25 (E) HEAT PUMPS.--HEAT PUMPS WHOSE ENERGY INPUT IS ENTIRELY  
 26 ELECTRIC SHALL SHOW A COEFFICIENT OF PERFORMANCE (COP), HEATING,  
 27 NOT LESS THAN THE VALUES SPECIFIED IN TABLE 9.

28 TABLE 9

29 MINIMUM COP FOR HEAT PUMPS, HEATING MODE

30 SOURCE AND OUTDOOR TEMPERATURE (DEGREE F.) MINIMUM COP

1	AIR SOURCE--47 DB/43 WB	2.2
2	AIR SOURCE--17 DB/15 WB	1.2
3	WATER SOURCE--60 ENTERING	2.2

4 (F) SUPPLEMENTARY HEATER.--THE HEAT PUMP SHALL BE INSTALLED  
5 WITH A CONTROL TO PREVENT SUPPLEMENTARY HEATER OPERATION WHEN  
6 THE HEATING LOAD CAN BE MET BY THE HEAT PUMP ALONE.

7 SUPPLEMENTARY HEATER OPERATION IS PERMITTED DURING TRANSIENT  
8 PERIODS, SUCH AS START-UPS, FOLLOWING ROOM THERMOSTAT SETPOINT  
9 ADVANCE, AND DURING DEFROST. A TWO-STAGE ROOM THERMOSTAT, WHICH  
10 CONTROLS THE SUPPLEMENTARY HEAT ON ITS SECOND STAGE, SHALL BE  
11 ACCEPTED AS MEETING THIS REQUIREMENT. THE CUT-ON TEMPERATURE FOR  
12 THE COMPRESSION HEATING SHALL BE HIGHER THAN THE CUT-ON  
13 TEMPERATURE FOR THE SUPPLEMENTARY HEAT, AND THE CUT-OFF  
14 TEMPERATURE FOR THE COMPRESSION HEATING SHALL BE HIGHER THAN THE  
15 CUT-OFF TEMPERATURE FOR THE SUPPLEMENTARY HEAT. SUPPLEMENTARY  
16 HEAT MAY BE DERIVED FROM ANY SOURCE OF ELECTRIC RESISTANCE  
17 HEATING OR COMBUSTION HEATING.

18 (G) COMBUSTION HEATING EQUIPMENT.--ALL GAS AND OILFIRED  
19 COMFORT HEATING EQUIPMENT SHALL SHOW A MINIMUM COMBUSTION  
20 EFFICIENCY OF 75% AT MAXIMUM RATED OUTPUT. COMBUSTION EFFICIENCY  
21 SHALL BE DETERMINED IN ACCORDANCE WITH THE ASHRAE STANDARD 90.

## 22 SECTION 222. DUCT INSULATION.

23 (A) INSULATION.--ALL DUCT SYSTEMS, OR PORTIONS THEREOF,  
24 EXPOSED TO NONCONDITIONED SPACES SHALL BE INSULATED TO PROVIDE A  
25 THERMAL RESISTANCE, EXCLUDING FILM RESISTANCE, OF

26 
$$R = \frac{TI - TO}{15}$$

27 
$$R = \frac{1}{15} \text{ (HR) (SQ.FT) (F) / BTU}$$

28

29 WHERE TI-TO IS THE DESIGN TEMPERATURE DIFFERENTIAL (ABSOLUTE  
30 VALUE) BETWEEN THE AIR IN THE DUCT AND THE SURROUNDING AIR WITH

1 THE FOLLOWING EXCEPTIONS. DUCT INSULATION, EXCEPT WHEN NEEDED TO  
2 PREVENT CONDENSATION, IS NOT REQUIRED IN ANY OF THE FOLLOWING  
3 CASES:

4 (1) WHERE TI-TO IS 25 DEGREES F. OR LESS.

5 (2) WHEN THE HEAT GAIN OR LOSS OF THE DUCTS, WITHOUT  
6 INSULATION, WILL NOT INCREASE THE ENERGY REQUIREMENTS OF THE  
7 BUILDING.

8 (3) EXHAUST AIR DUCTS.

9 (4) SUPPLY OR RETURN AIR DUCTS INSTALLED IN CRAWL SPACES  
10 WITH INSULATED WALLS, BASEMENTS OR CELLARS IN ONE AND TWO-  
11 FAMILY DWELLINGS.

12 (B) VAPOR BARRIERS.--WHERE REQUIRED TO PREVENT CONDENSATION,  
13 INSULATION WITH VAPOR BARRIERS SHALL BE INSTALLED IN ADDITION TO  
14 INSULATION REQUIRED ABOVE.

15 SECTION 223. SYSTEM CONTROLS.

16 (A) APPLICATION.--ALL HEATING, VENTILATING AND AIR  
17 CONDITIONING SYSTEMS SHALL BE PROVIDED CONTROLS AS SPECIFIED  
18 HEREIN.

19 (B) TEMPERATURE.--EACH HEATING, VENTILATING AND AIR  
20 CONDITIONING SYSTEM SHALL BE PROVIDED WITH AT LEAST ONE  
21 THERMOSTAT FOR THE REGULATION OF TEMPERATURE. EACH THERMOSTAT  
22 SHALL BE CAPABLE OF BEING SET FROM 55 DEGREES F. TO 75 DEGREES  
23 F. WHERE USED TO CONTROL HEATING ONLY AND FROM 70 DEGREES F. TO  
24 85 DEGREES F. WHERE USED TO CONTROL COOLING ONLY. WHERE USED TO  
25 CONTROL BOTH HEATING AND COOLING IT SHALL BE CAPABLE OF BEING  
26 SET FROM 55 DEGREES F. TO 85 DEGREES F. AND SHALL BE CAPABLE OF  
27 OPERATING THE SYSTEM HEATING AND COOLING IN SEQUENCE. IT SHALL  
28 BE ADJUSTABLE TO PROVIDE A TEMPERATURE RANGE OF UP TO 10 DEGREES  
29 F. BETWEEN FULL HEATING AND FULL COOLING, EXCEPT AS ALLOWED IN  
30 SECTION 220.

1 (C) HUMIDITY.--IF A HEATING, VENTILATING AND AIR  
2 CONDITIONING SYSTEM IS EQUIPPED WITH A MEANS FOR ADDING MOISTURE  
3 TO MAINTAIN SPECIFIC SELECTED RELATIVE HUMIDITIES IN SPACES OR  
4 ZONES, A HUMIDISTAT SHALL BE PROVIDED. THIS DEVICE SHALL BE  
5 CAPABLE OF BEING SET TO PREVENT NEW ENERGY FROM BEING USED TO  
6 PRODUCE SPACE RELATIVE HUMIDITY ABOVE 30% R.H. WHERE A  
7 HUMIDISTAT IS USED IN A HEATING, VENTILATING AND AIR  
8 CONDITIONING SYSTEM FOR CONTROLLING MOISTURE REMOVAL TO MAINTAIN  
9 SPECIFIC SELECTED RELATIVE HUMIDITIES IN SPACES OR ZONES, IT  
10 SHALL BE CAPABLE OF BEING SET TO PREVENT NEW ENERGY FROM BEING  
11 USED TO PRODUCE A SPACE RELATIVE HUMIDITY BELOW 60%.

12 (D) TEMPERATURE ZONING.--

13 (1) IN ALL BUILDINGS AND STRUCTURES OF USE GROUP R-3, AT  
14 LEAST ONE THERMOSTAT FOR REGULATION OF SPACE TEMPERATURE  
15 SHALL BE PROVIDED FOR EACH SEPARATE HEATING, VENTILATING AND  
16 AIR CONDITIONING SYSTEM. IN ADDITION, A READILY ACCESSIBLE  
17 MANUAL OR AUTOMATIC MEANS SHALL BE PROVIDED TO PARTIALLY  
18 RESTRICT OR SHUT-OFF THE HEATING OR COOLING INPUT TO EACH  
19 ZONE OR FLOOR, EXCLUDING UNHEATED OR UNCOOLED BASEMENTS AND  
20 GARAGES.

21 (2) IN ALL BUILDINGS AND STRUCTURES OF USE GROUP R-2,  
22 EACH INDIVIDUAL DWELLING UNIT SHALL BE CONSIDERED SEPARATELY  
23 AND SHALL MEET THE REQUIREMENTS FOR ONE AND TWO-FAMILY  
24 DWELLINGS ABOVE.

25 (3) IN ALL BUILDINGS AND STRUCTURES OTHER THAN USE GROUP  
26 R-3 AND IN SPACES OTHER THAN DWELLING UNITS IN USE GROUP R-2,  
27 AT LEAST ONE THERMOSTAT FOR REGULATION OF SPACE TEMPERATURE  
28 SHALL BE PROVIDED FOR EACH SEPARATE HEATING, VENTILATING AND  
29 AIR CONDITIONING SYSTEM AND FOR EACH FLOOR OF THE BUILDING.

30 (E) SET-BACK AND SHUT-OFF.--

(1) IN ALL BUILDINGS AND STRUCTURES, OR PORTIONS THEREOF OF USE GROUP R-3, THE THERMOSTAT, OR AN ALTERNATE MEANS SUCH AS A SWITCH OR A CLOCK, SHALL PROVIDE A READILY ACCESSIBLE, MANUAL OR AUTOMATIC MEANS FOR REDUCING THE ENERGY REQUIRED FOR HEATING AND COOLING DURING PERIODS OF NONUSE OR REDUCED NEED.

(2) IN ALL OTHER BUILDINGS AND STRUCTURES, OR PORTIONS THEREOF EACH HEATING, VENTILATING AND AIR CONDITIONING SYSTEM SHALL BE EQUIPPED WITH A READILY ACCESSIBLE MEANS OF REDUCING THE ENERGY USED FOR HEATING, VENTILATING AND AIR CONDITIONING DURING PERIODS OF NONUSE OR ALTERNATE USES OF THE BUILDING SPACES OR ZONES SERVED BY THE SYSTEM, SUCH AS WITH MANUALLY ADJUSTABLE AUTOMATIC TIMING DEVICES, MANUAL DEVICES FOR USE BY OPERATING PERSONNEL, OR AUTOMATIC CONTROL SYSTEMS.

(3) LOWERING THERMOSTAT SET POINTS TO REDUCE ENERGY CONSUMPTION OF HEATING SYSTEMS SHALL NOT CAUSE ENERGY TO BE EXPENDED TO REACH THE REDUCED SETTING.

#### SECTION 224. STEAM AND HOT WATER HEATING PIPING.

(A) PIPING INSULATION.--ALL PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM INSTALLED TO SERVE BUILDINGS AND WITHIN BUILDINGS SHALL BE THERMALLY INSULATED AS SHOWN IN TABLE 10.

TABLE 10

#### MINIMUM PIPE INSULATION

#### INSULATION THICKNESS IN INCHES

FLUID		FOR PIPE SIZES					
PIPING	TEMPERATURE						
SYSTEM	RANGE,	RUNOUTS	1" AND	1 1/4-	2 1/2-	5&	8" AND
TYPES	F.	UP TO 2"	LESS	2	4	6	LARGER
HEATING SYSTEMS							



1	STEAM &								
2	HOT WATER								
3	HIGH PRESSURE/								
4	TEMP	306-450	1 1/2	1 1/2	2	2 1/2	3 1/2	3 1/2	
5	MED. PRESSURE/								
6	TEMP	251-305	1 1/2	1 1/2	2	2 1/2	3	3	
7	LOW PRESSURE/								
8	TEMP	201-250	1	1	1 1/2	1 1/2	2	2	
9	LOW TEM-								
10	PERATURE	120-200	1/2	3/4	1	1	1	1 1/2	
11	STEAM CON-								
12	DENSATE	ANY	1	1	1	1 1/2	1 1/2	2	
13	(FOR FEED								
14	WATER)								
15	COOLING SYSTEMS								
16	CHILLED								
17	WATER,	40-55	1/2	1/2	3/4	1	1	1	
18	REFRIGERANT,								
19	OR BRINE	BELOW 40	1	1	1 1/2	1 1/2	1 1/2	1 1/2	

20 INSULATION THICKNESSES ARE BASED ON INSULATION HAVING THERMAL  
21 RESISTANCES IN THE RANGE OF 4.0 TO 4.6 PER INCH OF THICKNESS ON  
22 A FLAT SURFACE AT A MEAN TEMPERATURE OF 75 DEGREES F. MINIMUM  
23 INSULATION THICKNESS SHALL BE INCREASED FOR MATERIALS HAVING R  
24 VALUES LESS THAN 4.0 OR MAY BE REDUCED FOR MATERIALS HAVING R  
25 VALUES GREATER THAN 4.6 PER INCH OF THICKNESS AS FOLLOWS:

26 (B) HIGH THERMAL RESISTANCE.--FOR MATERIALS WITH THERMAL  
27 RESISTANCE GREATER THAN R=4.6, THE MINIMUM INSULATION THICKNESS  
28 MAY BE REDUCED AS FOLLOWS:

$$29 \quad \frac{4.6 \times \text{TABLE 10 THICKNESS}}{\text{ACTUAL R}} = \text{NEW MINIMUM THICKNESS}$$

30

(C) LOW THERMAL RESISTANCE.--FOR MATERIALS WITH THERMAL RESISTANCE LESS THAN  $R=4.0$  THE MINIMUM INSULATION THICKNESS SHALL BE INCREASED AS FOLLOWS:

$$\frac{4.0 \times \text{TABLE 10 THICKNESS}}{\text{ACTUAL R}} = \text{NEW MINIMUM THICKNESS}$$

PIPING INSULATION, EXCEPT WHEN NEEDED TO PREVENT CONDENSATION, IS NOT REQUIRED IN ANY OF THE FOLLOWING CASES:

(1) PIPING INSTALLED WITHIN HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT.

(2) PIPING AT TEMPERATURES BETWEEN 55 DEGREES F. AND 120 DEGREES F.

(3) WHEN THE HEAT LOSS OR HEAT GAIN OF THE PIPING, WITHOUT INSULATION, DOES NOT INCREASE THE ENERGY REQUIREMENTS OF THE BUILDING.

(4) PIPING INSTALLED IN BASEMENTS OR CELLARS IN ONE AND TWO-FAMILY DWELLINGS.

(D) VAPOR BARRIERS.--WHERE REQUIRED TO PREVENT CONDENSATION, INSULATION WITH VAPOR BARRIERS SHALL BE INSTALLED IN ADDITION TO INSULATION REQUIRED ABOVE.

#### SUBCHAPTER F

#### PLUMBING SYSTEMS

##### SECTION 225. PURPOSE.

THIS SUBCHAPTER SETS FORTH PROVISIONS FOR DESIGN AND EQUIPMENT SELECTION FOR ENERGY CONSERVATION IN SERVICE WATER HEATING SYSTEMS.

##### SECTION 226. FIXTURES.

(A) LAVATORIES.--LAVATORIES IN RESTROOMS OF PUBLIC FACILITIES SHALL BE EQUIPPED WITH SELF-CLOSING OUTLET DEVICES WHICH LIMIT THE FLOW OF HOT WATER TO A MAXIMUM OF 0.5 GPM, DEVICES WHICH LIMIT THE OUTLET TEMPERATURE TO A MAXIMUM OF 110

1 DEGREES F. AND SELF-CLOSING VALVES WHICH LIMIT THE QUANTITY OF  
2 HOT WATER TO A MAXIMUM OF 0.25 GALLONS.

3 (B) SHOWERS.--SHOWERS USED FOR OTHER THAN SAFETY REASONS  
4 SHALL BE EQUIPPED WITH FLOW CONTROL DEVICES TO LIMIT TOTAL FLOW  
5 TO A MAXIMUM OF 3 GPM PER SHOWER HEAD.

6 SECTION 227. INSULATION.

7 (A) PIPING INSULATION.--PIPING IN REQUIRED RETURN  
8 CIRCULATION SYSTEMS SHALL BE INSULATED SO THAT HEAT LOSS IS  
9 LIMITED TO A MAXIMUM OF 25 BTUH PER SQUARE FOOT OF EXTERNAL PIPE  
10 SURFACE FOR ABOVE GROUND PIPING AND A MAXIMUM OF 35 BTUH PER  
11 SQUARE FOOT OF EXTERNAL PIPE SURFACE FOR UNDERGROUND PIPING.  
12 MAXIMUM HEAT LOSS SHALL BE DETERMINED AT A TEMPERATURE  
13 DIFFERENTIAL EQUAL TO THE MAXIMUM WATER TEMPERATURE MINUS A  
14 DESIGN AMBIENT TEMPERATURE NO HIGHER THAN 65 DEGREES F. EXCEPT  
15 THAT CONFORMANCE WITH TABLE 10 FOR "LOW TEMPERATURE PIPING  
16 SYSTEM" SHALL BE DEEMED AS COMPLYING WITH THIS SECTION.

17 (B) TANKS.--UNFIRED HOT WATER STORAGE TANKS SHALL BE  
18 INSULATED SO THAT HEAT LOSS IS LIMITED TO A MAXIMUM OF 15 BTUH  
19 PER SQUARE FOOT OF EXTERNAL TANK SURFACE AREA. FOR PURPOSES OF  
20 DETERMINING THIS HEAT LOSS, THE DESIGN AMBIENT TEMPERATURE SHALL  
21 BE NO HIGHER THAN 65 DEGREES F.

22 SECTION 228. EQUIPMENT.

23 (A) PUMP OPERATION.--CIRCULATING HOT WATER SYSTEMS SHALL BE  
24 ARRANGED SO THAT THE CIRCULATING PUMP CAN BE CONVENIENTLY TURNED  
25 OFF EITHER AUTOMATICALLY OR MANUALLY WHEN THE HOT WATER SYSTEM  
26 IS NOT IN OPERATION.

27 (B) ELECTRIC WATER HEATERS.--ALL AUTOMATIC ELECTRIC STORAGE  
28 WATER HEATERS SHALL HAVE A STAND-BY LOSS NOT EXCEEDING 4 WATTS  
29 PER SQUARE FOOT OF TANK SURFACE AREA. THE METHOD OF TEST OF  
30 STAND-BY LOSS SHALL BE AS DESCRIBED IN SECTION 4.3.1 OF ANSI

1 C72.1 HOUSEHOLD AUTOMATIC ELECTRICAL STORAGE-TYPE WATER HEATERS.

2 (C) GAS AND OIL-FIRED WATER HEATERS.--ALL GAS AND OIL-FIRED  
3 AUTOMATIC STORAGE HEATERS SHALL HAVE A RECOVERY EFFICIENCY, ER,  
4 NOT LESS THAN 75% AND A STAND-BY LOSS PERCENTAGE S, NOT  
5 EXCEEDING  $S=2.3+67/V$  WHERE V=RATED VOLUME IN GALLONS. THE METHOD  
6 OF TEST OF ER AND S SHALL BE AS DESCRIBED IN SECTION 2.7 OF ANSI  
7 Z21.10.3 CIRCULATING TANK, INSTANTANEOUS AND LARGE AUTOMATIC  
8 STORAGE TYPE WATER HEATERS, APPROVAL REQUIREMENTS FOR GAS WATER  
9 HEATERS.

10 SECTION 229. CONTROLS.

11 (A) TEMPERATURE CONTROLS.--ALL HOT WATER SUPPLY SYSTEMS  
12 SHALL BE EQUIPPED WITH AUTOMATIC TEMPERATURE CONTROLS CAPABLE OF  
13 ADJUSTMENTS FROM THE LOWEST TO THE HIGHEST ACCEPTABLE  
14 TEMPERATURE SETTINGS FOR THE INTENDED USE.

15 (B) SHUT DOWN.--A SEPARATE SWITCH SHALL BE PROVIDED TO  
16 TERMINATE THE ENERGY SUPPLIED TO ELECTRIC HOT WATER SUPPLY  
17 SYSTEMS. A SEPARATE VALVE SHALL BE PROVIDED TO TURN OFF THE  
18 ENERGY SUPPLIED TO THE MAIN BURNER OF ALL OTHER TYPES OF HOT  
19 WATER SUPPLY SYSTEMS.

## 20 SUBCHAPTER G

### 21 ELECTRICAL SYSTEMS

22 SECTION 230. SYSTEM REQUIREMENTS.

23 (A) POWER FACTOR.--THE POWER FACTOR OF THE OVERALL  
24 ELECTRICAL DISTRIBUTION SYSTEM IN A BUILDING SHALL BE NOT LESS  
25 THAN 90% UNDER RATED DESIGN INSTALLED LOAD OF THE BUILDING,  
26 EITHER BY UTILIZATION EQUIPMENT DESIGN OR BY THE USE OF POWER  
27 FACTOR CORRECTIVE DEVICES. THE POWER FACTOR CORRECTIVE DEVICES  
28 MAY BE INSTALLED ON INDIVIDUAL EQUIPMENT, RATED GREATER THAN  
29 1,000 WATTS AND SWITCHED THEREWITH, REGIONALLY GROUPED, LOCATED  
30 AT THE SERVICE EQUIPMENT OR POWER FACTOR CORRECTION ACHIEVED BY

1 OTHER EQUIVALENT MEANS. THE CHOICE AMONG THESE CORRECTIVE  
2 METHODS SHOULD BE MADE BASED UPON AN ENGINEERING EVALUATION OF  
3 EACH DISTRIBUTION SYSTEM.

4 (B) SERVICE VOLTAGE.--WHERE A CHOICE OF SERVICE VOLTAGE IS  
5 AVAILABLE, THE VOLTAGE RESULTING IN THE LEAST ENERGY LOSS SHALL  
6 BE USED.

7 (C) VOLTAGE DROP.--IN ANY BUILDING, THE MAXIMUM TOTAL  
8 VOLTAGE DROP SHALL NOT EXCEED 3% IN BRANCH CIRCUITS OR FEEDERS,  
9 FOR A TOTAL OF 5% TO THE FARTHEST OUTLET BASED ON STEADY STATE  
10 DESIGN LOAD CONDITIONS.

11 (D) LIGHTING SWITCHING.--SWITCHING SHALL BE PROVIDED FOR  
12 EACH LIGHTING CIRCUIT, OR FOR PORTIONS OF EACH CIRCUIT, SO THAT  
13 THE PARTIAL LIGHTING REQUIRED FOR CUSTODIAL OR FOR EFFECTIVE  
14 COMPLEMENTARY USE WITH NATURAL LIGHTING MAY BE OPERATED  
15 SELECTIVELY.

16 (E) SEPARATE METERING.--IN ALL MULTI-FAMILY DWELLINGS  
17 PROVISIONS SHALL BE MADE TO DETERMINE THE ELECTRICAL ENERGY  
18 CONSUMED BY EACH TENANT.

#### 19 SUBCHAPTER H

#### 20 LIGHTING

#### 21 SECTION 231. LIGHT POWER BUDGET.

22 A LIGHTING POWER BUDGET IS THE UPPER LIMIT OF THE POWER TO BE  
23 AVAILABLE TO PROVIDE THE LIGHTING NEEDS IN ACCORDANCE WITH A  
24 GIVEN SET OF CRITERIA AND GIVEN CALCULATION PROCEDURE.

#### 25 SECTION 232. CALCULATION METHODS.

26 THE CRITERIA SPECIFIED BELOW SHALL BE UTILIZED FOR  
27 COMPUTATION OF THE LIGHTING POWER BUDGET. ALL CALCULATIONS SHALL  
28 BE IN ACCORDANCE WITH ACCEPTED ENGINEERING PRACTICE. WHEN  
29 INSUFFICIENT INFORMATION IS KNOWN ABOUT THE SPECIFIC USE OF THE  
30 BUILDING SPACE (E.G., NUMBER OF OCCUPANTS, SPACE FUNCTION,

LOCATION OF PARTITIONS), THE BUDGET SHALL BE BASED ON THE  
APPARENT INTENDED USE OF THE BUILDING SPACE.

SECTION 233. BUILDING INTERIORS.

(A) PROCEDURE.--THE ALLOWABLE ELECTRIC POWER FOR LIGHTING  
SHALL BE ESTABLISHED BY USING THE CRITERIA AND THE CALCULATION  
PROCEDURES SPECIFIED IN SECTION 236. THE VALUE SHALL BE BASED ON  
THE USE FOR WHICH THE SPACE WITHIN THE BUILDING IS INTENDED AND  
ON EFFICIENT ENERGY UTILIZATION.

(B) ILLUMINATION LEVEL CRITERIA.--FOR THE PURPOSE OF  
ESTABLISHING A BUDGET, LEVELS OF ILLUMINATION SHALL BE THOSE  
LISTED IN FIG. 9-80 OF THE IES LIGHTING HANDBOOK, AND THOSE  
LEVELS SHALL BE USED AS FOLLOWS:

(1) FOR TASK LIGHTING, THE LEVELS OF ILLUMINATION LISTED  
ARE FOR SPECIFIC TASKS. THESE LEVELS ARE FOR THE TASK AREAS  
DEFINED IN THE IES LIGHTING HANDBOOK OR, WHERE NOT DEFINED,  
AT ALL USABLE PORTIONS OF TASK SURFACES. IN SOME CASES, THE  
LEVELS OF ILLUMINATION ARE LISTED FOR LOCATIONS (E.G.,  
AUDITORIUMS). THESE LEVELS ARE TO BE CONSIDERED AS AVERAGE  
LEVELS.

(2) FOR GENERAL LIGHTING, IN AREAS SURROUNDING TASK  
LOCATIONS, THE AVERAGE LEVEL OF GENERAL LIGHTING, FOR BUDGET  
PURPOSES ONLY, SHALL BE ONE-THIRD THE LEVEL FOR THE TASKS  
PERFORMED IN THE AREA BUT IN NO CASE LESS THAN 20-FOOT  
CANDLES. WHERE MORE THAN ONE TASK LEVEL OCCURS IN A SPACE,  
THE GENERAL LEVEL SHALL BE ONE-THIRD THE WEIGHTED AVERAGE OF  
THE SPECIFIC TASK LEVELS.

(3) FOR NONCRITICAL LIGHTING, IN CIRCULATION AND SEATING  
AREAS, WHERE NO SPECIFIC VISUAL TASKS OCCUR, THE AVERAGE  
LEVEL OF ILLUMINATION SHALL BE ONE-THIRD OF THE AVERAGE  
GENERAL LIGHTING IN THE ADJACENT TASK SPACES BUT IN NO CASE

1 LESS THAN TEN-FOOT CANDLES.

2 (4) FOR THE PURPOSE OF ESTABLISHING A POWER BUDGET, ONLY  
3 LAMP EFFICACIES AND COEFFICIENTS OF UTILIZATION (CU)  
4 SPECIFIED IN TABLE 11, SHALL BE ASSUMED.

5 SECTION 234. BUILDING EXTERIORS.

6 (A) BASIS ON USE.--IN EXTERIOR SPACES, THE LIGHTING POWER  
7 BUDGET SHALL BE BASED ON THE USE OF WHICH THE SPACE IS INTENDED  
8 (FOR TASK PERFORMANCE, SAFETY, OR SECURITY) AND ON EFFICIENT  
9 ENERGY UTILIZATION.

10 (B) CRITERIA.--THE SAME CRITERIA AS THOSE FOR INTERIOR  
11 SPACES APPLY FOR ILLUMINATION LEVELS AND LIGHTING SYSTEMS WITH  
12 THE ADDITION OF LUMINAIRES FOR FLOOD LIGHTING. FOR POWER BUDGET  
13 PURPOSES FLOODLIGHTING SHALL BE SELECTED WITH LUMINAIRES HAVING  
14 A GREATER PERCENTAGE OF THEIR BEAM LUMENS RESTRICTED TO THE AREA  
15 TO BE LIGHTED. SUCH LUMINAIRES ARE DEFINED AS THOSE WITH AT  
16 LEAST THE MINIMUM EFFICIENCIES LISTED IN THE IES LIGHTING  
17 HANDBOOK.

18 (C) FACADE LIGHTING.--FACADE LIGHTING FOR BUDGET PURPOSES  
19 SHALL BE NO GREATER THAN 2% OF THE TOTAL INTERIOR LOAD OF THE  
20 BUILDING.

21 (D) CALCULATION PROCEDURE.--IN ESTABLISHING A LIGHTING POWER  
22 BUDGET THE FOLLOWING PROCEDURES SHALL BE USED:

23 (1) FOR OVERHEAD LIGHTING THE PROCEDURE SPECIFIED IN  
24 SECTION 236 SHALL BE FOLLOWED, BUT USING REFLECTANCES AS  
25 FOUND.

26 (2) FOR FLOOD LIGHTING THE BEAM LUMEN METHOD, AS SHOWN  
27 IN THE IES LIGHTING HANDBOOK AND A COEFFICIENT OF BEAM  
28 UTILIZATION (CBU) OF 0.75 SHALL BE USED FOR FLOODLIGHTING  
29 CALCULATIONS.

30 SECTION 235. EXCEPTIONS TO CRITERIA.

(A) INTERIORS.--THE CRITERIA OF SECTION 233 SHALL NOT APPLY TO THE FOLLOWING AREAS WHEN CALCULATING THE LOAD:

(1) PORTIONS OF RESIDENTIAL OCCUPANCIES EXCEPT FOR KITCHENS, BATHROOMS, AND LAUNDRY AREAS AND PUBLIC SPACES INCLUDING LOBBIES, HALLS, STAIRWAYS, BASEMENT AREAS, AND UTILITY ROOMS.

(2) RESIDENTIAL TYPE SPACES SIMILAR TO THOSE STATED IN PARAGRAPH (1) IN INSTITUTIONS, SUCH AS HOSPITALS, HOTELS, FUNERAL HOMES, CHURCHES, MUSEUMS, ETC.

(3) THEATER AUDITORIUMS, ENTERTAINMENT AND AUDIOVISUAL PRESENTATIONS WHERE THE LIGHTING IS AN ESSENTIAL TECHNICAL ELEMENT FOR THE FUNCTION PERFORMED.

(B) EXTERIORS.--THE CRITERIA OF SECTION 234 SHALL NOT APPLY TO THE FOLLOWING LAMPS AND LUMINARIES; HOWEVER, THEIR USE SHALL BE ACCOUNTED FOR IN THE CALCULATION OF TASK LIGHTING LOADS FOR SPECIFIC TASKS. THE ALLOWABLE LOAD SHALL BE BASED ON THE LUMINARY WATTAGE TO ACHIEVE THE LEVELS OF ILLUMINATION AS COVERED IN SECTION 233 USING A POINT CALCULATION METHOD GIVEN IN THE IES LIGHTING HANDBOOK. THE EXCEPTED LAMPS AND LUMINAIRES ARE AS FOLLOWS:

(1) LUMINAIRES FOR MEDICAL AND DENTAL PURPOSES.

(2) LUMINAIRES FOR HIGHLIGHTING APPLICATIONS, SUCH AS SCULPTURE EXHIBITS, ART EXHIBITS, AND INDIVIDUAL ITEMS OF DISPLAY MERCHANDISE.

(3) LUMINAIRES FOR SPECIALIZED LIGHTING APPLICATIONS (COLOR MATCHING, WHERE ELECTRICAL INTERFERENCE CANNOT BE TOLERATED, ETC.).

(C) CONTROL OF REFLECTANCES.--THE CRITERIA OF TABLE 11 SHALL NOT APPLY IN SPACES WHERE IT IS IMPRACTICAL TO CONTROL REFLECTANCES AND WHERE A DIRTY ATMOSPHERE CANNOT BE AVOIDED.



1 WHERE THIS CONDITION EXISTS, THE VALUES FOR REFLECTANCES AND  
2 LIGHT LOSS FACTORS SHALL BE THOSE EXPECTED TO BE FOUND AND SHALL  
3 BE APPROVED BY THE DEPARTMENT. THE CALCULATION SHALL MAKE A NOTE  
4 OF THIS DEVIATION.

5 SECTION 236. CALCULATION PROCEDURE.

6 (A) ILLUMINATION LEVELS AND AREAS.--TO ESTABLISH  
7 ILLUMINATION LEVELS AND AREAS, THE FOLLOWING PROCEDURE SHALL BE  
8 USED:

9 (1) DETERMINE THE VISUAL TASKS THAT ARE EXPECTED TO BE  
10 PERFORMED IN EACH SPACE AND THE NUMBER OF PLANNED WORK  
11 LOCATIONS WHERE TASKS WILL BE PERFORMED. IF ASSUMPTIONS ARE  
12 MADE, THEIR BASES SHALL BE INDICATED.

13 (2) SELECT THE ILLUMINATION LEVEL, IN FOOT-CANDLES FOR  
14 THOSE EXPECTED TASKS IN ACCORDANCE WITH SECTION 233(B)(1).

15 (3) CALCULATE TOTAL TASK AREAS TO BE ILLUMINATED TO THE  
16 SAME LEVEL BY MULTIPLYING THE NUMBER OF WORK LOCATIONS BY 50  
17 SQUARE FEET PER WORK LOCATION. (TOTAL TASK AREAS SHALL NOT  
18 EXCEED ACTUAL TOTAL SPACE AREA). IF ACTUAL TASK AREA IS  
19 GREATER THAN 50 SQUARE FEET THE ACTUAL AREA SHALL BE USED. IF  
20 SPECIAL TASK LIGHTING OR LOCALIZED LIGHTING IS TO BE  
21 EMPLOYED, USE THE ACTUAL TASK AREAS AND POINT CALCULATION  
22 PROCEDURES.

23 (4) CALCULATE THE LEVEL OF GENERAL LIGHTING BY  
24 MULTIPLYING THE TASK LIGHTING LEVEL BY ONE-THIRD, WHERE THERE  
25 IS ONLY ONE TASK LEVEL, OR BY TAKING ONE-THIRD OF THE SUM OF  
26 THE PRODUCTS OF THE TASK LEVELS AS PROVIDED FOR IN PARAGRAPH  
27 (2) AND THEIR AREAS AS PROVIDED FOR IN PARAGRAPH (3) DIVIDED  
28 BY THE TOTAL TASK AREAS.

29 (5) CALCULATE THE LEVEL OF NONCRITICAL LIGHTING.

30 (B) LIGHTING SYSTEM DATA.--TO ESTABLISH LIGHTING SYSTEM

1 DATA, THE FOLLOWING SHALL BE USED:

2 (1) LIGHT SOURCE AND LUMINAIRE TYPES TO USE.

3 (2) LAMP LUMENS PER WATT AND LUMINAIRE COEFFICIENTS OF

4 UTILIZATION FOR ROOM AND LUMINAIRE MOUNTING HEIGHT

5 DIMENSIONS. LUMINAIRE CUS SHALL BE SELECTED FROM THE IES

6 LIGHTING HANDBOOK. IN ALL CASES, NO LUMINAIRE SHALL HAVE A CU

7 FOR RCR = 1 OF LESS THAN THAT GIVEN IN TABLE 11 LAMP

8 EFFICACIES FOR THE APPROPRIATE SPACE.

9 (C) ALLOWABLE WATTAGE.--TO ESTABLISH ALLOWABLE WATTAGE, THE  
10 FOLLOWING SHALL BE USED:

11 (1) USING DATA FROM SUBSECTION (B), THE ILLUMINATION  
12 LEVELS AND AREAS DETERMINED IN SUBSECTION (A), AND THE  
13 CRITERIA OF TABLE 11 ON REFLECTANCE, CALCULATE THE ALLOWABLE  
14 WATTAGES USING THE LUMEN METHOD.

15 (2) CALCULATE THE TOTAL SPACE WATTAGE BY ADDING THE  
16 TASK, GENERAL AND NONCRITICAL LIGHTING LOADS.

17 (3) ADD THE WATTAGE OF LUMINAIRES ALLOWED IN SECTION  
18 235(B).

19 TABLE 11

20 (A) LAMP EFFICACIES.--THE FOLLOWING ARE INITIAL LUMEN OUTPUT  
21 PER WATT INPUT, INCLUDING BALLAST LOSSES:

22 APPLICATION	LUMENS
23 PER WATT	
24 WHERE MODERATE COLOR RENDITION IS APPROPRIATE	55
25 WHERE GOOD COLOR RENDITION IS APPROPRIATE	40
26 WHERE HIGH COLOR RENDITION IS APPROPRIATE,	
27 SPACES ARE LESS THAN 50 SQUARE FEET OR WHERE	
28 USE OF LOW WATTAGE HIGH INTENSITY DISCHARGE	
29 (HID) LAMPS UNDER 250 W OR FLUORESCENT	
30 LAMPS UNDER 40 W IS APPROPRIATE	25

1 (B) LUMINARY COEFFICIENTS OF UTILIZATION (CU).--COEFFICIENTS  
 2 OF UTILIZATION (CUS) ARE TO BE FOR LUMINAIRES FOR USE IN THE  
 3 TYPES OF SPACES LISTED BELOW, AND THOSE LUMINAIRES SHALL HAVE A  
 4 CU OF NO LESS THAN THAT LISTED BELOW (FOR EACH TYPE SPACE) FOR A  
 5 ROOM CAVITY RATIO (RCR) OF 1 AND REFLECTANCES AS IN (C).

6 SPACE USE	MINIMUM CU
7	(AT RCR = 1)

8 FOR SPACES WITH TASKS SUBJECTED TO VEILING	
9 REFLECTIONS WHERE DESIGN LEVELS OF	
10 ILLUMINATION ARE LISTED IN TERMS OF	
11 EQUIVALENT SPHERE ILLUMINATION (ESI) AND	
12 WHERE VISUAL COMFORT IS IMPORTANT.	0.55

13 FOR SPACES WITHOUT TASKS, OR WITH TASKS	
14 NOT SUBJECTED TO VEILING REFLECTIONS, BUT	
15 WHERE VISUAL COMFORT IS IMPORTANT.	0.63
16 FOR SPACES WITHOUT TASKS AND WHERE VISUAL	
17 COMFORT IS NOT A CRITERION	0.70

18 (C) OTHER CRITERIA; REFLECTANCES.--FOR INTERIOR SPACES, THE  
 19 FOLLOWING INITIAL CAVITY AND SURFACE REFLECTANCES SHALL BE  
 20 ASSUMED:

21 CEILING CAVITY REFLECTANCE	80%
22 WALL REFLECTANCE	50%
23 FLOOR CAVITY REFLECTANCE	20%

24 LIGHT LOSS FACTOR. A LIGHT LOSS FACTOR (LLF) OF 0.70 SHALL BE  
 25 USED.

26 SUBCHAPTER I

27 ALTERNATIVE SYSTEMS

28 SECTION 237. PERFORMANCE ALTERNATIVE.

29 ALTERNATIVE BUILDING SYSTEMS AND EQUIPMENT DESIGN MAY BE  
 30 APPROVED BY THE DEPARTMENT WHEN THEY CAN BE SHOWN TO HAVE ENERGY

1 CONSUMPTION NOT GREATER THAN THAT OF A SIMILAR BUILDING WITH  
2 SIMILAR FORMS OF ENERGY REQUIREMENTS, DESIGNED IN ACCORDANCE  
3 WITH THE PROVISIONS OF THIS ACT OR WHEN THEY CAN BE SHOWN TO  
4 HAVE ENERGY CONSUMPTION NOT GREATER THAN THAT WHICH SHALL BE  
5 ESTABLISHED BY THE DEPARTMENT WITH THE APPROVAL OF THE BUILDING  
6 ENERGY CONSERVATION COMMITTEE, FOR THE PURPOSES OF THIS SECTION:  
7 PROVIDED, HOWEVER, THAT FOR ALL BUILDINGS CLASSIFIED AS USE  
8 GROUP R-3 ALTERNATE BUILDING SYSTEMS AND EQUIPMENT DESIGN WHICH  
9 SATISFY THE CRITERIA OF THIS SECTION SHALL NOT REQUIRE THE  
10 APPROVAL OF THE DEPARTMENT BUT THE USE OF SUCH AN ALTERNATE  
11 BUILDING SYSTEM OR EQUIPMENT DESIGN SHALL BE INDICATED IN THE  
12 WARRANTY PROVIDED IN SECTION 306.

13 SECTION 238. NONDEPLETABLE SOURCES.

14 WHEN SUCH ALTERNATIVE SYSTEMS UTILIZE SOLAR, GEOTHERMAL, WIND  
15 OR OTHER NONDEPLETABLE ENERGY SOURCES FOR ALL OR PART OF THEIR  
16 ENERGY SOURCES, SUCH NONDEPLETABLE ENERGY SUPPLIED TO THE  
17 BUILDING SHALL BE EXCLUDED FROM THE TOTAL ENERGY CHARGEABLE TO  
18 THE PROPOSED ALTERNATIVE DESIGN.

19 SECTION 239. DOCUMENTATION.

20 PROPOSED ALTERNATIVE DESIGNS, SUBMITTED TO THE DEPARTMENT AS  
21 REQUESTS FOR EXCEPTION TO THE STANDARD DESIGN CRITERIA, MUST BE  
22 ACCOMPANIED BY AN ENERGY ANALYSIS PREPARED IN ACCORDANCE WITH  
23 THE ASHRAE STANDARD 90-75.

24 SUBCHAPTER J

25 USE GROUP R-3 PRESCRIPTIVE STANDARDS

26 SECTION 240. MINIMUM INSULATION REQUIREMENTS FOR USE GROUP R-3.

27 USE GROUP R-3 BUILDINGS SHALL BE CONSTRUCTED UTILIZING THE  
28 FOLLOWING MINIMUM INSULATION STANDARDS:

29 CEILINGS R - 19

30 EXTERIOR WALLS R - 13

1	FLOORS OVER UNHEATED BASEMENTS	
2	AND CRAWL SPACES *	R - 11
3	* BASEMENTS CONTAINING A FURNACE	
4	AND/OR HOT WATER HEATER MAY BE	
5	CONSIDERED HEATED	
6	EDGE INSULATION FOR:	
7	HEATED SLABS	R - 6.3
8	UNHEATED SLABS	R - 4.2
9	WINDOWS	MULTIGLAZING
10	ENTRANCE DOORS	R - 2.5
11	SLIDING GLASS DOORS (IF APPLICABLE)	MULTIGLAZING
12	DUCTS IN UNHEATED AREAS	R - 3

### 13 CHAPTER 3

#### 14 APPLICATION OF STANDARDS: ESTABLISHMENT

#### 15 OF COMMITTEE AND PENALTIES

#### 16 SECTION 301. MODIFICATION OF STANDARDS; CRITERIA.

17 THE DEPARTMENT, WITH THE APPROVAL OF THE BUILDING ENERGY  
18 CONSERVATION COMMITTEE ESTABLISHED PURSUANT TO SECTION 304,  
19 AFTER ONE OR MORE PUBLIC HEARINGS, MAY RECOMMEND TO THE GENERAL  
20 ASSEMBLY MODIFICATIONS TO THE ENERGY CONSERVATION STANDARDS  
21 CONTAINED IN CHAPTER 2 HEREOF. ANY RECOMMENDED MODIFICATION TO  
22 THE ENERGY CONSERVATION STANDARDS SHALL MEET THE FOLLOWING  
23 CRITERIA:

24 (1) IT SHALL BE CONSISTENT WITH THE LATEST AND MOST  
25 EFFECTIVE TECHNOLOGY.

26 (2) IT SHALL NOT BE IN CONFLICT WITH EXISTING SAFEGUARDS  
27 FOR PUBLIC HEALTH AND SAFETY.

28 (3) IT SHALL BE ECONOMICALLY FEASIBLE AS DETERMINED BY  
29 LIFE-CYCLE-COST PROCEDURES.

30 (4) IT SHALL BE SUFFICIENTLY STRINGENT TO EFFECT A

1        SIGNIFICANT SAVINGS OF ENERGY RESOURCES.

2            (5) IT SHALL BE A PERFORMANCE STANDARD FOR THE DESIGN OF  
3        BUILDINGS AND SYSTEMS WITHIN BUILDINGS TO ASSURE MAXIMUM  
4        PRACTICAL CONSERVATION OF ENERGY.

5            (6) CONSIDERATION SHALL BE GIVEN TO BUILDING AND ENERGY  
6        STANDARDS PROMULGATED BY NATIONAL AND OTHER STATE  
7        GOVERNMENTAL AGENCIES, PRIVATE ORGANIZATIONS AND ANY OTHER  
8        AVAILABLE ENERGY DATA, AS WELL AS THE TOTAL ENERGY ALLOCATION  
9        APPROACH.

10    SECTION 302. APPLICATION OF ENERGY CONSERVATION STANDARDS.

11        THE ENERGY CONSERVATION STANDARDS CONTAINED HEREIN OR AS  
12        PROMULGATED BY THE DEPARTMENT WITH THE APPROVAL OF THE BUILDING  
13        ENERGY CONSERVATION COMMITTEE SHALL APPLY TO NEW BUILDINGS OR TO  
14        RENOVATIONS ON WHICH ACTUAL CONSTRUCTION AND/OR DESIGN HAS NOT  
15        COMMENCED PRIOR TO THEIR EFFECTIVE DATES. NO DEPARTMENT, BOARD,  
16        AGENCY OR COMMISSION OTHER THAN AS PROVIDED HEREIN, SHALL  
17        PROMULGATE OR ADOPT ANY RULES OR REGULATIONS WHICH DEAL WITH ANY  
18        SUBJECT MATTER CONTAINED IN THIS ACT.

19    SECTION 303. ENERGY CONSERVATION MANUAL FOR BUILDINGS.

20        (A) PRODUCTION OF MANUAL.--CONCURRENT WITH THE ADOPTION OF  
21        THE ENERGY CONSERVATION CODES REQUIRED BY THIS ACT, THE  
22        DEPARTMENT SHALL PRODUCE AN ENERGY CONSERVATION MANUAL FOR USE  
23        BY DESIGNERS, BUILDERS, CONTRACTORS OF RESIDENTIAL AND  
24        NONRESIDENTIAL BUILDINGS, AND MUNICIPALITIES OF THE  
25        COMMONWEALTH. THIS MANUAL SHALL CONTAIN THE ESTABLISHED  
26        STANDARDS AND ACCEPTED PRACTICES. THE MANUAL SHALL FURTHER  
27        CONTAIN PRESCRIPTIVE STANDARDS WHICH, IF COMPLIED WITH, WILL  
28        RESULT IN CONFORMANCE WITH THE PERFORMANCE STANDARDS CONTAINED  
29        HEREIN OR AS PROMULGATED BY THE DEPARTMENT AND SHALL BE WRITTEN  
30        IN SUCH MANNER AS TO BE EASILY UNDERSTOOD BY PERSONS POSSESSING

1 A MINIMAL TECHNICAL BACKGROUND. THE MANUAL SHALL BE FURNISHED  
2 UPON REQUEST TO MEMBERS OF THE PUBLIC AT A PRICE SUFFICIENT TO  
3 COVER THE COST OF PRINTING.

4 (B) REVIEW OF MANUAL.--THE MANUAL SHALL BE REVIEWED BY THE  
5 DEPARTMENT AND THE BUILDING ENERGY CONSERVATION COMMITTEE AT  
6 LEAST ANNUALLY AND SHALL BE UPDATED AS SIGNIFICANT NEW ENERGY  
7 CONSERVATION INFORMATION BECOMES AVAILABLE.

8 (C) EDUCATIONAL PROGRAMS.--THE DEPARTMENT SHALL PROVIDE  
9 SEMINARS AND OTHER EDUCATIONAL PROGRAMS THROUGHOUT THE  
10 COMMONWEALTH TO PROVIDE INFORMATION AND COUNSELING TO BUILDERS,  
11 ARCHITECTS, OTHER LICENSED DESIGN PROFESSIONALS, LOCAL BUILDING  
12 OFFICIALS AND OTHER PERSONS AFFECTED BY THIS ACT ON THE  
13 STANDARDS CONTAINED HEREIN OR AS PROMULGATED BY THE DEPARTMENT.  
14 SECTION 304. BUILDING ENERGY CONSERVATION COMMITTEE.

15 (A) COMPOSITION OF COMMITTEE.--IN ORDER TO FURTHER THE  
16 COORDINATED AND EFFECTIVE ADMINISTRATION OF THIS ACT, THERE IS  
17 HEREBY ESTABLISHED A BUILDING ENERGY CONSERVATION COMMITTEE. IT  
18 SHALL CONSIST OF AT LEAST 30 MEMBERS AND NO MORE THAN 40  
19 MEMBERS, THE MEMBERSHIP OF WHICH SHALL BE APPOINTED BY THE  
20 GOVERNOR AND SHALL INCLUDE A REPRESENTATIVE OF EACH OF THE  
21 FOLLOWING ENTITIES OR THEIR SUCCESSORS:

- 22 (1) DEPARTMENT OF EDUCATION.
- 23 (2) GOVERNOR'S ENERGY COUNCIL.
- 24 (3) DEPARTMENT OF GENERAL SERVICES.
- 25 (4) DEPARTMENT OF LABOR AND INDUSTRY.
- 26 (5) DEPARTMENT OF COMMUNITY AFFAIRS.
- 27 (6) PENNSYLVANIA BUILDERS ASSOCIATION.
- 28 (7) PENNSYLVANIA ASSOCIATED BUILDERS AND CONTRACTORS,  
29 INC.
- 30 (8) PENNSYLVANIA BUILDING OFFICIALS CONFERENCE.

- 1 (9) MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA.
- 2 (10) PENNSYLVANIA CHAMBER OF COMMERCE.
- 3 (11) GENERAL CONTRACTORS ASSOCIATION OF PENNSYLVANIA.
- 4 (12) PENNSYLVANIA SOCIETY OF ARCHITECTS.
- 5 (13) PENNSYLVANIA SOCIETY OF PROFESSIONAL ENGINEERS.
- 6 (14) AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR
- 7 CONDITIONING ENGINEERS, INC..
- 8 (15) PENNSYLVANIA GAS ASSOCIATION.
- 9 (16) PENNSYLVANIA ELECTRIC ASSOCIATION.
- 10 (17) INDUSTRIALIZED HOUSING MANUFACTURERS ASSOCIATION.
- 11 (18) THERMAL INSULATION MANUFACTURERS ASSOCIATION.
- 12 (19) PENNSYLVANIA BUILDING TRADES COUNCIL.
- 13 (20) CONSULTING ENGINEERS COUNCIL OF PENNSYLVANIA.
- 14 (21) PENNSYLVANIA LEAGUE OF CITIES.
- 15 (22) PENNSYLVANIA STATE ASSOCIATION OF BOROUGHES.
- 16 (23) PENNSYLVANIA STATE ASSOCIATION OF TOWNSHIP
- 17 COMMISSIONERS.
- 18 (24) PENNSYLVANIA STATE ASSOCIATION OF TOWNSHIP
- 19 SUPERVISORS.
- 20 (25) PUBLIC UTILITY COMMISSION.
- 21 (26) NATIONAL ASSOCIATION OF INDUSTRIAL AND OFFICE
- 22 PARKS.
- 23 (27) PENNSYLVANIA UTILITIES, RAILROAD AND AREA
- 24 DEVELOPMENT ASSOCIATION.
- 25 (28) REPRESENTATIVES OF SUCH OTHER AGENCIES AND
- 26 ORGANIZATIONS OR INDIVIDUALS AS THE GOVERNOR MAY FIND ARE
- 27 NECESSARY AND PROPER TO CARRY OUT THE PURPOSES OF THE
- 28 COMMITTEE INCLUDING, BUT NOT LIMITED TO, LABOR ORGANIZATIONS,
- 29 FINANCIAL AND LENDING INSTITUTIONS, AND CONSUMER GROUPS.
- 30 (B) POWERS AND DUTIES.--IN ADDITION TO THE POWERS AND DUTIES



1 ENUMERATED IN THIS ACT, THE BUILDING ENERGY CONSERVATION  
2 COMMITTEE SHALL:

3 (1) BE RESPONSIBLE FOR THE REGULAR EXCHANGE OF  
4 INFORMATION AND PLANS REGARDING BUILDING ENERGY CONSERVATION,  
5 FOR THE DEVELOPMENT, REVIEW AND APPROVAL OF PROPOSED AND  
6 EXISTING STANDARDS, GUIDELINES, REGULATIONS, AND MANUALS.

7 (2) ELECT FROM ITS MEMBERS A BOARD ON VARIANCES.

8 (C) EXPENSES.--THE MEMBERS OF THE COMMITTEE SHALL NOT  
9 RECEIVE ANY COMPENSATION FOR THEIR SERVICES BUT SHALL BE  
10 REIMBURSED FOR THEIR ACTUAL AND NECESSARY EXPENSES INCURRED IN  
11 THE PERFORMANCE OF THEIR DUTIES. PROVIDED, HOWEVER, WHEN ACTING  
12 ON MATTERS CONCERNING VARIANCES MEMBERS OF THE BOARD ON  
13 VARIANCES SHALL RECEIVE \$50 PER DAY PLUS THEIR ACTUAL AND  
14 NECESSARY EXPENSES.

15 SECTION 305. CERTIFICATION.

16 (A) APPLICABILITY.--THE PROVISIONS OF THIS SECTION SHALL  
17 APPLY TO ALL BUILDINGS SUBJECT TO THIS ACT EXCEPT THOSE  
18 CLASSIFIED AS USE GROUP R-3.

19 (B) COMPLIANCE WITH ACT.--IT SHALL BE THE DUTY OF THE  
20 LICENSED DESIGN PROFESSIONAL RETAINED IN CONNECTION WITH THE  
21 DESIGN OR CONSTRUCTION OF A BUILDING TO CERTIFY THE DRAWINGS,  
22 SPECIFICATIONS AND OTHER DATA SHOWING COMPLIANCE WITH THE  
23 PROVISIONS OF THIS ACT, EXCEPT AS PROVIDED IN SUBSECTION (E). IF  
24 THE BUILDING IS SUBJECT TO THE PROVISIONS OF THE ACT OF APRIL  
25 27, 1927 (P.L.465, NO.299), REFERRED TO AS THE FIRE AND PANIC  
26 ACT, THE CERTIFICATION REQUIRED HEREUNDER SHALL BE SUBMITTED ON  
27 A FORM WITH THE APPLICATION FOR PLAN APPROVAL UNDER THE SAID  
28 FIRE AND PANIC ACT.

29 (C) INSPECTION.--EACH LICENSED DESIGN PROFESSIONAL RETAINED  
30 BY THE OWNER OR HIS DESIGNEE, WHERE ANY OF SUCH ARE RETAINED

1 DURING THE CONSTRUCTION OF A BUILDING, SHALL MAKE PERIODIC  
2 INSPECTIONS OF THE BUILDING PROGRESSION TO INSURE COMPLIANCE  
3 WITH THIS ACT, EXCEPT AS PROVIDED IN SUBSECTION (E).

4 (D) FINAL CERTIFICATION.--EACH LICENSED DESIGN PROFESSIONAL  
5 RETAINED BY THE OWNER SHALL MAKE A FINAL CERTIFICATION OF EVERY  
6 COMPLETED BUILDING SHOWING COMPLIANCE WITH THE PROVISIONS OF  
7 THIS ACT, EXCEPT AS PROVIDED IN SUBSECTION (E).

8 (E) CERTIFICATION BY BUILDER.--IF A LICENSED DESIGN  
9 PROFESSIONAL IS NOT RETAINED IN CONNECTION WITH THE DESIGN AND  
10 CONSTRUCTION OF A BUILDING, IT SHALL BE THE RESPONSIBILITY OF  
11 THE BUILDER OR OWNER, IF HE IS THE BUILDER, TO PERFORM THE  
12 INSPECTIONS AND CERTIFICATION REQUIRED BY THIS SECTION.

13 SECTION 306. USE GROUP R-3; NOTICE; WARRANTY.

14 (A) NOTICE.--PRIOR TO CONSTRUCTION OF ANY BUILDING  
15 CLASSIFIED AS USE GROUP R-3, THE BUILDER SHALL NOTIFY THE  
16 DEPARTMENT BY CERTIFIED MAIL OF HIS INTENT TO BEGIN  
17 CONSTRUCTION. SUCH NOTICE SHALL CONTAIN THE NAME OF THE OWNER OF  
18 THE BUILDING AND ITS LOCATION.

19 (B) WARRANTY.--AT THE TIME A CONTRACT FOR THE CONSTRUCTION  
20 OF ANY BUILDING CLASSIFIED AS USE GROUP R-3 IS ENTERED INTO, THE  
21 BUILDER SHALL WARRANT TO THE OWNER IN WRITING THAT THE BUILDING  
22 SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROVISIONS OF THIS  
23 ACT. SUCH WARRANTY SHALL BE A DOCUMENT SEPARATE FROM THE  
24 CONTRACT AND SHALL BE IN THE FOLLOWING FORM:

25 I, (BUILDER) , HEREBY WARRANT TO (OWNER) THAT THE  
26 PREMISES KNOWN AS (DESCRIPTION)  
27 SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PROVISIONS OF THE  
28 ACT OF \_\_\_\_\_, 19\_\_, NO.\_\_\_\_\_, KNOWN AS THE "BUILDING ENERGY  
29 CONSERVATION ACT." THIS LAW PROVIDES BUILDING AND EQUIPMENT  
30 STANDARDS TO MAKE YOUR HOME ENERGY EFFICIENT AND ALSO PROVIDES

1 YOU WITH LEGAL REMEDIES IF YOUR HOME IS NOT BUILT ACCORDING TO  
2 THE STATE STANDARDS. IF YOU WOULD LIKE THE STATE TO DO AN  
3 ENERGY AUDIT OF YOUR HOME TO DETERMINE IF IT CONFORMS TO STATE  
4 STANDARDS, YOU MAY CALL THE PENNSYLVANIA DEPARTMENT OF  
5 COMMUNITY AFFAIRS AT (TELEPHONE) , AND THEY WILL PERFORM AN  
6 INSPECTION OF YOUR HOME FOR A FEE OF \$25.

7 INDICATE IF ALTERNATE BUILDING SYSTEM OR EQUIPMENT DESIGN IS  
8 BEING EMPLOYED.

9 (C) IF THE BUILDER IS ALSO THE OWNER OF THE BUILDING AT THE  
10 TIME OF CONSTRUCTION, HE SHALL PROVIDE THE WARRANTY REQUIRED BY  
11 SUBSECTION (B) AT THE TIME OF ITS INITIAL SALE TO A NEW OWNER.  
12 SUCH WARRANTY SHALL BE IN SUBSTANTIALLY THE SAME FORM AS  
13 PROVIDED IN SUBSECTION (B).

14 (D) FAILURE TO PROVIDE NOTICE.--THE DEPARTMENT OF COMMUNITY  
15 AFFAIRS, AFTER HEARING, MAY ASSESS A CIVIL PENALTY PAYABLE TO  
16 THE COMMONWEALTH OF PENNSYLVANIA NOT TO EXCEED \$100 UPON ANY  
17 BUILDER WHO FAILS TO GIVE THE NOTICE REQUIRED BY SUBSECTION (A).  
18 IN DETERMINING THE AMOUNT OF THE CIVIL PENALTY, THE DEPARTMENT  
19 OF COMMUNITY AFFAIRS SHALL CONSIDER THE WILLFULNESS OF THE  
20 VIOLATION AND THE COST INCURRED BY THE DEPARTMENT IN DISCOVERING  
21 THE VIOLATION.

22 (E) FAILURE TO PROVIDE WARRANTY.--WHENEVER A BUILDER FAILS  
23 TO PROVIDE THE WARRANTY REQUIRED BY SUBSECTIONS (B) OR (C) SUCH  
24 REQUIRED WARRANTY SHALL CONSTITUTE AN IMPLIED WARRANTY AND THE  
25 OWNER'S RIGHT TO PROCEED UNDER SECTION 315(A) SHALL NOT BE  
26 AFFECTED. IF IT IS ESTABLISHED BY A PREPONDERANCE OF THE  
27 EVIDENCE THAT THE BUILDER'S FAILURE TO PROVIDE THE WARRANTY WAS  
28 WILLFUL, THEN DAMAGES IN TWICE THE AMOUNT PROVIDED IN SECTION  
29 315 MAY BE AWARDED.

30 SECTION 307. VARIANCES.

1 (A) REQUESTS.--ANY REQUEST FOR A VARIANCE FROM THE ENERGY  
2 CONSERVATION STANDARDS CONTAINED HEREIN SHALL BE MADE TO THE  
3 BOARD ON VARIANCES OF THE BUILDING ENERGY CONSERVATION COMMITTEE  
4 AND A DECISION ON SUCH REQUEST SHALL BE MADE WITHIN 30 DAYS OF  
5 ITS FILING.

6 (B) CRITERIA.--A VARIANCE SHALL BE GRANTED ONLY IF IT IS  
7 FOUND THAT:

8 (1) COMPLIANCE WITH THE PROVISIONS OF THIS ACT WOULD  
9 RESULT IN EXTREME HARDSHIP TO THE OWNER; AND

10 (2) THE GRANTING OF SUCH VARIANCE WOULD NOT RESULT IN A  
11 SIGNIFICANT INCREASE IN THE ENERGY USAGE OF THE BUILDING.

12 SECTION 308. BUILDING PERMITS.

13 ANY BUILDING PERMIT ISSUED BY THE COMMONWEALTH OR ANY OF ITS  
14 POLITICAL SUBDIVISIONS SHALL HAVE PRINTED UPON ITS FACE NOTICE  
15 THAT THE PROVISIONS OF THIS ACT MUST BE COMPLIED WITH.

16 SECTION 309. PERMITS FOR USE OR OCCUPANCY.

17 BEFORE ANY BUILDING OR STRUCTURE HEREAFTER CONSTRUCTED, OTHER  
18 THAN A BUILDING CLASSIFIED AS USE GROUP R-3, SHALL BE USED OR  
19 OPENED FOR OCCUPANCY, THE OWNER THEREOF SHALL NOTIFY THE  
20 DEPARTMENT OF THE COMPLETION OF THE BUILDING FOR THE PURPOSES OF  
21 THIS ACT AND SUBMIT THE NECESSARY CERTIFICATION THEREWITH:

22 PROVIDED, HOWEVER, THAT IF A MUNICIPALITY ELECTS TO ADMINISTER  
23 THE PROVISIONS OF THIS ACT UNDER CHAPTER 5 SUCH NOTICE AND  
24 CERTIFICATION SHALL BE SUBMITTED TO THE MUNICIPALITY WHICH SHALL  
25 FORWARD A COPY OF THE NOTICE TO THE DEPARTMENT. NO PERMIT FOR  
26 USE OR OCCUPANCY SHALL BE GRANTED UNTIL SUCH SUBMISSION HAS BEEN  
27 MADE. NO BUILDING OFFICIAL OF THE COMMONWEALTH OR ANY OF ITS  
28 POLITICAL SUBDIVISIONS SHALL ISSUE A PERMIT UNTIL HE HAS  
29 RECEIVED PROOF OF SUCH COMPLIANCE. WHERE THE CERTIFICATE HAS  
30 BEEN SUBMITTED TO THE DEPARTMENT, PRESENTATION TO THE BUILDING

1 OFFICIAL OF THE MAILING RECEIPT TOGETHER WITH A COPY OF THE  
2 CERTIFICATION REQUIRED BY SECTION 305 SHALL ESTABLISH PROOF OF  
3 COMPLIANCE FOR THE PURPOSES OF THIS SECTION. UPON SUCH  
4 PRESENTATION ANY BUILDING OFFICIAL OF THE COMMONWEALTH OR ANY OF  
5 ITS POLITICAL SUBDIVISIONS SHALL ISSUE A PERMIT FOR USE OR  
6 OCCUPANCY, PROVIDED ALL OTHER CRITERIA FOR SUCH A PERMIT HAVE  
7 BEEN SATISFIED AND SAID BUILDING OFFICIAL SHALL NOTIFY THE  
8 DEPARTMENT THAT HE HAS ISSUED THE SAME.

9 SECTION 310. FAILURE TO SUBMIT CERTIFICATION.

10 WHENEVER THE OWNER OF ANY BUILDING, OTHER THAN A BUILDING  
11 CLASSIFIED AS USE GROUP R-3, SHALL FAIL TO GIVE THE NOTICE AND  
12 SUBMIT THE NECESSARY CERTIFICATION IN ACCORDANCE WITH SECTION  
13 309 AND SHALL NEVERTHELESS PROCEED WITH THE USE OR OCCUPANCY OF  
14 THE BUILDING, THE DEPARTMENT OR THE MUNICIPALITY SHALL SERVE  
15 NOTICE ON THE SAID OWNER THAT HE IS IN VIOLATION OF THIS ACT AND  
16 ORDER HIM TO COMPLY THEREWITH.

17 SECTION 311. INSPECTIONS.

18 THE DEPARTMENT MAY PERFORM A NONDESTRUCTIVE INSPECTION WITHIN  
19 TWO YEARS OF THE DATE OF COMPLETION OF CONSTRUCTION OF ANY  
20 BUILDING CONSTRUCTED AFTER THE EFFECTIVE DATE OF THIS ACT TO  
21 DETERMINE COMPLIANCE WITH THE PROVISIONS OF THIS ACT, PROVIDED  
22 AT LEAST 30 DAYS NOTICE HAS BEEN GIVEN TO THE OWNER. THE  
23 DEPARTMENT MAY ALSO PERFORM SUCH INSPECTIONS AT THE REQUEST OF  
24 THE OWNER OF ANY BUILDING SUBJECT TO THIS ACT FOR A FEE OF \$25.

25 SECTION 312. APPEALS.

26 REVIEW OF ANY DECISIONS RENDERED UNDER THE PROVISIONS OF THIS  
27 ACT SHALL BE BROUGHT IN THE COURT OF COMMON PLEAS OF THE COUNTY  
28 WHEREIN THE BUILDING IS SITUATED. SUCH REVIEW SHALL BE LIMITED  
29 TO DETERMINING WHETHER ANY SUCH DECISION WAS ARBITRARY AND  
30 CAPRICIOUS.

1 SECTION 313. PENALTIES.

2 (A) APPLICABILITY.--THE PROVISIONS OF THIS SECTION SHALL  
3 APPLY TO ALL BUILDINGS SUBJECT TO THIS ACT EXCEPT THOSE  
4 CLASSIFIED AS USE GROUP R-3.

5 (B) VIOLATIONS OF ACT.--ANY PERSON WHO SHALL WILLFULLY OR  
6 NEGLIGENTLY VIOLATE ANY OF THE PROVISIONS OF THIS ACT, OR THE  
7 RULES AND REGULATIONS OR THE ORDERS FOR THE ENFORCEMENT OF THE  
8 SAID PROVISIONS OR RULES AND REGULATIONS ISSUED BY DULY  
9 AUTHORIZED OFFICERS OF THE DEPARTMENT OR WHO SHALL HINDER, DELAY  
10 OR INTERFERE WITH ANY OFFICER CHARGED WITH THE ENFORCEMENT OF  
11 THIS ACT IN THE PERFORMANCE OF HIS DUTY, SHALL, UPON CONVICTION  
12 THEREOF, BE PUNISHED BY A FINE OF NOT MORE THAN \$300 AND COSTS.  
13 IN THE EVENT OF VIOLATION OF MORE THAN ONE PROVISION OF THIS  
14 ACT, THE VIOLATION OF EACH PROVISION SHALL BE DEEMED A SEPARATE  
15 AND DISTINCT OFFENSE FOR THE PURPOSES OF THIS SECTION.

16 (C) INSTITUTION OF PROCEEDINGS.--PROSECUTIONS FOR VIOLATIONS  
17 OF THIS ACT OR THE RULES AND REGULATIONS OF THE DEPARTMENT MAY  
18 BE INSTITUTED BY THE SECRETARY OF LABOR AND INDUSTRY OR UNDER  
19 HIS DIRECTIONS BY AN AUTHORIZED REPRESENTATIVE OF THE  
20 DEPARTMENT. UPON CONVICTION AFTER A HEARING IN A COURT OF  
21 COMPETENT JURISDICTION, THE SENTENCES PROVIDED IN THIS ACT SHALL  
22 BE IMPOSED AND SHALL BE FINAL UNLESS AN APPEAL BE TAKEN IN THE  
23 MANNER PRESCRIBED BY LAW.

24 (D) DISPOSITION OF FINES.--ALL FINES COLLECTED UNDER THIS  
25 ACT SHALL BE FORWARDED TO THE DEPARTMENT WHO SHALL PAY THE SAME  
26 INTO THE STATE TREASURY FOR THE USE OF THE COMMONWEALTH.

27 (E) FALSE CERTIFICATION.--ANY ARCHITECT OR OTHER LICENSED  
28 DESIGN PROFESSIONAL WHO WILLFULLY PROVIDES A FALSE CERTIFICATION  
29 FOR ANY BUILDING SUBJECT TO THE PROVISIONS OF THIS ACT SHALL BE  
30 SUBJECT TO THE SUSPENSION OR REVOCATION OF HIS LICENSE BY THE

1 STATE BOARD OF EXAMINERS OF ARCHITECTS OR OTHER APPLICABLE STATE  
2 LICENSING BOARD.

3 SECTION 314. ENFORCEMENT.

4 (A) APPLICABILITY.--THE PROVISIONS OF THIS ACT SHALL APPLY  
5 TO EVERY BUILDING ENUMERATED IN THIS ACT, INCLUDING BUILDINGS  
6 OWNED IN WHOLE OR IN PART BY THE COMMONWEALTH OR ANY POLITICAL  
7 SUBDIVISION THEREOF, AND FOR ALL BUILDINGS, OTHER THAN THOSE  
8 CLASSIFIED AS USE GROUP R-3 SHALL BE ENFORCED BY THE SECRETARY  
9 OF LABOR AND INDUSTRY, BY AND THROUGH HIS AUTHORIZED  
10 REPRESENTATIVES.

11 (B) POWERS OF OFFICERS.--FOR THE PURPOSE OF ENFORCING THE  
12 PROVISIONS OF THIS ACT, ALL THE OFFICERS CHARGED WITH ITS  
13 ENFORCEMENT SHALL HAVE THE POWER TO ENTER ANY OF THE BUILDINGS  
14 ENUMERATED IN THIS ACT, AND NO PERSON SHALL HINDER OR DELAY, OR  
15 INTERFERE WITH ANY OF THE SAID OFFICERS IN THE PERFORMANCE OF  
16 HIS DUTY, NOR REFUSE ANY PERTINENT INFORMATION NECESSARY TO  
17 DETERMINE WHETHER THE PROVISIONS OF THIS ACT AND THE RULES AND  
18 REGULATIONS HEREIN PROVIDED FOR, ARE OR WILL BE COMPLIED WITH.  
19 SECTION 315. CIVIL ACTION.

20 (A) USE GROUP R-3.--THE OWNER OF ANY BUILDING SUBJECT TO THE  
21 REQUIREMENTS OF SECTION 306 WHO IS AGGRIEVED AS THE RESULT OF  
22 SUCH BUILDING NOT BEING PROPERLY DESIGNED OR CONSTRUCTED IN  
23 CONFORMANCE WITH THIS ACT SHALL HAVE A RIGHT OF ACTION FOR  
24 BREACH OF WARRANTY. REMEDIES MAY INCLUDE SPECIFIC PERFORMANCE OR  
25 AN AWARD OF DAMAGES IN AN AMOUNT NOT LESS THAN \$300. ATTORNEY'S  
26 FEES SHALL BE RECOVERABLE IN ANY ACTION IN WHICH THE OWNER  
27 PREVAILS. ANY SUCH AWARD SHALL FURTHER PROVIDE FOR PAYMENT OF  
28 THE ACTUAL COSTS IN EXCESS OF \$25 INCURRED BY THE DEPARTMENT IF  
29 IT INSPECTED THE BUILDING FOR THE OWNER AND THE OWNER SHALL  
30 REMIT SUCH AMOUNT TO THE DEPARTMENT.

1 (B) OTHER BUILDINGS.--THE OWNER OF ANY BUILDING, OTHER THAN  
2 A BUILDING CLASSIFIED AS USE GROUP R-3, AT THE TIME OF ITS  
3 DESIGN OR CONSTRUCTION UNDER THE PROVISIONS OF THIS ACT WHO IS  
4 AGGRIEVED AS THE RESULT OF SUCH BUILDING NOT BEING PROPERLY  
5 DESIGNED OR CONSTRUCTED IN CONFORMANCE WITH THIS ACT SHALL HAVE  
6 A RIGHT OF ACTION AGAINST ANY PERSON WHO IS REQUIRED TO SUBMIT  
7 THE CERTIFICATE REQUIRED BY SECTION 305.

8 (C) LIMITATION OF ACTION.--NO ACTION BROUGHT UNDER THIS  
9 SECTION SHALL BE MAINTAINED UNLESS BROUGHT WITHIN THREE YEARS  
10 FROM THE DATE OF COMPLETION OF THE BUILDING.

#### 11 CHAPTER 4

#### 12 ADOPTION OF FUTURE STANDARDS

#### 13 SECTION 401. ADOPTION AND PROMULGATION OF STANDARDS.

14 THE DEPARTMENT, WITH THE APPROVAL OF THE BUILDING ENERGY  
15 CONSERVATION COMMITTEE, SHALL, AFTER ONE OR MORE PUBLIC  
16 HEARINGS, ADOPT AND PUBLISH ENERGY CONSERVATION STANDARDS FOR  
17 ALL BUILDINGS COVERED BY THIS ACT IN ACCORDANCE WITH THE  
18 PROVISIONS OF THE ACT OF JULY 31, 1968 (P.L.769, NO.240), KNOWN  
19 AS THE "COMMONWEALTH DOCUMENTS LAW." THE PURPOSE OF SUCH  
20 STANDARDS IS TO REDUCE WASTEFUL OR UNECONOMIC CONSUMPTION OF  
21 ENERGY BY BALANCING THE COST OF ENERGY PROCUREMENT AGAINST THE  
22 COST OF ENERGY-CONSERVING BUILDING PRACTICES. THE ENERGY  
23 CONSERVATION STANDARDS SHALL MEET THE FOLLOWING CRITERIA:

24 (1) THEY SHALL BE CONSISTENT WITH THE LATEST AND MOST  
25 EFFECTIVE TECHNOLOGY.

26 (2) THEY SHALL NOT BE IN CONFLICT WITH EXISTING  
27 SAFEGUARDS FOR PUBLIC HEALTH AND SAFETY.

28 (3) THEY SHALL BE ECONOMICALLY FEASIBLE AS DETERMINED BY  
29 LIFE-CYCLE-COST PROCEDURES.

30 (4) THEY SHALL BE SUFFICIENTLY STRINGENT TO EFFECT A





1 MAY 11, 1972 (P.L.286, NO.70), KNOWN AS THE "INDUSTRIALIZED  
2 HOUSING ACT" AND THE ACT OF MAY 11, 1972 (P.L.281, NO.69), KNOWN  
3 AS THE "UNIFORM STANDARDS CODE FOR MOBILE HOMES." SUCH ELECTION  
4 SHALL BE MADE BY RESOLUTION OF THE GOVERNING BODY OF SUCH CITY  
5 WHICH SHALL BE IN SUBSTANTIALLY THE FOLLOWING FORM:

6 THE CITY OF \_\_\_\_\_ HEREBY ELECTS TO ADMINISTER THE  
7 PROVISIONS OF THE ACT OF \_\_\_\_\_, 1978, NO. \_\_\_\_\_ KNOWN AS  
8 THE "BUILDING ENERGY CONSERVATION ACT."  
9 SECTION 503. POWERS OF MUNICIPALITIES.

10 ANY MUNICIPALITY ELECTING TO ADMINISTER THE PROVISIONS OF  
11 THIS ACT UNDER SECTION 501 OR 502 SHALL EXERCISE THE SAME POWERS  
12 CONFERRED UPON THE DEPARTMENT BY THIS ACT, INCLUDING THE POWER  
13 TO INSTITUTE PROCEEDINGS FOR VIOLATIONS OF THE ACT, WITH THE  
14 EXCEPTION OF THOSE POWERS SPECIFIED IN SECTIONS 301, 303 AND IN  
15 CHAPTER 4. IN ADDITION, ANY SUCH MUNICIPALITY MAY EXERCISE SUCH  
16 OTHER ADMINISTRATIVE AND ENFORCEMENT PROCEDURES AS IT SHALL DEEM  
17 NECESSARY TO EFFECT THE PURPOSES OF THIS ACT INCLUDING, BUT NOT  
18 LIMITED TO, PRIOR PLAN APPROVAL, BUILDING PERMIT REQUIREMENTS,  
19 USE OR OCCUPANCY PERMIT REQUIREMENTS AND INSPECTIONS DURING THE  
20 COURSE OF CONSTRUCTION.

21 SECTION 504. VARIANCES.

22 ANY MUNICIPALITY ELECTING TO ADMINISTER THE PROVISIONS OF  
23 THIS ACT UNDER SECTION 501 OR 502 SHALL ESTABLISH A BOARD ON  
24 VARIANCES TO MAKE DETERMINATIONS ON REQUEST FOR VARIANCE FROM  
25 THE ENERGY CONSERVATION STANDARDS CONTAINED HEREIN OR AS  
26 PROMULGATED BY THE DEPARTMENT WITH THE APPROVAL OF THE BUILDING  
27 ENERGY CONSERVATION COMMITTEE, AND IS AUTHORIZED EXCLUSIVE  
28 JURISDICTION TO GRANT SUCH VARIANCES, SECTION 307(A)  
29 NOTWITHSTANDING. A VARIANCE SHALL ONLY BE GRANTED IF THE  
30 CRITERIA OF SECTION 307(B) HAVE BEEN SATISFIED.

1 SECTION 505. DISPOSITION OF FINES.

2 ANY FINES COLLECTED UNDER THIS ACT BY ANY MUNICIPALITY  
3 ELECTING TO ADMINISTER THE PROVISIONS OF THIS ACT UNDER SECTION  
4 501 OR 502 SHALL BE RETAINED BY THE MUNICIPALITY, SECTION 313(C)  
5 NOTWITHSTANDING.

6 CHAPTER 6

7 REPORT TO GENERAL ASSEMBLY

8 SECTION 601. REPORT TO GENERAL ASSEMBLY.

9 THIRTY MONTHS AFTER THE EFFECTIVE DATE OF THIS ACT, THE  
10 DEPARTMENT SHALL REPORT TO THE GENERAL ASSEMBLY THE RESULTS OF  
11 THE INSPECTIONS IT HAS PERFORMED UNDER THIS ACT TOGETHER WITH A  
12 REPORT ON PUBLIC COMPLIANCE WITH THIS ACT.

13 SECTION 602. EFFECTIVE DATE.

14 THIS ACT SHALL TAKE EFFECT AS FOLLOWS:

15 (1) CHAPTER 2 SHALL TAKE EFFECT IN SIX MONTHS AND SHALL  
16 REMAIN IN FULL FORCE AND EFFECT FOR A PERIOD OF ONE YEAR  
17 AFTER WHICH TIME THE PROVISIONS OF CHAPTER 2 SHALL HAVE NO  
18 LEGAL EFFECT.

19 (2) SECTION 301 SHALL TAKE EFFECT IMMEDIATELY AND ITS  
20 PROVISIONS SHALL REMAIN IN FULL FORCE AND EFFECT FOR A PERIOD  
21 OF 18 MONTHS AFTER WHICH TIME SAID PROVISIONS SHALL HAVE NO  
22 LEGAL EFFECT.

23 (3) CHAPTER 4 SHALL TAKE EFFECT IN 18 MONTHS.

24 (4) ALL OTHER PROVISIONS OF THIS ACT SHALL TAKE EFFECT  
25 IMMEDIATELY.