

**ANSI/ASHRAE/IESNA Addenda
a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,r,s,t,u,v,x, and ak to
ANSI/ASHRAE/IESNA Standard 90.1-2004**



2006 SUPPLEMENT

Energy Standard for Buildings Except Low-Rise Residential Buildings

See Appendix for approval dates.

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CONTENTS

ANSI/ASHRAE Addenda to ANSI/ASHRAE Standard 90.1-2004 Energy Standard for Buildings Except Low-Rise Residential Buildings

SECTION	PAGE
Addendum a.....	4
Addendum b.....	7
Addendum c.....	9
Addendum d.....	11
Addendum e.....	12
Addendum f.....	13
Addendum g.....	16
Addendum h.....	21
Addendum i.....	22
Addendum j.....	23
Addendum k.....	24
Addendum l.....	26
Addendum m.....	27
Addendum n.....	28
Addendum o.....	29
Addendum p.....	60
Addendum r.....	61
Addendum s.....	62
Addendum t.....	63
Addendum u.....	64
Addendum v.....	65
Addendum x.....	66
Addendum ak.....	67
Appendix.....	69

NOTE

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FOREWORD

This addendum applies to the changes published in ANSI/ASHRAE/IESNA Addendum e (Informative Appendix G, Performance Rating Method) to ANSI/ASHRAE/IESNA Standard 90.1-2001 now incorporated into the 2004 edition of ANSI/ASHRAE/IESNA Standard 90.1. The changes include incorporating some proposals made by leaders at the U.S. Green Building Council. The changes clarify how windows should be distributed in the baseline simulation model and how uninsulated assemblies should be treated in the baseline simulation model, increase the size range for the use of packaged VAV systems in the baseline model, and provide more detail on how service hot water systems should be modeled. Many of these changes may affect the ultimate performance rating of buildings using Appendix G. In addition, a reference was added to ASHRAE Standard 140 for the method of testing simulation programs.

Addendum a to 90.1-2004 (I-P and SI Editions)

Add the following definition in Section 3.2:

unmet load hour: an hour in which one or more zones is outside of the thermostat setpoint range.

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process.)

INFORMATIVE APPENDIX G PERFORMANCE RATING METHOD

Add a new Section G2.1.4 (identical to Section 11.2.1.4 of ANSI/ASHRAE/IESNA Addendum “p” to ANSI/ASHRAE/IESNA Standard 90.1-2001 and now incorporated into ANSI/ASHRAE/IESNA Standard 90.1-2004)

G2.1.4 The simulation program shall be tested according to ANSI/ASHRAE Standard 140 and the results shall be furnished by the software provider.

Revise Section G3.1 as follows:

G3.1 Proposed Design Model. The simulation model of the *proposed design* shall be consistent with the design documents, including proper accounting of fenestration and opaque envelope types and areas; interior lighting power and controls; HVAC system types, sizes, and controls; and service

water heating systems and controls. All end-use load components within and associated with the building shall be modeled, including, but not limited to, exhaust fans, parking garage ventilation fans, snow-melt and freeze-protection equipment, facade lighting, swimming pool heaters and pumps, elevators and escalators, refrigeration, and cooking. Where the simulation program does not specifically model the functionality of the installed system, spreadsheets or other documentation of the assumptions shall be used to generate the power demand and operating schedule of the systems.

Revise Exceptions of G3.6 (a) as follows:

G3.6 Building Envelope. All components of the *building envelope* in the *proposed design* shall be modeled as shown on architectural drawings or as built for existing building envelopes.

Exceptions to G3.6: The following building elements are permitted to differ from architectural drawings.

- a. All uninsulated assemblies (e.g. projecting balconies, perimeter edges of intermediate floor slabs, concrete floor beams over parking garages, roof parapet) shall be separately modeled- using either of the following techniques:
 1. Separate model of each of these assemblies within the energy simulation model
 2. Separate calculation of the U-factor for each of these assemblies. The U-factors of these assemblies are then area-weighted averaged with larger adjacent surfaces. This average U-factor is modeled within the energy simulation model.

Any other envelope assembly that covers less than 5% of the total area of that assembly type (e.g., exterior walls) need not be separately described provided that it is similar to an assembly being modeled. If not separately described, the area of an envelope assembly shall be added to the area of an assembly of that same type with the same orientation and thermal properties.

- b. Exterior surfaces whose azimuth orientation and tilt differ by less than 45 degrees and are otherwise the same may be described as either a single surface or by using multipliers.
- c. For exterior roofs, the roof surface may be modeled with a reflectance of 0.45 if the reflectance of the *proposed design* roof is greater than 0.70 and its emittance is greater than 0.75. Reflectance values shall be based on testing in accordance with ASTM E903, ASTM E1175, or ASTM E1918, and the emittance values shall be based on testing in accordance with ASTM C835, ASTM C1371, or ASTM E408. All other roof surfaces shall be modeled with a reflectance of 0.30.

- d. Manual fenestration shading devices such as blinds or shades shall not be modeled. Automatically controlled fenestration shades or blinds may be modeled. Permanent shading devices such as fins, overhangs and light shelves may be modeled.

Revise Exception to G3.8 (d) as follows:

G3.8 Lighting. Lighting power in the *proposed design* shall be determined as follows:

- d. Lighting system power shall include all lighting system components shown or provided for on the plans (including lamps and ballasts and task and furniture-mounted fixtures).

Exception to G3.8 (d): For multifamily living units, hotel/motel guest rooms, and other spaces in which lighting systems are connected via receptacles and are not shown or provided for on building plans, assume identical lighting power for the *proposed* and *baseline building designs* in the simulations, ~~but exclude these loads when calculating the baseline building performance and proposed building performance.~~

Revise Section G4.1 (c) as follows:

G4.1 Baseline Building Envelope. The *baseline building design* shall be modeled with the same number of floors and identical conditioned floor area as the *proposed design*. Equivalent dimensions shall be assumed for each exterior envelope component type as in the *proposed design*; i.e., the total gross area of exterior walls shall be the same in the *proposed* and *baseline building designs*. The same shall be true for the areas of roofs, floors, and doors, and the exposed perimeters of concrete slabs on grade shall also be the same in the *proposed* and *baseline building designs*. The following additional requirements shall apply to the modeling of the *baseline building design*:

- a. Orientation. The baseline building performance shall be generated by simulating the building with its actual orientation and again after rotating the entire building 90, 180, 270 degrees, then averaging the results. The building shall be modeled so that it does not shade itself.
- b. Opaque assemblies. Opaque assemblies used for new buildings or additions shall conform with the following common, light-weight assembly types and shall match the appropriate assembly maximum U-factors in Tables B-1 through B-26:
 - Roofs – Insulation Entirely above Deck
 - Above-Grade Walls – Steel Framed
 - Floors – Steel Joist
 - Opaque Door types shall match the proposed design and conform to the U-factor requirements from the same tables.
 - Slab-on-Grade Floors shall match the F-factor for unheated slabs from the same tables.

Opaque assemblies used for alterations shall conform with 4.1.2.2.1.

- c. Vertical Fenestration. Vertical fenestration areas for new buildings and additions shall equal that in the proposed design or 40% of gross above-grade wall area, whichever is smaller, ~~and shall be distributed uniformly in horizontal bands across the four orientations and shall be distributed on each face of the building in the same proportion as on the Proposed Design.~~ Fenestration U-factors shall match the appropriate requirements in Tables B-1 through B-26 for the applicable vertical glazing percentage for U_{fixed} . Fenestration Solar Heat Gain Coefficient (SHGC) shall match the appropriate requirements in Tables B-1 through B-26 using the value for $SHGC_{all}$ for the applicable vertical glazing percentage. All vertical glazing shall be modeled as fixed and shall be assumed to be flush with the exterior wall, and no shading projections shall be modeled. Manual window shading devices such as blinds or shades shall not be modeled. The fenestration areas for envelope alterations shall reflect the limitations on area, U-factor, and SHGC as described in 4.1.2.2.1.
- d. Skylights and Glazed Smoke Vents. Skylight area shall be equal to that in the proposed building design or 5% of the gross roof area that is part of the building envelope, whichever is smaller. If the skylight area of the proposed building design is greater than 5% of the gross roof area, baseline skylight area shall be decreased by an identical percentage in all roof components in which skylights are located to reach the 5% skylight-to-roof ratio. Skylight orientation and tilt shall be the same as in the proposed building design. Skylight U-factor and SHGC properties shall match the appropriate requirements in Tables B-1 through B-26.
- e. Roof albedo. All roof surfaces shall be modeled with a reflectivity of 0.30.
- f. Existing Buildings. For existing building envelopes, the *baseline building design* shall reflect existing conditions prior to any revisions that are part of the scope of work being evaluated.

Revise the Table G4.2.1A column headings as follows:

Nonresidential & Three Floors or Less & <75,000 ft² (7,000 m²) ~~25,000 ft² (2,300 m²)~~

Nonresidential & Four or Five Floors & <75,000 ft² (7,000 m²) ~~25,000 ft² (2,300 m²)~~ **or Five Floors or Less & 75,000 ft² (7,000 m²)** ~~25,000 ft² (2,300 m²)~~ **to 150,000 ft² (14,000 m²)**

Nonresidential & More than Five Floors or >150,000 ft² (14,000 m²)

Revise Section G4.2.3.12 as follows:

G4.2.3.1.2 Supply Air Temperature Reset (Systems 5 through 8). ~~Supply air temperature shall be reset based on zone demand from the design temperature difference to a~~

~~10°F (5.6°C) temperature difference under minimum load conditions. Design air flow rates shall be sized for the reset supply air temperature; i.e., a 10°F (5.6°C) temperature difference. The air temperature for cooling shall be reset higher by 5°F (2.3°C) under the minimum cooling load conditions.~~

Revise Section G4.3 as follows:

G4.3 Baseline Service Hot Water Systems. The service hot water system in the baseline building design shall use the same energy source as the corresponding system in the proposed design and shall conform to the following conditions:

- a. Where ~~a~~ the complete service hot water system exists, the *baseline building design* shall reflect the actual system type using the actual component capacities and efficiencies.
- b. Where a new service hot water system has been specified, the system shall be sized according to the provisions of Section 7.2.1, and the equipment shall match the minimum efficiency requirements in Sections 7.2.2. Where the energy source is electricity, the heating method shall be electrical resistance.
- c. Where no service hot water system exists or has been specified, but the building will have service hot water loads, a service hot water system(s) using electrical resistance heat and matching minimum efficiency requirements of Section 7.2 shall be assumed and modeled identically in the *proposed* and *baseline building* design.
- d. For buildings that will have no service hot water loads, no service hot water heating shall be modeled.
- e. Where a combined system has been specified to meet both space heating and service water heating loads, the *baseline building* system shall use separate systems meeting the minimum efficiency requirements applicable to each system individually.
- f. Service hot water energy consumption shall be calculated explicitly based upon volume of service hot water required, and the entering make-up water and the leaving service hot water temperatures. Entering water temperatures shall be estimated based the location. Leaving temperatures shall be based upon the end use requirements.
- g. Where recirculation pumps are used to ensure prompt availability of service hot water at the end use, the energy consumption of such pumps shall be calculated explicitly.
- h. Service water loads and usage shall be the same for both the *baseline building design* and for the *proposed design*

and shall be documented by the calculation procedures described in Section 7.2.1, with the following exceptions:

1. Service hot water usage can be demonstrated to be reduced by documented water conservation measures that reduce the physical volume of service water required. Examples include low flow shower heads. Such reduction shall be demonstrated by calculations.
2. Service hot water energy consumption can be demonstrated to be reduced by reducing the required temperature of service mixed water or by increasing the temperature of the entering make-up water. Examples include alternative sanitizing technologies for dishwashing or heat recovery to entering makeup water. Such reduction shall be demonstrated by calculations.
3. Service hot water usage can be demonstrated to be reduced by reducing the hot fraction of mixed water to achieve required operational temperature. Examples include shower or laundry heat recovery to incoming cold water supply, reducing the hot water fraction required to meet required mixed water temperature. Such reduction shall be demonstrated by calculations.

Revise Section G4.5 as follows:

G4.5 Other Baseline Systems. Other systems, such as motors covered by Section 10, and miscellaneous loads shall be modeled as identical to those in the *proposed design* including schedules of operations and controls of the equipment. Where there are specific efficiency requirements in Section 10, these systems or components shall be modeled as having the lowest efficiency allowed by those requirements. Where no efficiency requirements exist, power and energy rating or capacity of the equipment shall be identical between the baseline building and the proposed design with the following exception: variations of the power requirements, schedules, or control sequences of the equipment modeled in the baseline building from those in the proposed design may be allowed by the rating authority based upon documentation that the equipment installed in the proposed design represents a significant verifiable departure from documented conventional practice. The burden of this documentation is to demonstrate that accepted conventional practice would result in baseline building equipment different from that installed in the proposed design. Occupancy and occupancy schedules may not be changed.

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FOREWORD

In 2002, ASHRAE published Addendum d to ASHRAE 90.1-2001. The intent of Addendum d was to establish single package vertical air conditioners (SPVAC) and heat pumps (SPVHP) as a new product class of air-conditioning and heating equipment as well as to establish test procedures and standards for these products. Under the Energy Policy and Conservation Act (EPCA), the publication of the addendum triggered a review at the Department of Energy (DOE) to determine if the amended Standard 90.1 could be adopted as a federal standard. DOE's examination of Addendum d revealed some deficiencies with the test procedures (ARI standard 390-2001) as well as with the minimum efficiency standards, which were inconsistent with current federal regulations. This proposal corrects the deficiencies noted by DOE on Addendum d.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes are open for review and comment at this time. Additional material is provided for context

only and is not open for comment except as it relates to the proposed substantive changes..

Addendum b to 90.1-2004 (I-P and SI Editions)

Add new definitions for single package vertical units in Section 3.2 as follows:

single package vertical air conditioner (SPVAC): is a type of air-cooled small or large commercial package air-conditioning and heating equipment; factory assembled as a single package having its major components arranged vertically, which is an encased combination of cooling and optional heating components; is intended for exterior mounting on, adjacent interior to, or through an outside wall; and is powered by single or three-phase current. It may contain separate indoor grille(s), outdoor louvers, various ventilation options, indoor free air discharge, ductwork, wall plenum, or sleeve. Heating components may include electrical resistance, steam, hot water, gas, or no heat but may not include reverse cycle refrigeration as a heating means.

single package vertical heat pump (SPVHP): is an SPVAC that utilizes reverse cycle refrigeration as its primary heat source, with secondary supplemental heating by means of electrical resistance, steam, hot water, or gas.

Revise Table 6.8.1D (formerly Table 6.2.1D in 90.1-2001) as follows:

I-P Version:

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
SPVAC (Cooling Mode)	All Capacities ≤65,000 Btu/h	95°F db/ 75°F wb Outdoor Air	8.6 EER 9.0 EER	ARI 390
	<u>≥65,000 Btu/h and</u> <u>≤135,000 Btu/h</u>	<u>95°F db/ 75°F wb</u> <u>Outdoor Air</u>	<u>8.9 EER</u>	
	<u>≥135,000 Btu/h and</u> <u>≤240,000 Btu/h</u>	<u>95°F db/ 75°F wb</u> <u>Outdoor Air</u>	<u>8.6 EER</u>	
SPVHP (Cooling Mode)	All Capacities ≤65,000 Btu/h	95°F db/ 75°F wb Outdoor Air	8.6 EER 9.0 EER	
	<u>≥65,000 Btu/h and</u> <u>≤135,000 Btu/h</u>	<u>95°F db/ 75°F wb</u> <u>Outdoor Air</u>	<u>8.9 EER</u>	
	<u>≥135,000 Btu/h and</u> <u>≤240,000 Btu/h</u>	<u>95°F db/ 75°F wb</u> <u>Outdoor Air</u>	<u>8.6 EER</u>	
SPVHP (Heating Mode)	All Capacities ≤65,000 Btu/h	47°F db/ 43°F wb Outdoor Air	2.7 COP 3.0 COP	
	<u>≥65,000 Btu/h and</u> <u>≤135,000 Btu/h</u>	<u>47°F db/ 43°F wb</u> <u>Outdoor Air</u>	<u>3.0 COP</u>	
	<u>≥135,000 Btu/h and</u> <u>≤240,000 Btu/h</u>	<u>47°F db/ 43°F wb</u> <u>Outdoor Air</u>	<u>2.9 COP</u>	

SI Version:

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
SPVAC (Cooling Mode)	All Capacities <19 kW	35.0°C db/ 23.9°C wb Outdoor Air	2.52 COP <u>2.64 COP</u>	ARI 390
	≥19 kW and <40 kW	<u>35.0°C db/ 23.9°C wb Outdoor Air</u>	<u>2.61 COP</u>	
	≥40 kW and <70 Btu/h	35.0°C db/ 23.9°C wb Outdoor Air	<u>2.52 COP</u>	
SPVHP (Cooling Mode)	All Capacities <19 kW	35.0°C db/ 23.9°C wb Outdoor Air	2.52 COP <u>2.64 COP</u>	
	≥19 kW and <40 kW	<u>35.0°C db/ 23.9°C wb Outdoor Air</u>	<u>2.61 COP</u>	
	≥40 kW and <70 Btu/h	<u>35.0°C db/ 23.9°C wb Outdoor Air</u>	<u>2.52 COP</u>	
SPVHP (Heating Mode)	All Capacities <19 kW	8.3°C db/ 6.1°C wb Outdoor Air	2.7 COP <u>3.0 COP</u>	
	≥19 kW and <40 kW	<u>8.3°C db/ 6.1°C wb Outdoor Air</u>	<u>3.0 COP</u>	
	≥40 kW and <70 Btu/h	<u>8.3°C db/ 6.1°C wb Outdoor Air</u>	<u>2.9 COP</u>	

Remaining parts of Table 6.8.1D (formerly Table 6.2.1D in 90.1-2001) remain the same.

Revise the reference in Section 12 “Normative References” (under Air Conditioning and Refrigeration Institute) as follows:

Reference	Title
ARI 390-2004 3	Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps

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FOREWORD

The SSPC received a question as to whether, if a vestibule is conditioned, then by definition this conditioned space needed a further vestibule and so on. In response, the SSPC decided to clarify the envelope requirements for a vestibule, as sometimes they are heated and sometimes they are not. In discussing the merits of vestibules, there was discussion on how big-box retail stores and other low-rise buildings in cold climates could, by reason of the exceptions, not have to have a vestibule. This led to an overall examination of all the exceptions with the intent of bringing the exceptions more in line with good building practice in moderate and cold climates.

The conditioned vestibule issue is addressed in the first paragraph. Text is added to describe the two vestibule conditions one would encounter, a heated or conditioned vestibule and an unheated or a semi-heated vestibule, and how the designer is to treat them from an envelope standpoint. Further, the word DOOR is replaced with the words BUILDING ENTRANCE (note definition, Chapter 3) to more specifically state that vestibules are only required at building entrances as opposed to other types of DOORS, such as fire doors, access doors, roll-up doors.

The issue of good building practice is addressed with the exceptions re-worded and re-ordered. First the exceptions are re-ordered to put the obvious ones first. Then the hierarchy becomes more stringent as one moves from warm to cold climates. This reflects the best building and design practice of reducing heat loss in heating-dominated climates. The reasoning for each of the exceptions is as follows:

- (a) Revolving doors—a revolving door can substitute for a vestibule due to the better control of air movement and better weather sealing.
- (b) Doors not intended as a building entrance—the vestibule requirement is only intended for main building entrances. Note if a building has two “building entrances” (whether on the same side of a building or on different sides of a building), they both need vestibules. All other references and examples are removed. While this is somewhat duplicative, the SSPC felt it was better to be clear that doors that are NOT considered a “building entrance” are exempt.
- (c) Dwelling unit—intended for multi-family residential units accessed from the exterior.
- (d) Climate Zones 1 and 2—intended to exempt all buildings in warm climates.
- (e) Climate Zones 3 and 4—intended to exempt some buildings in the moderate climates, limited by height and area. This is intended to be representative of a small office building and smaller stores or buildings. This is based on

professional judgment. (See Figure 15, Chapter 26, 2001 ASHRAE Handbook—Fundamentals.)

- (f) Climate Zones 5 through 8, 1000 ft² (100 m²) building exception—intended to exempt small buildings in colder climates, by area only. This is intended to be representative of gas stations, mini-marts, and other small stand-alone buildings that are too small to warrant the square footage allotted to a vestibule. A larger stand-alone building, such as a fast food restaurant or branch bank, would be expected to have a vestibule. This exception is based on professional judgment. (See Figure 15, Chapter 26, 2001 ASHRAE Handbook—Fundamentals.)
- (g) 3000 ft² (300 m²) exception—intended to exempt those spaces within a larger development, such as a retail strip-mall or mixed-use high-rise development. Note the added qualifier of “separate” to help describe the character of the space as distinctly separate from the larger development. This does not exempt a 50-story office building with 8 elevators and a 2900 ft² (290 m²) lobby from the vestibule requirement.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes..

Addendum c to 90.1-2004 (I-P and SI Editions)

Revise the following definition in Section 3.2:

building entrance: any doorway, set of doors, turnstile, vestibule, or other form of portal that is ordinarily used to gain access to the building by its users and occupants.

Revise Section 5.4.3.4 as follows:

5.4.3.4 Vestibules. Building entrances ~~A door~~ that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. Interior and exterior doors shall have a minimum distance between them of not less than 7 ft (2.1 m) when in the closed position. The exterior envelope of conditioned vestibules shall comply with the requirements for a conditioned space. The interior and exterior envelope of unconditioned vestibules shall comply with the requirements for a semi-heated space.

Exceptions to 5.4.3.4

- a.f. ~~Building entrances~~ ~~Doors in building entrances~~ with revolving doors.
- b.e. Doors not intended to be used as a building entrance door, such as mechanical or electrical equipment rooms.
- c.d. Doors opening directly from a dwelling unit.
- d.a. ~~Building entrances~~ ~~Doors~~ in buildings located in Climate

Zones 1 ~~and~~ or 2.

~~e.g.~~ Building entrances ~~Doors~~ in buildings located in Climate Zones 3 or 4 that are less than four stories above grade and less than 10,000 ft² (1,000 m²) in area.

~~f.g.~~ Building entrances in buildings located in Climate Zones 5, 6, 7, or 8 that are less than 1000 ft² (100 m²) in area.

~~Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.~~

~~g.e.~~ Doors that open directly from a space that is less than 3000 ft² (300 m²) in area and is separate from the building entrance.

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FOREWORD

This is a routine update to incorporate the latest versions of references that are cited in Standard 90.1, primarily in the building envelope sections. For the references being updated, the ASTM standards were revised in 2001-2004 and the NFRC standards were revised in 2004. Five references (two from ASTM and three from NFRC) that were listed in Section 12 but not cited in the body of Standard 90.1 are proposed to be deleted.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.

Addendum d to 90.1-2004 (I-P and SI Editions)

Revise the normative references in Section 12 as follows:

ASTM C90- 96 <u>03</u>	Standard Specification for Loadbearing Concrete Masonry Units
ASTM C272- 94 <u>01</u>	Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions
ASTM C518- 02 <u>04</u>	Standard Test Method for Steady-State Thermal Transmittance Properties by Means of the Heat Flow Meter Apparatus
ASTM C835- 95 (1999) <u>01</u>	Standard Test Method for Total Hemispherical Emittance of Surfaces from 20°C to 1400°C
ASTM C1371- 98 <u>04</u>	Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
ASTM E408-71(1996) <u>(2002)</u>	Test Methods for Total Normal

	Emittance of Surfaces Using Inspection-Meter Techniques
ASTM E1175-87(1996) <u>(2003)</u>	Standard Test Method for Determining Solar or Photopic Reflectance, Transmittance, and Absorptance of Materials Using a Large Diameter Integrating Sphere
NFRC 100- 2001 <u>2004</u>	Procedure for Determining Fenestration Product U-Factors (Second Edition) <i>Published November 2002</i>
NFRC 200- 2001 <u>2004</u>	Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence (Second Edition) <i>Published November 2002</i>
NFRC 300- 2001 <u>2004</u>	Standard Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems, (Second Edition) <i>Published November 2002</i>
NFRC 400- 2001 <u>2004</u>	Procedure for Determining Fenestration Product Air Leakage (Second Edition) <i>Published November 2002</i>

Delete the following normative references in Section 12:

ASTM E96-95	Test Methods for Water Vapor Transmission of Materials
ASTM E283-91	Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
NFRC 101-2001	Procedure for Determining Thermo Physical Properties of Materials for Use in NFRC-Approved Software Programs, (First Edition) <i>Published November 2002</i>
NFRC 102-2001	Test Procedures for Measuring the Steady State Thermal Transmittance of Fenestration Systems, (Second Edition) <i>Published November 2002</i>
NFRC 201-2001	Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods, (Second Edition) <i>Published November 2002</i>

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FOREWORD

This proposed change recognizes that track and busway type lighting systems can be limited by circuit breakers and permanently installed current limiters below a value of 30 W/lin ft (98 W/lin m). This wording allows these limits to be used to calculate installed power for these installed lighting systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.

Addendum e to 90.1-2004 (I-P and SI Editions)

Revise Section 9.1.4 (c) as follows:

9.1.4 Luminaire Wattage.

(c) ~~For The wattage of~~ line-voltage lighting track and plug-in busway, designed to that allow the addition and/or relocation of luminaires without altering the wiring of the system, ~~the wattage~~ shall be:

1. the specified wattage of the luminaires included in the system with a minimum of 30 W/lin ft (98 W/lin m), or
2. the wattage limit of the system's circuit breaker, or
3. the wattage limit of other permanent current limiting device(s) on the system.

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FOREWORD

In 2003, ASHRAE published addendum i to ASHRAE Standard 90.1-2001 to establish new minimum efficiency standards for three-phase air-cooled air conditioners and heat pumps less than 65,000 Btu/h at levels identical to the minimum federal efficiency standards for single-phase residential equipment. At the time of publication of Addendum i to Standard 90.1-2001, the new minimum federal standards in place for residential equipment were those promulgated on May 23, 2002, by the Department of Energy (DOE) setting a seasonal energy efficiency ratio (SEER) rating of 12.0 and a heating seasonal performance factor (HSPF) of 7.4 effective January 23, 2006.

However, on January 13, 2004, the US Appeals Court for the Second Circuit in New York found that the DOE did not follow proper administrative procedures while adopting the 12 SEER/7.4 HSPF standards. The court concluded that DOE improperly withdrew the 13 SEER/7.7 HSPF rule published on January 22, 2001, and ruled that the 13 SEER/7.7 HSPF standard must be reinstated. On April 2, 2004, the DOE announced that it will be enforcing the 13 SEER/7.7 HSPF standard effective January 23, 2006.

This addendum raises the minimum efficiency standard for three-phase air-cooled central air conditioners and heat pumps less than 65,000 Btu/h to 13 SEER/7.7 HSPF to be consistent with federal minimum standards for single-phase residential equipment. It also removes the product class for small duct high velocity (SDHV) equipment to be consistent with the DOE final rule. Minimum efficiency standards for SDHV systems have been addressed by the DOE’s Office of Hearings and Appeals through the “application for exception” process.

The recommended adoption date for the new standards under Standard 90.1 is January 23, 2006, which is identical to the effective date mandated in the DOE final rule for single-phase central air-conditioner products. This will save an estimated 2.3 quads of primary energy through the year 2030.

Addendum f to 90.1-2004 (I-P and SI Editions)

Revise Tables 6.8.1A and 6.8.1B to reflect the newly adopted DOE efficiency standards for single-phase air conditioners and heat pumps less than 65,000 Btu/h. The revisions proposed are as follows.

In I-P units:

**TABLE 6.8.1A Electrically Operated Unitary Air Conditioners and Condensing Units—
Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency^b	Test Procedure^a
Air conditioners, air cooled	<65,000 Btu/h ^c	All	Split system	10.0 SEER (before 1/23/2006) 12.0 SEER-13.0 SEER (as of 1/23/2006)	ARI 210/240
			Single package	9.7 SEER (before 1/23/2006) 12.0 SEER 13.0 SEER (as of 1/23/2006)	
Small duct high-velocity, air-cooled	<65,000 Btu/h ^c	All	Split system	10 SEER	

The remainder of the table is left unchanged.

TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
Air cooled, (cooling mode)	<65,000 Btu/h ^c	All	Split system	10.0 SEER (before 1/23/2006) 12.0-13.0 SEER (as of 1/23/2006)	ARI 210/240
			Single package	9.7 SEER (before 1/23/2006) 12.0-13.0 SEER (as of 1/23/2006)	
Small duct high velocity (air cooled, cooling mode)	<65,000 Btu/h^c	All	Split system	10 SEER	
Air cooled, (heating mode)	<65,000 Btu/h ^c (cooling capacity)	-	Split system	6.8 HSPF (before 1/23/2006) 7.4 <u>7.7</u> HSPF as of 1/23/2006)	
			Single package	6.6 HSPF (before 1/23/2006) 7.4 <u>7.7</u> HSPF as of 1/23/2006)	
Small duct high velocity (air cooled, heating mode)	<65,000 Btu/h^c (cooling capacity)	-	Split system	6.8 HSPF	

The remainder of the table is left unchanged.

In SI units:

TABLE 6.8.1A Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
Air conditioners, air cooled	<19 kW ^c	All	Split system	2.93 SCOP (before 1/23/2006) 3.52 SCOP-3.81 SCOP (as of 1/23/2006)	ARI 210/240
			Single package	2.84 SCOP (before 1/23/2006) 3.52 SCOP 3.81 SCOP (as of 1/23/2006)	
Small duct high velocity, air cooled	<19kW^c	All	Split system	2.93 SCOP	

The remainder of the table is left unchanged.

TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^b	Test Procedure ^a
Air cooled, (cooling mode)	<19 kW ^c	All	Split system	2.93 SCOP (before 1/23/2006) 3.52-3.81 SCOP (as of 1/23/2006)	ARI 210/240
			Single package	2.84 SCOP (before 1/23/2006) 3.52-3.81 SCOP (as of 1/23/2006)	
Small duct high-velocity (air cooled, cooling Mode)	<19 kW_e	All	Split system	2.93 SCOP	
Air cooled, (heating mode)	<19 kW ^c (cooling capacity)	-	Split system	1.99 SCOP _H (before 1/23/2006) 2.17-2.25 SCOP _H as of 1/23/2006)	
			Single package	1.93 SCOP _H (before 1/23/2006) 2.17-2.25 SCOP _H as of 1/23/2006)	
Small duct high-velocity (air cooled, heating mode)	<19 kW_e (cooling capacity)	-	Split system	1.99 SCOP_H	

The remainder of the table is left unchanged.

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FOREWORD

On October 29, 1999, ASHRAE approved amendments to Standard 90.1 that increased the minimum efficiency levels of much heating and cooling equipment, including commercial air-cooled air conditioners and heat pumps greater than 65,000 Btu/h covered by the Energy Policy and Conservation Act (EPCA) of 1992. These new minimum efficiency standards published by ASHRAE triggered a rulemaking at the Department of Energy (DOE) to assess if the amended standards could be adopted as federal minimum energy-efficiency standards. On January 12, 2001, the DOE published a final rule in the Federal Register adopting the ASHRAE Standard 90.1-1999 efficiency levels as federal minimum efficiency standards for some, but not all, EPCA-covered equipment. Among the products for which new federal minimum standards were not adopted were air-cooled commercial unitary air conditioners and heat pumps with cooling capacities between 65,000 and 240,000 Btu/h. For these products, the DOE concluded that cost-effective energy savings could result from more stringent standards and decided to undertake further analyses to assess if higher efficiency levels could be justified.

The DOE started a rulemaking process in 2001. On July 29, 2004, the DOE published an Advanced Notice of Proposed Rulemaking (ANOPR) to solicit public comments on its preliminary technical analyses. The comment period ended last November. Under normal procedures, the DOE is expected to finalize the rule in the next two to three years.

In March 2004, the Air-Conditioning and Refrigeration Institute (ARI), representing HVAC manufacturers, and the American Council for and Energy-Efficient Economy (ACEEE), representing the energy-efficiency community, entered into informal discussions on commercial air-cooled air conditioners and heat pumps with cooling capacities between 65,000 and 760,000 Btu/h. The purpose of these discussions was to develop consensus recommendations on minimum efficiency standards in order to speed up the rulemaking process and allow the DOE to proceed to a final rule more quickly than the normal procedures. Another objective of the discussions was to agree on specific minimum standards for products between 240,000 and 760,000 Btu/h, which are not presently covered by federal standards. These discussions resulted in a consensus agreement that was announced at the DOE's September 30, 2004, ANOPR workshop. Following the workshop, ARI and ACEEE submitted joint comments to the DOE, urging the Department to adopt the efficiency standards in the consensus agreement as minimum federal energy-efficiency standards. A copy of the joint comments is attached at the end of this document.

This addendum amends the minimum efficiency levels of air-cooled air conditioners and heat pumps greater or equal to 65,000 Btu/h contained in Tables 6.8.1A and 6.8.1B of ASHRAE Standard 90.1-2004 to be consistent with the consensus agreement. The effective date of January 1, 2010, is designed to coincide with the phase out date of R-22, mandated by the Clean Air Act. Justifications of the efficiency levels are included in the joint comments, and the technical analyses can be found in the DOE Technical Support Document: Energy Efficiency Program for Commercial and Industrial Equipment: Commercial Unitary Air Conditioners and Heat Pumps. This is posted on the DOE's Web site at: http://www.eere.energy.gov/buildings/appliance_standards/commercial/cuac_tsd_060904.html. This addendum will save an estimated 1.05 quads of cumulative primary energy by the year 2035.

Revise minimum efficiency standards for air-cooled air conditioners and heat pumps listed in Tables 6.8.1A and 6.8.1B as follows.

In I-P units:

**TABLE 6.8.1A Electrically Operated Unitary Air Conditioners and Condensing Units—
Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b
Air conditioners, air cooled	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	10.3 EER (before 1/1/2010) 11.2 EER (as of 1/1/2010)	ARI 340/360
		All other	Split system and single package	10.1 EER (before 1/1/2010) 11.0 EER (as of 1/1/2010)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	9.7 EER (before 1/1/2010) 11.0 EER (as of 1/1/2010)	
		All other	Split system and single package	9.5 EER (before 1/1/2010) 10.8 EER (as of 1/1/2010)	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	9.5 EER (before 1/1/2010) 10.0 EER (as of 1/1/2010) 9.7 IPLV	
		All other	Split system and single package	9.3 EER (before 1/1/2010) 9.8 EER (as of 1/1/2010) 9.5 IPLV	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	9.2 EER (before 1/1/2010) 9.7 EER (as of 1/1/2010) 9.4 IPLV	
		All other	Split system and single package	9.0 EER (before 1/1/2010) 9.5 EER (as of 1/1/2010) 9.2 IPLV	

The remainder of the table is left unchanged.

**TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps—
Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b		
Air cooled (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	10.1 EER <u>(before 1/1/2010)</u> 11.0 EER (as of 1/1/2010)	ARI 340/360		
		All other	Split system and single package	9.9 EER <u>(before 1/1/2010)</u> 10.8 EER (as of 1/1/2010)			
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	9.3 EER <u>(before 1/1/2010)</u> 10.6 EER (as of 1/1/2010)			
		All other	Split system and single package	9.1 EER <u>(before 1/1/2010)</u> 10.4 EER (as of 1/1/2010)			
	≥240,000 Btu/h	Electric resistance (or none)	Split system and single package	9.0 EER <u>(before 1/1/2010)</u> 9.5 EER <u>(as of 1/1/2010)</u> 9.2 IPLV			
		All other	Split system and single package	8.8 EER <u>(before 1/1/2010)</u> 9.3 EER <u>(as of 1/1/2010)</u> 9.0 IPLV			
	Air cooled (heating mode)	≥65,000 Btu/h and <135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb outdoor air		3.2 COP <u>(before 1/1/2010)</u> 3.3 COP (as of 1/1/2010)	ARI 340/360
				17°F db/15°F wb outdoor air		2.2 COP	
≥135,000 Btu/h (cooling capacity)		—	47°F db/43°F wb outdoor air	3.1 COP <u>(before 1/1/2010)</u> 3.2 COP (as of 1/1/2010)			
			17°F db/15°F wb outdoor air	2.0 COP			

The remainder of the table is left unchanged.

In SI units:

**TABLE 6.8.1A Electrically Operated Unitary Air Conditioners and Condensing Units—
Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency^a	Test Procedure^b	
Air conditioners, air cooled	≥19 kW and <40 kW	Electric resistance (or none)	Split system and single package	3.02 COP (before 1/1/2010) 3.28 COP (as of 1/1/2010)	ARI 340/360	
		All other	Split system and single package	2.96 COP (before 1/1/2010) 3.22 COP (as of 1/1/2010)		
	≥40 kW and <70 kW	Electric resistance (or none)	Split system and single package	2.84 COP (before 1/1/2010) 3.22 COP (as of 1/1/2010)		
		All other	Split system and single package	2.78 COP (before 1/1/2010) 3.16 COP (as of 1/1/2010)		
	≥70 kW and <223 kW	Electric resistance (or none)	Split system and single package	2.78 COP (before 1/1/2010) 2.93 COP (as of 1/1/2010) 2.84 IPLV		
			All other	Split system and single package		2.72 COP (before 1/1/2010) 2.87 COP (as of 1/1/2010) 2.78 IPLV
		≥223 kW	Electric resistance (or none)	Split system and single package		2.70 COP (before 1/1/2010) 2.84 COP (as of 1/1/2010) 2.75 IPLV
			All other	Split system and single package		2.64 COP (before 1/1/2010) 2.78 COP (as of 1/1/2010) 2.69 IPLV

The remainder of the table is left unchanged.

TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b		
Air cooled (cooling mode)	≥ 19kW and <40 kW	Electric resistance (or none)	Split system and single package	2.96 COP _C <u>(before 1/1/2010)</u> 3.22 COP _C (as of 1/1/2010)	ARI 340/360		
		All other	Split system and single package	2.90 COP _C <u>(before 1/1/2010)</u> 3.16 COP _C (as of 1/1/2010)			
	≥40 kW and <70 kW Btu/h	Electric resistance (or none)	Split system and single package	2.72 COP _C <u>(before 1/1/2010)</u> 3.10 COP _C (as of 1/1/2010)			
		All other	Split system and single package	2.66 COP _C <u>(before 1/1/2010)</u> 3.04 COP _C (as of 1/1/2010)			
	≥70 kW	Electric resistance (or none)	Split system and single package	2.64 COP _C <u>(before 1/1/2010)</u> 2.78 COP _C <u>(as of 1/1/2010)</u> 2.70 IPLV			
		All other	Split system and single package	2.58 COP _C <u>(before 1/1/2010)</u> 2.72 COP _C <u>(as of 1/1/2010)</u> 2.64 IPLV			
	Air cooled (heating mode)	≥19 kW and <40 kW (cooling capacity)	–	8.3°C db/6.1°C wb outdoor air		3.2 COP _H <u>(before 1/1/2010)</u> 3.3 COP _H (as of 1/1/2010)	ARI 340/360
				–8.3°C db/–9.4°C wb outdoor air		2.2 COP _H	
≥40 kW Btu/h (cooling capacity)		–	8.3°C db/6.1°C wb outdoor air	3.1 COP _H <u>(before 1/1/2010)</u> 3.2 COP _H (as of 1/1/2010)			
			–8.3°C db/–9.4°C wb outdoor air	2.0 COP _H			

The remainder of the table is left unchanged.

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FOREWORD

Table 2.1 of ASHRAE's Thermal Guidelines for Data Processing Environments (p. 10) provides environmental conditions for electronic equipment such as that found in data processing centers. This more recent publication found that electronic equipment can perform under more relaxed conditions than were previously believed. In light of this new information, it makes sense to remove these types of spaces from having specific exceptions on temperature and humidification dead bands.

Addendum h to 90.1-2004 (I-P and SI Editions)

Revise the exceptions to Sections 6.4.3.1.2 and 6.4.3.6 as follows:

6.4.3.1.2 Dead Band. Where used to control both heating and cooling, zone thermostatic controls shall be capable of providing a temperature range or dead band of at least

5°F (3°C) within which the supply of heating and cooling energy to the zone is shut off or reduced to a minimum.

Exceptions to 6.4.3.1.2:

- a. Thermostats that require manual changeover between heating and cooling modes.
- b. Special occupancy or special applications where wide temperature ranges are not acceptable (such as retirement homes, process applications, ~~data processing~~, museums, some areas of hospitals) and are approved by the *authority having jurisdiction*.

6.4.3.6 Humidification and Dehumidification. Where a zone is served by a system or systems with both humidification and dehumidification capability, means (such as limit switches, mechanical stops, or, for DDC systems, software programming) shall be provided capable of preventing simultaneous operation of humidification and dehumidification equipment.

Exceptions to 6.4.3.6:

- a. Zones served by desiccant systems, used with direct evaporative cooling in series.
- b. Systems serving zones where specific humidity levels are required, such as ~~computer rooms~~, museums, and hospitals, and approved by the *authority having jurisdiction*.

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FOREWORD

This additional language allows additional flexibility in assigning wattage to luminaires with multi-level ballasts where other luminaire components would restrict lamp size. In these cases the manufacturer's labeling of maximum wattage

based on these restrictions would be allowed as the maximum value for compliance calculation.

Addendum i to 90.1-2004 (I-P and SI Editions)

Revise Section 9.1.4(b) as follows:

9.1.4(b) The wattage of luminaires with permanently installed or remote ballasts or *transformers* shall be the operating input wattage of the maximum lamp/auxiliary combination based on values from the auxiliary *manufacturer's* literature or recognized testing laboratories or shall be the maximum labeled wattage of the luminaire.

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FOREWORD

This language modification allows additional flexibility in complying with the controls requirements by allowing additional combinations of commonly available control equipment. This flexibility allows designers and builders additional cost-effective options for compliance.

Addendum j to 90.1-2004 (I-P and SI Editions)

Revise Section 9.4.1.3 as follows:

9.4.1.3 Exterior Lighting Control. Lighting for all exterior applications not exempted in 9.1 shall have automatic controls capable of turning off exterior lighting when sufficient daylight is available or when the lighting is not required during nighttime hours. Lighting not designated for dusk-to-dawn operation shall be controlled by either:

- a. a combination of a photosensor and a time switch or
- b. an astronomical time switch.

Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All ~~Astronomical~~ time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.

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FOREWORD

Metal building roofs often include blanket insulation draped over purlins in screw-down roof designs. U-factors for

screw-down roofs with R-10, R-11, and R-13 insulation were included in Table A2.3 of Standard 90.1-2004. This addendum adds U-factors for R-19 insulation to Table A2.3. U-factors for R-19 Screw-Down Roofs were included in California Title 24 (2005 Joint Appendices Table IV.7).

For consistency, the new U-factors were derived from the values in Table 1A of the NAIMA publication “ASHRAE 90.1 Compliance for Metal Buildings” (December 1997), which was the original source for the values in Standard 90.1 Table A-2 and the California Title 24 appendices.

Addendum k to 90.1-2004 (I-P and SI Editions)

Revise Table A2.3 to add U-Factors for Screw-Down Roofs with R-19 Insulation as follows:

I-P edition:

TABLE A2.3 Assembly U-Factors for Metal Building Roofs

Insulation System	Rated R-Value of Insulation	Total Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (uninterrupted by framing)					
				Rated R-Value of Continuous Insulation					
				R-5.6	R-11.2	R-16.8	R-22.4	R-28.0	R-33.6
Screw Down Roofs									
	R-10	10	0.153	0.082	0.056	0.043	0.035	0.029	0.025
	R-11	11	0.139	0.078	0.054	0.042	0.034	0.028	0.025
	R-13	13	0.130	0.075	0.053	0.041	0.033	0.028	0.024
	R-19	19	0.098	<u>0.063</u>	<u>0.047</u>	<u>0.037</u>	<u>0.031</u>	<u>0.026</u>	<u>0.023</u>

The remainder of the table is left unchanged.

SI edition:

TABLE A2.3 Assembly U-Factors for Metal Building Roofs

Insulation System	Rated R-Value of Insulation	Total Rated R-Value of Insulation	Overall U-Factor for Entire Base Roof Assembly	Overall U-Factor for Assembly of Base Roof Plus Continuous Insulation (uninterrupted by framing)					
				Rated R-Value of Continuous Insulation					
				R-1.0	R-2.0	R-3.0	R-4.0	R-4.9	R-5.9
Screw Down Roofs									
	R-1.8	1.8	0.868	0.467	0.320	0.243	0.196	0.164	0.141
	R-1.9	1.9	0.788	0.443	0.308	0.236	0.192	0.161	0.139
	R-2.3	2.3	0.737	0.427	0.300	0.232	0.188	0.159	0.137
	<u>R-3.3</u>	<u>3.3</u>	<u>0.557</u>	<u>0.355</u>	<u>0.267</u>	<u>0.210</u>	<u>0.178</u>	<u>0.150</u>	<u>0.132</u>

The remainder of the table is left unchanged.

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FOREWORD

The “Energy Cost Budget” section relies on the use of a building energy simulation program to estimate the energy cost difference between the design building model and a budget building model. The building designer can select any building energy simulation program for performing these estimates as

long as the program complies with a list of requirements describing the minimum capabilities of the software. One of the requirements is a reference to ANSI/ASHRAE Standard 140-2001, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs. Requiring the building energy simulation program to be tested using the Standard 140 procedure provides benefits to persons using the Energy Cost Budget method by prompting developers to fix bugs found during the testing. This addendum updates the reference to the latest version of Standard 140—the 2004 version—which includes additional tests covering unitary cooling equipment models. These additional tests increase the coverage and potentially reduce errors occurring in building energy simulation programs used the Energy Cost Budget section.

Addendum I to 90.1-2004 (I-P and SI Editions)

Update the reference to ASHRAE Standard 140 in Section 12 as follows:

12. NORMATIVE REFERENCES

**American Society of Heating, Refrigerating and Air-Conditioning Engineers,
1791 Tullie Circle, NE, Atlanta, GA 30329**

ANSI/ASHRAE Standard 140-~~2001~~ 2004

Standard Method of Test for the Evaluation of Building Energy
Analysis Computer Programs

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FOREWORD

This modification addresses the issue of task lighting in office types and other spaces. It is understood that task lighting is becoming more of an integral element in current lighting design and that its supplemental nature may make determining compliance difficult. It is also rational to realize that task lighting with automatic control will provide supplemental light while having a minimal impact on connected load. Therefore, an option is provided for compliance that exempts the commonly used furniture mounted task lighting if it incorporates automatic shutoff.

Addendum m to 90.1-2004 (I-P and SI Editions)

Add exception (p) to section 9.2.2.3 list of exceptions as follows (other text included as reference):

9.2.2.3 Interior Lighting Power. The *interior lighting power allowance* for a *building* or a separately metered or permitted portion of a *building* shall be determined by either the *Building Area Method* described in 9.5 or the *Space-by-Space*

Method described in 9.6. Trade-offs of *interior lighting power allowance* among portions of the *building* for which a different method of calculation has been used are not permitted. The *installed interior lighting power* identified in accordance with 9.1.3 shall not exceed the *interior lighting power allowance* developed in accordance with 9.5 or 9.6.

Exceptions to 9.2.2.3: The following *lighting equipment* and applications shall not be considered when determining the *interior lighting power allowance* developed in accordance with 9.5 or 9.6, nor shall the wattage for such lighting be included in the *installed interior lighting power* identified in accordance with 9.1.3. However, any such lighting shall not be exempt unless it is an addition to general lighting and is controlled by an independent *control device*.

...

- p. Furniture mounted supplemental task lighting that is controlled by automatic shutoff and complies with 9.4.1.4 (d).

9.4.1.4 Additional Control.

...

- d. *Task Lighting*—supplemental task lighting, including *permanently installed* undershelf or undercabinet lighting, shall have a *control device* integral to the *luminaires* or be controlled by a wall-mounted *control device* provided the *control device* is readily accessible and located so that the occupant can see the controlled lighting.

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FOREWORD

Exception (b) to Section 5.5.4.4.1 allows users to take credit for overhangs toward compliance with the maximum SHGC requirements. The table of credits was developed based on an opaque overhang. This addendum provides clarification on how the credits would apply to louvered overhangs and to partially opaque overhangs..

Addendum n to 90.1-2004 (I-P and SI Editions)

Revise 5.5.4.4 as follows:

5.5.4.4 Fenestration Solar Heat Gain Coefficient (SHGC).

5.5.4.4.1 SHGC of Vertical Fenestration. *Vertical fenestration* shall have a SHGC not greater than that specified for “all” orientations in Tables 5.5-1 through 5.5-8 for the appropriate total *vertical fenestration area*.

Exceptions to 5.5.4.4.1:

- a. In latitudes greater than 10 degrees, the SHGC for *north-oriented vertical fenestration* shall be calculated separately and shall not be greater than that specified in Tables 5.5-1 through 5.5-8 for *north-oriented fenestration*. When this exception is used, the *fenestration area* used in selecting the criteria shall be calculated separately for *north-oriented* and all other-oriented *fenestration*.

Note to adopting authority: If the project is in the southern hemisphere, change north to south.

- b. For demonstrating compliance for *vertical fenestration only, shaded by opaque permanent projections that will last as long as the building itself*, the SHGC in the proposed building shall be reduced by using the multipliers in Table 5.5.4.4.1. ~~for each fenestration product shaded by permanent projections that will last as long as the building itself.~~
- c. For demonstrating compliance for vertical fenestration shaded by partially opaque permanent projections (e.g. framing with glass or perforated metal) that will last as long as the building itself, the projection factor shall be reduced by multiplying it by a factor O_s derived as follows:

$$O_s = (A_i * O_i) + (A_f * O_f)$$

where:

- O_s ≡ percent opacity of the shading device
- A_i ≡ percent of the area of the shading device that is a partially opaque infill
- O_i ≡ percent opacity of the infill. For glass = $(100\% - T_s)$. Where T_s is the Solar Transmittance as determined in accordance with NFRC 300. For perforated or decorative metal panels, O_i = percentage of solid material.
- A_f ≡ percent of the area of the shading device that represents the framing members
- O_f ≡ percent opacity of the framing members. If solid then 100%

And then the SHGC in the proposed building shall be reduced by using the multipliers in Table 5.5.4.4.1 for each fenestration product.

(e) (d) *Vertical fenestration* that is located on the street side of the street-level story only, provided that:

1. the street side of the street-level story does not exceed 20 ft in height,
2. the *fenestration* has a continuous overhang with a weighted average *projection factor* greater than 0.5, and
3. the *fenestration area* for the street side of the street-level story is less than 75% of the *gross wall area* for the street side of the street-level story.

When this exception is utilized, separate calculations shall be performed for these sections of the *building envelope*, and these values shall not be averaged with any others for compliance purposes. No credit shall be given here or elsewhere in the building for not fully utilizing the *fenestration area* allowed.

TABLE 5.5.4.4.1 SHGC Multipliers for Permanent Projections

Projection Factor	SHGC Multiplier (All Other Orientations)	SHGC Multiplier (North-Oriented)
0-0.10	1.00	1.00
>0.10-0.20	0.91	0.95
>0.20-0.30	0.82	0.91
>0.30-0.40	0.74	0.87
>0.40-0.50	0.67	0.84
>0.50-0.60	0.61	0.81
>0.60-0.70	0.56	0.78
>0.70-0.80	0.51	0.76
>0.80-0.90	0.47	0.75
>0.90-1.00	0.44	0.73

5.5.4.4.2 SHGC of Skylights. *Skylights* shall have an SHGC not greater than that specified for “all” orientations in Tables 5.5-1 through 5.5-8 for the appropriate total *skylight area*.

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FOREWORD

The ASHRAE Standard 90.1-2004 climatic data for China contain a single location (Shanghai/Hongqiao), which is not adequate to effectively use the standard across the entire country. The SPC 169 Weather Data for Building Design Standards has current climatic data and is developing a standard that would contain all of the data required by Standards

90.1 and 90.2. In the meantime the current climatic data for just China (368 locations) and Taiwan (38 locations) were made available and used to develop this addendum.

In addition to adding the new data for China and Taiwan there were errors identified in Malaysia and Mexico. This addendum presents corrected values for those locations as well.

Climate data for other regions in Table D-3 remain unchanged. .

Addendum o to 90.1-2004 (I-P and SI Editions)

Change Table D-3 in both the I-P and SI edition as follows.

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling		
									DB 1.0%	WB 1.0%	
China											
Shanghai/Hongqiao			31.17	N 121.43	E 16	3,182	5,124	26	92	81	
Beijing/Peking		Municipalities	39.93	N 116.28	E 180	5,252	4,115	12	92	72	
Cangzhou		Municipalities	38.33	N 116.83	E 36	4,888	4,504	14	92	74	
Hong Kong Intl Arpt		Special Admin. Region	22.33	N 114.18	E 79	543	7,894	48	91	79	
Shanghai		Municipalities	31.40	N 121.47	E 13	3,182	5,124	29	92	80	
Shanghai/Hongqiao		Municipalities	31.17	N 121.43	E 23	3,184	5,127	26	92	82	
Tianjin/Tientsin		Municipalities	39.10	N 117.17	E 16	4,948	4,450	14	91	74	
Anqing		Anhui	30.53	N 117.05	E 66	3,093	5,476	28	94	80	
Bengbu		Anhui	32.95	N 117.37	E 72	3,644	5,053	23	93	79	
Fuyang		Anhui	32.93	N 115.83	E 128	3,639	5,004	23	93	79	
Hefei/Luogang		Anhui	31.87	N 117.23	E 118	3,468	5,110	25	93	80	
Huang Shan (Mtns)		Anhui	30.13	N 118.15	E 6,024	6,723	1,647	9	70	65	
Huoshan		Anhui	31.40	N 116.33	E 223	3,516	4,907	24	94	80	
Changting		Fujian	25.85	N 116.37	E 1,020	1,902	6,289	30	91	77	
Fuding		Fujian	27.33	N 120.20	E 125	1,868	6,277	34	92	80	
Fuzhou		Fujian	26.08	N 119.28	E 279	1,396	7,047	40	94	80	
Jiuxian Shan		Fujian	25.72	N 118.10	E 5,417	3,923	2,763	23	74	67	
Longyan		Fujian	25.10	N 117.02	E 1,119	1,120	7,248	37	93	75	
Nanping		Fujian	26.65	N 118.17	E 420	1,551	6,986	35	95	78	
Pingtai		Fujian	25.52	N 119.78	E 102	1,478	6,550	43	87	79	
Pucheng		Fujian	27.92	N 118.53	E 902	2,325	5,940	29	93	78	
Shaowu		Fujian	27.33	N 117.43	E 630	2,075	6,232	29	94	78	
Xiamen		Fujian	24.48	N 118.08	E 456	1,014	7,326	43	91	79	
Yong'An		Fujian	25.97	N 117.35	E 669	1,570	6,917	33	95	77	
Dunhuang		Gansu	40.15	N 94.68	E 3,740	6,531	3,272	1	93	64	

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
	<u>Hezuo</u>	<u>Gansu</u>	<u>35.00</u>	<u>N</u>	<u>102.90</u>	<u>E</u>	<u>9,547</u>	<u>9,760</u>	<u>491</u>	<u>-5</u>	<u>70</u>	<u>54</u>
	<u>Huajialing</u>	<u>Gansu</u>	<u>35.38</u>	<u>N</u>	<u>105.00</u>	<u>E</u>	<u>8,038</u>	<u>9,275</u>	<u>871</u>	<u>4</u>	<u>70</u>	<u>56</u>
	<u>Jiuquan/Suzhou</u>	<u>Gansu</u>	<u>39.77</u>	<u>N</u>	<u>98.48</u>	<u>E</u>	<u>4,849</u>	<u>7,316</u>	<u>2,473</u>	<u>-2</u>	<u>86</u>	<u>62</u>
	<u>Lanzhou</u>	<u>Gansu</u>	<u>36.05</u>	<u>N</u>	<u>103.88</u>	<u>E</u>	<u>4,980</u>	<u>5,849</u>	<u>2,954</u>	<u>11</u>	<u>87</u>	<u>63</u>
	<u>Mazong Shan (Mount)</u>	<u>Gansu</u>	<u>41.80</u>	<u>N</u>	<u>97.03</u>	<u>E</u>	<u>5,807</u>	<u>9,187</u>	<u>1,748</u>	<u>-9</u>	<u>84</u>	<u>55</u>
	<u>Minqin</u>	<u>Gansu</u>	<u>38.63</u>	<u>N</u>	<u>103.08</u>	<u>E</u>	<u>4,485</u>	<u>7,045</u>	<u>2,830</u>	<u>0</u>	<u>89</u>	<u>61</u>
	<u>Pingliang</u>	<u>Gansu</u>	<u>35.55</u>	<u>N</u>	<u>106.67</u>	<u>E</u>	<u>4,423</u>	<u>6,248</u>	<u>2,407</u>	<u>9</u>	<u>84</u>	<u>64</u>
	<u>Ruo'ergai</u>	<u>Gansu</u>	<u>33.58</u>	<u>N</u>	<u>102.97</u>	<u>E</u>	<u>11,289</u>	<u>10,826</u>	<u>232</u>	<u>-8</u>	<u>65</u>	<u>52</u>
	<u>Tianshui</u>	<u>Gansu</u>	<u>34.58</u>	<u>N</u>	<u>105.75</u>	<u>E</u>	<u>3,750</u>	<u>5,192</u>	<u>3,073</u>	<u>17</u>	<u>87</u>	<u>67</u>
	<u>Wudu</u>	<u>Gansu</u>	<u>33.40</u>	<u>N</u>	<u>104.92</u>	<u>E</u>	<u>3,540</u>	<u>3,419</u>	<u>4,250</u>	<u>28</u>	<u>90</u>	<u>68</u>
	<u>Wushaoling (Pass)</u>	<u>Gansu</u>	<u>37.20</u>	<u>N</u>	<u>102.87</u>	<u>E</u>	<u>9,987</u>	<u>11,697</u>	<u>263</u>	<u>-5</u>	<u>64</u>	<u>50</u>
	<u>Xifengzhen</u>	<u>Gansu</u>	<u>35.73</u>	<u>N</u>	<u>107.63</u>	<u>E</u>	<u>4,669</u>	<u>6,471</u>	<u>2,388</u>	<u>10</u>	<u>82</u>	<u>63</u>
	<u>Yumenzhen</u>	<u>Gansu</u>	<u>40.27</u>	<u>N</u>	<u>97.03</u>	<u>E</u>	<u>5,010</u>	<u>7,614</u>	<u>2,367</u>	<u>-3</u>	<u>86</u>	<u>60</u>
	<u>Zhangye</u>	<u>Gansu</u>	<u>38.93</u>	<u>N</u>	<u>100.43</u>	<u>E</u>	<u>4,865</u>	<u>7,288</u>	<u>2,439</u>	<u>-2</u>	<u>88</u>	<u>62</u>
	<u>Fogang</u>	<u>Guangdong</u>	<u>23.87</u>	<u>N</u>	<u>113.53</u>	<u>E</u>	<u>223</u>	<u>1,063</u>	<u>7,709</u>	<u>39</u>	<u>92</u>	<u>79</u>
	<u>Gaoyao</u>	<u>Guangdong</u>	<u>23.05</u>	<u>N</u>	<u>112.47</u>	<u>E</u>	<u>39</u>	<u>720</u>	<u>8,493</u>	<u>44</u>	<u>93</u>	<u>80</u>
	<u>Guangzhou/Baiyun</u>	<u>Guangdong</u>	<u>23.13</u>	<u>N</u>	<u>113.32</u>	<u>E</u>	<u>26</u>	<u>737</u>	<u>8,352</u>	<u>42</u>	<u>93</u>	<u>80</u>
	<u>Heyuan</u>	<u>Guangdong</u>	<u>23.73</u>	<u>N</u>	<u>114.68</u>	<u>E</u>	<u>135</u>	<u>902</u>	<u>8,079</u>	<u>40</u>	<u>93</u>	<u>79</u>
	<u>Lian Xian</u>	<u>Guangdong</u>	<u>24.78</u>	<u>N</u>	<u>112.38</u>	<u>E</u>	<u>322</u>	<u>1,660</u>	<u>7,018</u>	<u>35</u>	<u>94</u>	<u>79</u>
	<u>Lianping</u>	<u>Guangdong</u>	<u>24.37</u>	<u>N</u>	<u>114.48</u>	<u>E</u>	<u>702</u>	<u>1,301</u>	<u>7,189</u>	<u>36</u>	<u>92</u>	<u>78</u>
	<u>Meixian</u>	<u>Guangdong</u>	<u>24.30</u>	<u>N</u>	<u>116.12</u>	<u>E</u>	<u>276</u>	<u>937</u>	<u>8,016</u>	<u>39</u>	<u>94</u>	<u>79</u>
	<u>Shangchuan Island</u>	<u>Guangdong</u>	<u>21.73</u>	<u>N</u>	<u>112.77</u>	<u>E</u>	<u>59</u>	<u>514</u>	<u>8,621</u>	<u>46</u>	<u>89</u>	<u>81</u>
	<u>Shantou</u>	<u>Guangdong</u>	<u>23.40</u>	<u>N</u>	<u>116.68</u>	<u>E</u>	<u>10</u>	<u>779</u>	<u>7,743</u>	<u>45</u>	<u>90</u>	<u>80</u>
	<u>Shanwei</u>	<u>Guangdong</u>	<u>22.78</u>	<u>N</u>	<u>115.37</u>	<u>E</u>	<u>16</u>	<u>528</u>	<u>8,272</u>	<u>46</u>	<u>89</u>	<u>79</u>
	<u>Shaoguan</u>	<u>Guangdong</u>	<u>24.80</u>	<u>N</u>	<u>113.58</u>	<u>E</u>	<u>223</u>	<u>1,370</u>	<u>7,565</u>	<u>37</u>	<u>94</u>	<u>79</u>
	<u>Shenzhen</u>	<u>Guangdong</u>	<u>22.55</u>	<u>N</u>	<u>114.10</u>	<u>E</u>	<u>59</u>	<u>531</u>	<u>8,597</u>	<u>44</u>	<u>92</u>	<u>80</u>
	<u>Xinyi</u>	<u>Guangdong</u>	<u>22.35</u>	<u>N</u>	<u>110.93</u>	<u>E</u>	<u>276</u>	<u>570</u>	<u>8,763</u>	<u>43</u>	<u>93</u>	<u>79</u>
	<u>Yangjiang</u>	<u>Guangdong</u>	<u>21.87</u>	<u>N</u>	<u>111.97</u>	<u>E</u>	<u>72</u>	<u>547</u>	<u>8,470</u>	<u>45</u>	<u>90</u>	<u>80</u>
	<u>Zhangjiang</u>	<u>Guangdong</u>	<u>21.22</u>	<u>N</u>	<u>110.40</u>	<u>E</u>	<u>92</u>	<u>423</u>	<u>9,002</u>	<u>46</u>	<u>92</u>	<u>80</u>
	<u>Beihai</u>	<u>Guangxi</u>	<u>21.48</u>	<u>N</u>	<u>109.10</u>	<u>E</u>	<u>52</u>	<u>621</u>	<u>8,826</u>	<u>44</u>	<u>91</u>	<u>80</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Bose</u>		<u>Guangxi</u>	<u>23.90</u>	<u>N</u>	<u>106.60</u>	<u>E</u>	<u>794</u>	<u>716</u>	<u>8,488</u>	<u>43</u>	<u>96</u>	<u>79</u>
<u>Guilin</u>		<u>Guangxi</u>	<u>25.33</u>	<u>N</u>	<u>110.30</u>	<u>E</u>	<u>545</u>	<u>1,971</u>	<u>6,549</u>	<u>35</u>	<u>92</u>	<u>78</u>
<u>Guiping</u>		<u>Guangxi</u>	<u>23.40</u>	<u>N</u>	<u>110.08</u>	<u>E</u>	<u>144</u>	<u>957</u>	<u>8,084</u>	<u>42</u>	<u>93</u>	<u>80</u>
<u>Hechi/Jnchengjiang</u>		<u>Guangxi</u>	<u>24.70</u>	<u>N</u>	<u>108.05</u>	<u>E</u>	<u>702</u>	<u>1,229</u>	<u>7,489</u>	<u>40</u>	<u>93</u>	<u>78</u>
<u>Lingling</u>		<u>Guangxi</u>	<u>26.23</u>	<u>N</u>	<u>111.62</u>	<u>E</u>	<u>571</u>	<u>2,608</u>	<u>5,993</u>	<u>31</u>	<u>94</u>	<u>78</u>
<u>Liuzhou</u>		<u>Guangxi</u>	<u>24.35</u>	<u>N</u>	<u>109.40</u>	<u>E</u>	<u>318</u>	<u>1,370</u>	<u>7,604</u>	<u>38</u>	<u>94</u>	<u>78</u>
<u>Longzhou</u>		<u>Guangxi</u>	<u>22.37</u>	<u>N</u>	<u>106.75</u>	<u>E</u>	<u>423</u>	<u>681</u>	<u>8,596</u>	<u>43</u>	<u>94</u>	<u>80</u>
<u>Mengshan</u>		<u>Guangxi</u>	<u>24.20</u>	<u>N</u>	<u>110.52</u>	<u>E</u>	<u>476</u>	<u>1,485</u>	<u>7,125</u>	<u>36</u>	<u>92</u>	<u>79</u>
<u>Nanning/Wuxu</u>		<u>Guangxi</u>	<u>22.82</u>	<u>N</u>	<u>108.35</u>	<u>E</u>	<u>240</u>	<u>857</u>	<u>8,315</u>	<u>42</u>	<u>93</u>	<u>79</u>
<u>Napo</u>		<u>Guangxi</u>	<u>23.30</u>	<u>N</u>	<u>105.95</u>	<u>E</u>	<u>2,605</u>	<u>1,283</u>	<u>6,469</u>	<u>37</u>	<u>87</u>	<u>74</u>
<u>Qin Zhou</u>		<u>Guangxi</u>	<u>21.95</u>	<u>N</u>	<u>108.62</u>	<u>E</u>	<u>20</u>	<u>769</u>	<u>8,415</u>	<u>43</u>	<u>91</u>	<u>80</u>
<u>Wuzhou</u>		<u>Guangxi</u>	<u>23.48</u>	<u>N</u>	<u>111.30</u>	<u>E</u>	<u>394</u>	<u>1,074</u>	<u>7,934</u>	<u>39</u>	<u>94</u>	<u>80</u>
<u>Bijie</u>		<u>Guizhou</u>	<u>27.30</u>	<u>N</u>	<u>105.23</u>	<u>E</u>	<u>4,957</u>	<u>3,837</u>	<u>3,496</u>	<u>27</u>	<u>83</u>	<u>68</u>
<u>Dushan</u>		<u>Guizhou</u>	<u>25.83</u>	<u>N</u>	<u>107.55</u>	<u>E</u>	<u>3,340</u>	<u>3,021</u>	<u>4,530</u>	<u>27</u>	<u>83</u>	<u>71</u>
<u>Guiyang</u>		<u>Guizhou</u>	<u>26.58</u>	<u>N</u>	<u>106.72</u>	<u>E</u>	<u>3,524</u>	<u>2,879</u>	<u>4,689</u>	<u>28</u>	<u>85</u>	<u>70</u>
<u>Luodian</u>		<u>Guizhou</u>	<u>25.43</u>	<u>N</u>	<u>106.77</u>	<u>E</u>	<u>1,447</u>	<u>1,351</u>	<u>7,066</u>	<u>38</u>	<u>93</u>	<u>77</u>
<u>Rongjiang/Guzhou</u>		<u>Guizhou</u>	<u>25.97</u>	<u>N</u>	<u>108.53</u>	<u>E</u>	<u>942</u>	<u>1,967</u>	<u>6,362</u>	<u>34</u>	<u>93</u>	<u>78</u>
<u>Sansui</u>		<u>Guizhou</u>	<u>26.97</u>	<u>N</u>	<u>108.67</u>	<u>E</u>	<u>2,005</u>	<u>3,322</u>	<u>4,659</u>	<u>28</u>	<u>88</u>	<u>75</u>
<u>Sinan</u>		<u>Guizhou</u>	<u>27.95</u>	<u>N</u>	<u>108.25</u>	<u>E</u>	<u>1,371</u>	<u>2,494</u>	<u>5,719</u>	<u>34</u>	<u>93</u>	<u>76</u>
<u>Weining</u>		<u>Guizhou</u>	<u>26.87</u>	<u>N</u>	<u>104.28</u>	<u>E</u>	<u>7,336</u>	<u>4,632</u>	<u>2,342</u>	<u>21</u>	<u>75</u>	<u>60</u>
<u>Xingren</u>		<u>Guizhou</u>	<u>25.43</u>	<u>N</u>	<u>105.18</u>	<u>E</u>	<u>4,524</u>	<u>2,595</u>	<u>4,527</u>	<u>30</u>	<u>83</u>	<u>68</u>
<u>Zunyi</u>		<u>Guizhou</u>	<u>27.70</u>	<u>N</u>	<u>106.88</u>	<u>E</u>	<u>2,772</u>	<u>3,091</u>	<u>4,673</u>	<u>30</u>	<u>88</u>	<u>73</u>
<u>Danxian/Nada</u>		<u>Hainan</u>	<u>19.52</u>	<u>N</u>	<u>109.58</u>	<u>E</u>	<u>554</u>	<u>245</u>	<u>9,606</u>	<u>48</u>	<u>94</u>	<u>78</u>
<u>Dongfang/Basuo</u>		<u>Hainan</u>	<u>19.10</u>	<u>N</u>	<u>108.62</u>	<u>E</u>	<u>26</u>	<u>107</u>	<u>10,168</u>	<u>53</u>	<u>91</u>	<u>81</u>
<u>Haikou</u>		<u>Hainan</u>	<u>20.03</u>	<u>N</u>	<u>110.35</u>	<u>E</u>	<u>49</u>	<u>211</u>	<u>9,659</u>	<u>51</u>	<u>93</u>	<u>81</u>
<u>Qionghai/Jiaji</u>		<u>Hainan</u>	<u>19.23</u>	<u>N</u>	<u>110.47</u>	<u>E</u>	<u>82</u>	<u>133</u>	<u>9,882</u>	<u>52</u>	<u>93</u>	<u>81</u>
<u>Sanhu Island</u>		<u>Hainan</u>	<u>16.53</u>	<u>N</u>	<u>111.62</u>	<u>E</u>	<u>16</u>	<u>0</u>	<u>11,282</u>	<u>69</u>	<u>90</u>	<u>83</u>
<u>Xisha Island</u>		<u>Hainan</u>	<u>16.83</u>	<u>N</u>	<u>112.33</u>	<u>E</u>	<u>16</u>	<u>0</u>	<u>11,221</u>	<u>69</u>	<u>89</u>	<u>82</u>
<u>Yaxian/Sanya</u>		<u>Hainan</u>	<u>18.23</u>	<u>N</u>	<u>109.52</u>	<u>E</u>	<u>23</u>	<u>7</u>	<u>10,735</u>	<u>60</u>	<u>90</u>	<u>80</u>
<u>Baoding</u>		<u>Hebei</u>	<u>38.85</u>	<u>N</u>	<u>115.57</u>	<u>E</u>	<u>62</u>	<u>4,949</u>	<u>4,411</u>	<u>14</u>	<u>93</u>	<u>73</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
	<u>Chengde</u>	<u>Hebei</u>	<u>40.97</u>	<u>N</u>	<u>117.93</u>	<u>E</u>	<u>1,227</u>	<u>6,778</u>	<u>3,356</u>	<u>0</u>	<u>89</u>	<u>69</u>
	<u>Fengning/Dagezhen</u>	<u>Hebei</u>	<u>41.22</u>	<u>N</u>	<u>116.63</u>	<u>E</u>	<u>2,169</u>	<u>7,891</u>	<u>2,574</u>	<u>-5</u>	<u>86</u>	<u>66</u>
	<u>Huailai/Shacheng</u>	<u>Hebei</u>	<u>40.40</u>	<u>N</u>	<u>115.50</u>	<u>E</u>	<u>1,765</u>	<u>6,490</u>	<u>3,403</u>	<u>5</u>	<u>89</u>	<u>67</u>
	<u>Leting</u>	<u>Hebei</u>	<u>39.43</u>	<u>N</u>	<u>118.90</u>	<u>E</u>	<u>39</u>	<u>5,918</u>	<u>3,562</u>	<u>8</u>	<u>87</u>	<u>74</u>
	<u>Qinglong</u>	<u>Hebei</u>	<u>40.40</u>	<u>N</u>	<u>118.95</u>	<u>E</u>	<u>748</u>	<u>6,611</u>	<u>3,261</u>	<u>0</u>	<u>88</u>	<u>71</u>
	<u>Shijiazhuang</u>	<u>Hebei</u>	<u>38.03</u>	<u>N</u>	<u>114.42</u>	<u>E</u>	<u>266</u>	<u>4,695</u>	<u>4,469</u>	<u>15</u>	<u>93</u>	<u>73</u>
	<u>Tangshan</u>	<u>Hebei</u>	<u>39.67</u>	<u>N</u>	<u>118.15</u>	<u>E</u>	<u>95</u>	<u>5,675</u>	<u>3,867</u>	<u>8</u>	<u>89</u>	<u>74</u>
	<u>Weichang/Zhuizishan</u>	<u>Hebei</u>	<u>41.93</u>	<u>N</u>	<u>117.75</u>	<u>E</u>	<u>2,769</u>	<u>8,600</u>	<u>2,201</u>	<u>-6</u>	<u>83</u>	<u>65</u>
	<u>Xingtai</u>	<u>Hebei</u>	<u>37.07</u>	<u>N</u>	<u>114.50</u>	<u>E</u>	<u>256</u>	<u>4,506</u>	<u>4,626</u>	<u>18</u>	<u>93</u>	<u>73</u>
	<u>Yu Xian</u>	<u>Hebei</u>	<u>39.83</u>	<u>N</u>	<u>114.57</u>	<u>E</u>	<u>2,986</u>	<u>7,948</u>	<u>2,545</u>	<u>-9</u>	<u>86</u>	<u>65</u>
	<u>Zhangjiakou</u>	<u>Hebei</u>	<u>40.78</u>	<u>N</u>	<u>114.88</u>	<u>E</u>	<u>2,382</u>	<u>6,823</u>	<u>3,202</u>	<u>2</u>	<u>88</u>	<u>65</u>
	<u>Aihui</u>	<u>Heilongjiang</u>	<u>50.25</u>	<u>N</u>	<u>127.45</u>	<u>E</u>	<u>545</u>	<u>11,840</u>	<u>1,840</u>	<u>-28</u>	<u>83</u>	<u>68</u>
	<u>Anda</u>	<u>Heilongjiang</u>	<u>46.38</u>	<u>N</u>	<u>125.32</u>	<u>E</u>	<u>492</u>	<u>10,066</u>	<u>2,482</u>	<u>-20</u>	<u>86</u>	<u>69</u>
	<u>Baoqing</u>	<u>Heilongjiang</u>	<u>46.32</u>	<u>N</u>	<u>132.18</u>	<u>E</u>	<u>272</u>	<u>9,731</u>	<u>2,379</u>	<u>-17</u>	<u>85</u>	<u>69</u>
	<u>Fujin</u>	<u>Heilongjiang</u>	<u>47.23</u>	<u>N</u>	<u>131.98</u>	<u>E</u>	<u>213</u>	<u>10,265</u>	<u>2,356</u>	<u>-18</u>	<u>85</u>	<u>70</u>
	<u>Hailun</u>	<u>Heilongjiang</u>	<u>47.43</u>	<u>N</u>	<u>126.97</u>	<u>E</u>	<u>787</u>	<u>11,017</u>	<u>2,137</u>	<u>-24</u>	<u>83</u>	<u>68</u>
	<u>Harbin</u>	<u>Heilongjiang</u>	<u>45.75</u>	<u>N</u>	<u>126.77</u>	<u>E</u>	<u>469</u>	<u>9,830</u>	<u>2,482</u>	<u>-20</u>	<u>85</u>	<u>69</u>
	<u>Hulin</u>	<u>Heilongjiang</u>	<u>45.77</u>	<u>N</u>	<u>132.97</u>	<u>E</u>	<u>338</u>	<u>9,977</u>	<u>2,228</u>	<u>-17</u>	<u>82</u>	<u>70</u>
	<u>Huma</u>	<u>Heilongjiang</u>	<u>51.72</u>	<u>N</u>	<u>126.65</u>	<u>E</u>	<u>587</u>	<u>12,658</u>	<u>1,760</u>	<u>-36</u>	<u>84</u>	<u>67</u>
	<u>Jixi</u>	<u>Heilongjiang</u>	<u>45.28</u>	<u>N</u>	<u>130.95</u>	<u>E</u>	<u>768</u>	<u>9,518</u>	<u>2,318</u>	<u>-14</u>	<u>84</u>	<u>69</u>
	<u>Keshan</u>	<u>Heilongjiang</u>	<u>48.05</u>	<u>N</u>	<u>125.88</u>	<u>E</u>	<u>778</u>	<u>11,108</u>	<u>2,123</u>	<u>-25</u>	<u>84</u>	<u>68</u>
	<u>Mudanjiang</u>	<u>Heilongjiang</u>	<u>44.57</u>	<u>N</u>	<u>129.60</u>	<u>E</u>	<u>794</u>	<u>9,464</u>	<u>2,449</u>	<u>-16</u>	<u>85</u>	<u>69</u>
	<u>Qiqihar</u>	<u>Heilongjiang</u>	<u>47.38</u>	<u>N</u>	<u>123.92</u>	<u>E</u>	<u>486</u>	<u>9,924</u>	<u>2,514</u>	<u>-18</u>	<u>86</u>	<u>69</u>
	<u>Shangzhi</u>	<u>Heilongjiang</u>	<u>45.22</u>	<u>N</u>	<u>127.97</u>	<u>E</u>	<u>627</u>	<u>10,340</u>	<u>2,189</u>	<u>-26</u>	<u>84</u>	<u>70</u>
	<u>Suifenhe</u>	<u>Heilongjiang</u>	<u>44.38</u>	<u>N</u>	<u>131.15</u>	<u>E</u>	<u>1,634</u>	<u>10,219</u>	<u>1,714</u>	<u>-16</u>	<u>81</u>	<u>68</u>
	<u>Sunwu</u>	<u>Heilongjiang</u>	<u>49.43</u>	<u>N</u>	<u>127.35</u>	<u>E</u>	<u>771</u>	<u>12,334</u>	<u>1,585</u>	<u>-32</u>	<u>83</u>	<u>68</u>
	<u>Tailai</u>	<u>Heilongjiang</u>	<u>46.40</u>	<u>N</u>	<u>123.42</u>	<u>E</u>	<u>492</u>	<u>9,431</u>	<u>2,663</u>	<u>-16</u>	<u>87</u>	<u>69</u>
	<u>Tonghe</u>	<u>Heilongjiang</u>	<u>45.97</u>	<u>N</u>	<u>128.73</u>	<u>E</u>	<u>361</u>	<u>10,618</u>	<u>2,210</u>	<u>-24</u>	<u>84</u>	<u>71</u>
	<u>Yichun</u>	<u>Heilongjiang</u>	<u>47.72</u>	<u>N</u>	<u>128.90</u>	<u>E</u>	<u>761</u>	<u>11,239</u>	<u>1,965</u>	<u>-28</u>	<u>83</u>	<u>68</u>
	<u>Anyang/Zhangde</u>	<u>Henan</u>	<u>36.12</u>	<u>N</u>	<u>114.37</u>	<u>E</u>	<u>249</u>	<u>4,318</u>	<u>4,648</u>	<u>18</u>	<u>93</u>	<u>75</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Boxian</u>		<u>Henan</u>	<u>33.88</u>	<u>N</u>	<u>115.77</u>	<u>E</u>	<u>138</u>	<u>4.006</u>	<u>4.755</u>	<u>20</u>	<u>93</u>	<u>77</u>
<u>Gushi</u>		<u>Henan</u>	<u>32.17</u>	<u>N</u>	<u>115.67</u>	<u>E</u>	<u>190</u>	<u>3.567</u>	<u>4.964</u>	<u>24</u>	<u>92</u>	<u>80</u>
<u>Lushi</u>		<u>Henan</u>	<u>34.05</u>	<u>N</u>	<u>111.03</u>	<u>E</u>	<u>1,870</u>	<u>4.572</u>	<u>3.865</u>	<u>17</u>	<u>90</u>	<u>73</u>
<u>Nanyang</u>		<u>Henan</u>	<u>33.03</u>	<u>N</u>	<u>112.58</u>	<u>E</u>	<u>430</u>	<u>3.779</u>	<u>4.750</u>	<u>23</u>	<u>92</u>	<u>77</u>
<u>Xihua</u>		<u>Henan</u>	<u>33.78</u>	<u>N</u>	<u>114.52</u>	<u>E</u>	<u>174</u>	<u>4.032</u>	<u>4.623</u>	<u>21</u>	<u>93</u>	<u>78</u>
<u>Xinyang</u>		<u>Henan</u>	<u>32.13</u>	<u>N</u>	<u>114.05</u>	<u>E</u>	<u>377</u>	<u>3.576</u>	<u>4.922</u>	<u>24</u>	<u>92</u>	<u>78</u>
<u>Zhengzhou</u>		<u>Henan</u>	<u>34.72</u>	<u>N</u>	<u>113.65</u>	<u>E</u>	<u>364</u>	<u>4.146</u>	<u>4.614</u>	<u>19</u>	<u>93</u>	<u>75</u>
<u>Zhumadian</u>		<u>Henan</u>	<u>33.00</u>	<u>N</u>	<u>114.02</u>	<u>E</u>	<u>272</u>	<u>3.885</u>	<u>4.718</u>	<u>22</u>	<u>93</u>	<u>77</u>
<u>Fangxian</u>		<u>Hubei</u>	<u>32.03</u>	<u>N</u>	<u>110.77</u>	<u>E</u>	<u>1,427</u>	<u>3.688</u>	<u>4.483</u>	<u>24</u>	<u>91</u>	<u>75</u>
<u>Guanghua</u>		<u>Hubei</u>	<u>32.38</u>	<u>N</u>	<u>111.67</u>	<u>E</u>	<u>299</u>	<u>3.445</u>	<u>4.989</u>	<u>26</u>	<u>93</u>	<u>79</u>
<u>Jiangling/Jingzhou</u>		<u>Hubei</u>	<u>30.33</u>	<u>N</u>	<u>112.18</u>	<u>E</u>	<u>108</u>	<u>3.064</u>	<u>5.325</u>	<u>29</u>	<u>93</u>	<u>81</u>
<u>Macheng</u>		<u>Hubei</u>	<u>31.18</u>	<u>N</u>	<u>114.97</u>	<u>E</u>	<u>194</u>	<u>3.166</u>	<u>5.363</u>	<u>27</u>	<u>94</u>	<u>80</u>
<u>Wuhan/Nanhu</u>		<u>Hubei</u>	<u>30.62</u>	<u>N</u>	<u>114.13</u>	<u>E</u>	<u>75</u>	<u>3.140</u>	<u>5.433</u>	<u>28</u>	<u>94</u>	<u>81</u>
<u>Yichang</u>		<u>Hubei</u>	<u>30.70</u>	<u>N</u>	<u>111.30</u>	<u>E</u>	<u>440</u>	<u>2.812</u>	<u>5.476</u>	<u>30</u>	<u>93</u>	<u>79</u>
<u>Zaoyang</u>		<u>Hubei</u>	<u>32.15</u>	<u>N</u>	<u>112.67</u>	<u>E</u>	<u>417</u>	<u>3.463</u>	<u>5.034</u>	<u>25</u>	<u>93</u>	<u>78</u>
<u>Zhongxiang</u>		<u>Hubei</u>	<u>31.17</u>	<u>N</u>	<u>112.57</u>	<u>E</u>	<u>217</u>	<u>3.192</u>	<u>5.240</u>	<u>28</u>	<u>92</u>	<u>80</u>
<u>Changde</u>		<u>Hunan</u>	<u>29.05</u>	<u>N</u>	<u>111.68</u>	<u>E</u>	<u>115</u>	<u>2.896</u>	<u>5.520</u>	<u>30</u>	<u>95</u>	<u>81</u>
<u>Chenzhou</u>		<u>Hunan</u>	<u>25.80</u>	<u>N</u>	<u>113.03</u>	<u>E</u>	<u>607</u>	<u>2.496</u>	<u>6.255</u>	<u>31</u>	<u>95</u>	<u>78</u>
<u>Nanyue</u>		<u>Hunan</u>	<u>27.30</u>	<u>N</u>	<u>112.70</u>	<u>E</u>	<u>4,196</u>	<u>4.866</u>	<u>3.090</u>	<u>17</u>	<u>77</u>	<u>71</u>
<u>Sangzhi</u>		<u>Hunan</u>	<u>29.40</u>	<u>N</u>	<u>110.17</u>	<u>E</u>	<u>1,056</u>	<u>2.896</u>	<u>5.229</u>	<u>30</u>	<u>93</u>	<u>77</u>
<u>Shaoyang</u>		<u>Hunan</u>	<u>27.23</u>	<u>N</u>	<u>111.47</u>	<u>E</u>	<u>814</u>	<u>2.794</u>	<u>5.651</u>	<u>30</u>	<u>93</u>	<u>78</u>
<u>Tongdao/Shuangjiang</u>		<u>Hunan</u>	<u>26.17</u>	<u>N</u>	<u>109.78</u>	<u>E</u>	<u>1,302</u>	<u>2.706</u>	<u>5.440</u>	<u>30</u>	<u>90</u>	<u>76</u>
<u>Wugang</u>		<u>Hunan</u>	<u>26.73</u>	<u>N</u>	<u>110.63</u>	<u>E</u>	<u>1,115</u>	<u>2.854</u>	<u>5.424</u>	<u>30</u>	<u>92</u>	<u>77</u>
<u>Yuanling</u>		<u>Hunan</u>	<u>28.47</u>	<u>N</u>	<u>110.40</u>	<u>E</u>	<u>469</u>	<u>2.817</u>	<u>5.442</u>	<u>30</u>	<u>93</u>	<u>78</u>
<u>Yueyang</u>		<u>Hunan</u>	<u>29.38</u>	<u>N</u>	<u>113.08</u>	<u>E</u>	<u>171</u>	<u>2.870</u>	<u>5.681</u>	<u>30</u>	<u>92</u>	<u>81</u>
<u>Zhijiang</u>		<u>Hunan</u>	<u>27.45</u>	<u>N</u>	<u>109.68</u>	<u>E</u>	<u>896</u>	<u>2.857</u>	<u>5.385</u>	<u>30</u>	<u>92</u>	<u>78</u>
<u>Abag Oi/Xin Hot</u>		<u>Inner Mongolia</u>	<u>44.02</u>	<u>N</u>	<u>114.95</u>	<u>E</u>	<u>3,701</u>	<u>11.253</u>	<u>1.853</u>	<u>-25</u>	<u>84</u>	<u>60</u>
<u>Arxan</u>		<u>Inner Mongolia</u>	<u>47.17</u>	<u>N</u>	<u>119.95</u>	<u>E</u>	<u>3,373</u>	<u>13.802</u>	<u>964</u>	<u>-35</u>	<u>77</u>	<u>61</u>
<u>Bailing-Miao</u>		<u>Inner Mongolia</u>	<u>41.70</u>	<u>N</u>	<u>110.43</u>	<u>E</u>	<u>4,518</u>	<u>9.399</u>	<u>2,005</u>	<u>-15</u>	<u>85</u>	<u>59</u>
<u>Bayan Mod</u>		<u>Inner Mongolia</u>	<u>40.75</u>	<u>N</u>	<u>104.50</u>	<u>E</u>	<u>4,360</u>	<u>7.762</u>	<u>2,911</u>	<u>-6</u>	<u>89</u>	<u>59</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
Bugt		Inner Mongolia	48.77	N 121.92	E 2,425	12,243	1,187	-22	79	62
Bugt		Inner Mongolia	42.33	N 120.70	E 1,316	7,853	2,855	-4	87	68
Chifeng/Ulanhad		Inner Mongolia	42.27	N 118.97	E 1,877	7,571	3,015	-5	88	67
Dongsheng		Inner Mongolia	39.83	N 109.98	E 4,787	8,149	2,202	-3	83	59
Duolun/Dolonnur		Inner Mongolia	42.18	N 116.47	E 4,091	10,403	1,547	-18	80	61
Ejin Qi		Inner Mongolia	41.95	N 101.07	E 3,087	7,313	3,592	-5	95	62
Erenhot		Inner Mongolia	43.65	N 112.00	E 3,169	9,870	2,442	-19	89	61
Guaizihu		Inner Mongolia	41.37	N 102.37	E 3,150	7,189	3,769	-4	97	61
Hailar		Inner Mongolia	49.22	N 119.75	E 2,005	12,730	1,604	-32	82	64
Hails		Inner Mongolia	41.45	N 106.38	E 4,954	8,903	2,317	-11	85	57
Haliut		Inner Mongolia	41.57	N 108.52	E 4,232	8,927	2,305	-9	85	61
Hohhot		Inner Mongolia	40.82	N 111.68	E 3,494	8,022	2,509	-4	86	63
Huade		Inner Mongolia	41.90	N 114.00	E 4,869	10,129	1,600	-13	80	59
Jartai		Inner Mongolia	39.78	N 105.75	E 3,389	6,960	3,456	-3	93	62
Jarud Qi/Lubei		Inner Mongolia	44.57	N 120.90	E 873	8,245	2,856	-7	89	68
Jining		Inner Mongolia	41.03	N 113.07	E 4,646	9,276	1,709	-9	81	60
Jurh		Inner Mongolia	42.40	N 112.90	E 3,780	9,067	2,401	-13	87	60
Lindong/Bairin Zuoq		Inner Mongolia	43.98	N 119.40	E 1,591	8,954	2,352	-10	87	67
Linhe		Inner Mongolia	40.77	N 107.40	E 3,415	7,302	2,995	-1	89	64
Linxi		Inner Mongolia	43.60	N 118.07	E 2,625	9,154	2,171	-10	84	64
Mandal		Inner Mongolia	42.53	N 110.13	E 4,012	8,967	2,413	-10	87	59
Naran Bulag		Inner Mongolia	44.62	N 114.15	E 3,881	11,695	1,655	-23	84	60
Nenjiang		Inner Mongolia	49.17	N 125.23	E 797	11,980	1,880	-32	83	67
Otog Qi/Ulan		Inner Mongolia	39.10	N 107.98	E 4,531	7,722	2,505	-5	87	60
Tongliao		Inner Mongolia	43.60	N 122.27	E 591	8,319	2,951	-9	88	70
Tulihe		Inner Mongolia	50.45	N 121.70	E 2,405	14,791	902	-42	78	62
Uliastai		Inner Mongolia	45.52	N 116.97	E 2,756	11,342	1,892	-24	85	62
Xi Ujimqin Qi		Inner Mongolia	44.58	N 117.60	E 3,271	11,137	1,656	-21	83	62
Xilin Hot/Abagnar		Inner Mongolia	43.95	N 116.07	E 3,251	10,480	2,051	-20	85	62
Xin Barag Youqi		Inner Mongolia	48.67	N 116.82	E 1,824	11,562	1,945	-23	85	63

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Dongtai</u>		<u>Jiangsu</u>	<u>32.87</u>	<u>N</u>	<u>120.32</u>	<u>E</u>	<u>16</u>	<u>3,813</u>	<u>4,612</u>	<u>24</u>	<u>91</u>	<u>81</u>
<u>Ganyu/Dayishan</u>		<u>Jiangsu</u>	<u>34.83</u>	<u>N</u>	<u>119.13</u>	<u>E</u>	<u>33</u>	<u>4,412</u>	<u>4,255</u>	<u>19</u>	<u>89</u>	<u>78</u>
<u>Liyang</u>		<u>Jiangsu</u>	<u>31.43</u>	<u>N</u>	<u>119.48</u>	<u>E</u>	<u>26</u>	<u>3,517</u>	<u>4,909</u>	<u>25</u>	<u>93</u>	<u>81</u>
<u>Lusi</u>		<u>Jiangsu</u>	<u>32.07</u>	<u>N</u>	<u>121.60</u>	<u>E</u>	<u>33</u>	<u>3,613</u>	<u>4,572</u>	<u>27</u>	<u>90</u>	<u>81</u>
<u>Qingjiang</u>		<u>Jiangsu</u>	<u>33.60</u>	<u>N</u>	<u>119.03</u>	<u>E</u>	<u>62</u>	<u>4,018</u>	<u>4,561</u>	<u>21</u>	<u>90</u>	<u>80</u>
<u>Shenyang/Hede</u>		<u>Jiangsu</u>	<u>33.77</u>	<u>N</u>	<u>120.25</u>	<u>E</u>	<u>23</u>	<u>4,099</u>	<u>4,370</u>	<u>22</u>	<u>90</u>	<u>80</u>
<u>Xuzhou</u>		<u>Jiangsu</u>	<u>34.28</u>	<u>N</u>	<u>117.15</u>	<u>E</u>	<u>138</u>	<u>4,081</u>	<u>4,695</u>	<u>20</u>	<u>92</u>	<u>77</u>
<u>Ganzhou</u>		<u>Jiangxi</u>	<u>25.85</u>	<u>N</u>	<u>114.95</u>	<u>E</u>	<u>410</u>	<u>1,924</u>	<u>6,919</u>	<u>34</u>	<u>94</u>	<u>78</u>
<u>Guangchang</u>		<u>Jiangxi</u>	<u>26.85</u>	<u>N</u>	<u>116.33</u>	<u>E</u>	<u>466</u>	<u>2,289</u>	<u>6,373</u>	<u>30</u>	<u>95</u>	<u>78</u>
<u>Ji'An</u>		<u>Jiangxi</u>	<u>27.12</u>	<u>N</u>	<u>114.97</u>	<u>E</u>	<u>256</u>	<u>2,378</u>	<u>6,378</u>	<u>32</u>	<u>95</u>	<u>79</u>
<u>Jingdezhen</u>		<u>Jiangxi</u>	<u>29.30</u>	<u>N</u>	<u>117.20</u>	<u>E</u>	<u>197</u>	<u>2,620</u>	<u>5,889</u>	<u>29</u>	<u>95</u>	<u>80</u>
<u>Lu Shan (Mountain)</u>		<u>Jiangxi</u>	<u>29.58</u>	<u>N</u>	<u>115.98</u>	<u>E</u>	<u>3,822</u>	<u>4,773</u>	<u>3,240</u>	<u>17</u>	<u>80</u>	<u>72</u>
<u>Nanchang</u>		<u>Jiangxi</u>	<u>28.60</u>	<u>N</u>	<u>115.92</u>	<u>E</u>	<u>164</u>	<u>2,685</u>	<u>5,976</u>	<u>31</u>	<u>94</u>	<u>80</u>
<u>Nancheng</u>		<u>Jiangxi</u>	<u>27.58</u>	<u>N</u>	<u>116.65</u>	<u>E</u>	<u>269</u>	<u>2,509</u>	<u>6,120</u>	<u>31</u>	<u>94</u>	<u>79</u>
<u>Xiushui</u>		<u>Jiangxi</u>	<u>29.03</u>	<u>N</u>	<u>114.58</u>	<u>E</u>	<u>482</u>	<u>2,853</u>	<u>5,582</u>	<u>27</u>	<u>95</u>	<u>79</u>
<u>Xunwu</u>		<u>Jiangxi</u>	<u>24.95</u>	<u>N</u>	<u>115.65</u>	<u>E</u>	<u>981</u>	<u>1,658</u>	<u>6,685</u>	<u>33</u>	<u>92</u>	<u>77</u>
<u>Yichun</u>		<u>Jiangxi</u>	<u>27.80</u>	<u>N</u>	<u>114.38</u>	<u>E</u>	<u>423</u>	<u>2,717</u>	<u>5,726</u>	<u>30</u>	<u>94</u>	<u>79</u>
<u>Changbai</u>		<u>Jilin</u>	<u>41.35</u>	<u>N</u>	<u>128.17</u>	<u>E</u>	<u>3,340</u>	<u>10,452</u>	<u>1,502</u>	<u>-17</u>	<u>78</u>	<u>66</u>
<u>Changchun</u>		<u>Jilin</u>	<u>43.90</u>	<u>N</u>	<u>125.22</u>	<u>E</u>	<u>781</u>	<u>8,844</u>	<u>2,708</u>	<u>-13</u>	<u>85</u>	<u>70</u>
<u>Changling</u>		<u>Jilin</u>	<u>44.25</u>	<u>N</u>	<u>123.97</u>	<u>E</u>	<u>623</u>	<u>8,939</u>	<u>2,725</u>	<u>-14</u>	<u>86</u>	<u>69</u>
<u>Dunhua</u>		<u>Jilin</u>	<u>43.37</u>	<u>N</u>	<u>128.20</u>	<u>E</u>	<u>1,726</u>	<u>9,923</u>	<u>1,891</u>	<u>-17</u>	<u>81</u>	<u>68</u>
<u>Huadian</u>		<u>Jilin</u>	<u>42.98</u>	<u>N</u>	<u>126.75</u>	<u>E</u>	<u>866</u>	<u>9,326</u>	<u>2,484</u>	<u>-26</u>	<u>84</u>	<u>71</u>
<u>Ji'An</u>		<u>Jilin</u>	<u>41.10</u>	<u>N</u>	<u>126.15</u>	<u>E</u>	<u>587</u>	<u>7,612</u>	<u>2,944</u>	<u>-9</u>	<u>86</u>	<u>72</u>
<u>Linjiang</u>		<u>Jilin</u>	<u>41.72</u>	<u>N</u>	<u>126.92</u>	<u>E</u>	<u>1,093</u>	<u>8,645</u>	<u>2,573</u>	<u>-15</u>	<u>85</u>	<u>71</u>
<u>Qian Gorlos</u>		<u>Jilin</u>	<u>45.12</u>	<u>N</u>	<u>124.83</u>	<u>E</u>	<u>453</u>	<u>9,062</u>	<u>2,770</u>	<u>-16</u>	<u>86</u>	<u>71</u>
<u>Yanji</u>		<u>Jilin</u>	<u>42.88</u>	<u>N</u>	<u>129.47</u>	<u>E</u>	<u>584</u>	<u>8,680</u>	<u>2,396</u>	<u>-10</u>	<u>85</u>	<u>70</u>
<u>Chaoyang</u>		<u>Liaoning</u>	<u>41.55</u>	<u>N</u>	<u>120.45</u>	<u>E</u>	<u>577</u>	<u>7,072</u>	<u>3,397</u>	<u>-5</u>	<u>90</u>	<u>70</u>
<u>Dalian/Dairen/Luda</u>		<u>Liaoning</u>	<u>38.90</u>	<u>N</u>	<u>121.63</u>	<u>E</u>	<u>318</u>	<u>5,648</u>	<u>3,441</u>	<u>10</u>	<u>86</u>	<u>73</u>
<u>Dandong</u>		<u>Liaoning</u>	<u>40.05</u>	<u>N</u>	<u>124.33</u>	<u>E</u>	<u>46</u>	<u>6,642</u>	<u>3,014</u>	<u>2</u>	<u>83</u>	<u>74</u>
<u>Haiyang Island</u>		<u>Liaoning</u>	<u>39.05</u>	<u>N</u>	<u>123.22</u>	<u>E</u>	<u>33</u>	<u>5,475</u>	<u>3,341</u>	<u>13</u>	<u>82</u>	<u>77</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Jinzhou</u>		<u>Liaoning</u>	<u>41.13</u>	<u>N</u>	<u>121.12</u>	<u>E</u>	<u>230</u>	<u>6,598</u>	<u>3,397</u>	<u>2</u>	<u>87</u>	<u>72</u>
<u>Kuandian</u>		<u>Liaoning</u>	<u>40.72</u>	<u>N</u>	<u>124.78</u>	<u>E</u>	<u>856</u>	<u>7,744</u>	<u>2,667</u>	<u>-10</u>	<u>84</u>	<u>72</u>
<u>Qingyuan</u>		<u>Liaoning</u>	<u>42.10</u>	<u>N</u>	<u>124.95</u>	<u>E</u>	<u>771</u>	<u>8,373</u>	<u>2,749</u>	<u>-17</u>	<u>87</u>	<u>71</u>
<u>Shenyang/Dongta</u>		<u>Liaoning</u>	<u>41.77</u>	<u>N</u>	<u>123.43</u>	<u>E</u>	<u>141</u>	<u>7,218</u>	<u>3,325</u>	<u>-8</u>	<u>87</u>	<u>73</u>
<u>Siping</u>		<u>Liaoning</u>	<u>43.18</u>	<u>N</u>	<u>124.33</u>	<u>E</u>	<u>541</u>	<u>8,240</u>	<u>2,898</u>	<u>-10</u>	<u>86</u>	<u>71</u>
<u>Yingkou</u>		<u>Liaoning</u>	<u>40.67</u>	<u>N</u>	<u>122.20</u>	<u>E</u>	<u>13</u>	<u>6,765</u>	<u>3,403</u>	<u>0</u>	<u>85</u>	<u>75</u>
<u>Zhangwu</u>		<u>Liaoning</u>	<u>42.42</u>	<u>N</u>	<u>122.53</u>	<u>E</u>	<u>276</u>	<u>7,754</u>	<u>3,060</u>	<u>-8</u>	<u>87</u>	<u>71</u>
<u>Yanchi</u>		<u>Ningxia</u>	<u>37.78</u>	<u>N</u>	<u>107.40</u>	<u>E</u>	<u>4,426</u>	<u>6,914</u>	<u>2,774</u>	<u>-2</u>	<u>88</u>	<u>61</u>
<u>Yinchuan</u>		<u>Ningxia</u>	<u>38.48</u>	<u>N</u>	<u>106.22</u>	<u>E</u>	<u>3,648</u>	<u>6,617</u>	<u>2,979</u>	<u>1</u>	<u>87</u>	<u>66</u>
<u>Zhongning</u>		<u>Ningxia</u>	<u>37.48</u>	<u>N</u>	<u>105.67</u>	<u>E</u>	<u>3,888</u>	<u>6,217</u>	<u>3,070</u>	<u>3</u>	<u>88</u>	<u>66</u>
<u>Daqaidam</u>		<u>Qinghai</u>	<u>37.85</u>	<u>N</u>	<u>95.37</u>	<u>E</u>	<u>10,413</u>	<u>10,776</u>	<u>734</u>	<u>-11</u>	<u>74</u>	<u>49</u>
<u>Darlag</u>		<u>Qinghai</u>	<u>33.75</u>	<u>N</u>	<u>99.65</u>	<u>E</u>	<u>13,018</u>	<u>12,136</u>	<u>100</u>	<u>-13</u>	<u>62</u>	<u>48</u>
<u>Delingha</u>		<u>Qinghai</u>	<u>37.37</u>	<u>N</u>	<u>97.37</u>	<u>E</u>	<u>9,783</u>	<u>9,185</u>	<u>1,170</u>	<u>-3</u>	<u>77</u>	<u>53</u>
<u>Dulan/Qagan Us</u>		<u>Qinghai</u>	<u>36.30</u>	<u>N</u>	<u>98.10</u>	<u>E</u>	<u>10,472</u>	<u>9,668</u>	<u>770</u>	<u>-1</u>	<u>74</u>	<u>50</u>
<u>Gangca/Shaliuhe</u>		<u>Qinghai</u>	<u>37.33</u>	<u>N</u>	<u>100.13</u>	<u>E</u>	<u>10,830</u>	<u>11,792</u>	<u>174</u>	<u>-7</u>	<u>64</u>	<u>50</u>
<u>Golmud</u>		<u>Qinghai</u>	<u>36.42</u>	<u>N</u>	<u>94.90</u>	<u>E</u>	<u>9,216</u>	<u>8,414</u>	<u>1,442</u>	<u>1</u>	<u>79</u>	<u>52</u>
<u>Henan</u>		<u>Qinghai</u>	<u>34.73</u>	<u>N</u>	<u>101.60</u>	<u>E</u>	<u>11,483</u>	<u>11,607</u>	<u>155</u>	<u>-17</u>	<u>64</u>	<u>50</u>
<u>Lenghu</u>		<u>Qinghai</u>	<u>38.83</u>	<u>N</u>	<u>93.38</u>	<u>E</u>	<u>8,970</u>	<u>10,060</u>	<u>1,142</u>	<u>-8</u>	<u>78</u>	<u>49</u>
<u>Madoi/Huangheyan</u>		<u>Qinghai</u>	<u>34.92</u>	<u>N</u>	<u>98.22</u>	<u>E</u>	<u>14,019</u>	<u>14,135</u>	<u>31</u>	<u>-18</u>	<u>58</u>	<u>43</u>
<u>Qumarleb</u>		<u>Qinghai</u>	<u>34.13</u>	<u>N</u>	<u>95.78</u>	<u>E</u>	<u>13,701</u>	<u>13,175</u>	<u>67</u>	<u>-16</u>	<u>62</u>	<u>46</u>
<u>Tongde</u>		<u>Qinghai</u>	<u>35.27</u>	<u>N</u>	<u>100.65</u>	<u>E</u>	<u>10,794</u>	<u>11,220</u>	<u>288</u>	<u>-14</u>	<u>68</u>	<u>51</u>
<u>Tuotuohe/Tanggulash</u>		<u>Qinghai</u>	<u>34.22</u>	<u>N</u>	<u>92.43</u>	<u>E</u>	<u>14,879</u>	<u>14,505</u>	<u>21</u>	<u>-21</u>	<u>60</u>	<u>42</u>
<u>Wudaoliang</u>		<u>Qinghai</u>	<u>35.22</u>	<u>N</u>	<u>93.08</u>	<u>E</u>	<u>15,135</u>	<u>15,114</u>	<u>8</u>	<u>-16</u>	<u>56</u>	<u>40</u>
<u>Xining</u>		<u>Qinghai</u>	<u>36.62</u>	<u>N</u>	<u>101.77</u>	<u>E</u>	<u>7,421</u>	<u>7,417</u>	<u>1,620</u>	<u>3</u>	<u>78</u>	<u>57</u>
<u>Yushu</u>		<u>Qinghai</u>	<u>33.02</u>	<u>N</u>	<u>97.02</u>	<u>E</u>	<u>12,080</u>	<u>9,354</u>	<u>550</u>	<u>-2</u>	<u>70</u>	<u>52</u>
<u>Zadoi</u>		<u>Qinghai</u>	<u>32.90</u>	<u>N</u>	<u>95.30</u>	<u>E</u>	<u>13,346</u>	<u>11,257</u>	<u>218</u>	<u>-9</u>	<u>65</u>	<u>48</u>
<u>Ankang/Xing'an</u>		<u>Shaanxi</u>	<u>32.72</u>	<u>N</u>	<u>109.03</u>	<u>E</u>	<u>955</u>	<u>3,242</u>	<u>4,920</u>	<u>28</u>	<u>93</u>	<u>76</u>
<u>Baoji</u>		<u>Shaanxi</u>	<u>34.35</u>	<u>N</u>	<u>107.13</u>	<u>E</u>	<u>2,001</u>	<u>4,345</u>	<u>3,985</u>	<u>21</u>	<u>92</u>	<u>71</u>
<u>Hanzhong</u>		<u>Shaanxi</u>	<u>33.07</u>	<u>N</u>	<u>107.03</u>	<u>E</u>	<u>1,670</u>	<u>3,676</u>	<u>4,253</u>	<u>27</u>	<u>89</u>	<u>75</u>
<u>Hua Shan (Mount)</u>		<u>Shaanxi</u>	<u>34.48</u>	<u>N</u>	<u>110.08</u>	<u>E</u>	<u>6,768</u>	<u>7,893</u>	<u>1,516</u>	<u>5</u>	<u>72</u>	<u>60</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Tongchuan</u>		<u>Shaanxi</u>	<u>35.17</u>	<u>N</u>	<u>109.05</u>	<u>E</u>	<u>2,999</u>	<u>5,470</u>	<u>3,117</u>	<u>14</u>	<u>87</u>	<u>67</u>
<u>Xi'An</u>		<u>Shaanxi</u>	<u>34.30</u>	<u>N</u>	<u>108.93</u>	<u>E</u>	<u>1,306</u>	<u>4,332</u>	<u>4,276</u>	<u>21</u>	<u>93</u>	<u>74</u>
<u>Yan An</u>		<u>Shaanxi</u>	<u>36.60</u>	<u>N</u>	<u>109.50</u>	<u>E</u>	<u>3,146</u>	<u>5,872</u>	<u>3,132</u>	<u>6</u>	<u>89</u>	<u>66</u>
<u>Yulin</u>		<u>Shaanxi</u>	<u>38.23</u>	<u>N</u>	<u>109.70</u>	<u>E</u>	<u>3,471</u>	<u>7,039</u>	<u>2,834</u>	<u>-5</u>	<u>88</u>	<u>64</u>
<u>Chengshantou (Cape)</u>		<u>Shandong</u>	<u>37.40</u>	<u>N</u>	<u>122.68</u>	<u>E</u>	<u>154</u>	<u>5,125</u>	<u>3,151</u>	<u>20</u>	<u>79</u>	<u>74</u>
<u>Dezhou</u>		<u>Shandong</u>	<u>37.43</u>	<u>N</u>	<u>116.32</u>	<u>E</u>	<u>72</u>	<u>4,643</u>	<u>4,591</u>	<u>16</u>	<u>91</u>	<u>75</u>
<u>Haiyang</u>		<u>Shandong</u>	<u>36.77</u>	<u>N</u>	<u>121.17</u>	<u>E</u>	<u>210</u>	<u>4,943</u>	<u>3,742</u>	<u>16</u>	<u>85</u>	<u>74</u>
<u>Heze/Caozhou</u>		<u>Shandong</u>	<u>35.25</u>	<u>N</u>	<u>115.43</u>	<u>E</u>	<u>167</u>	<u>4,280</u>	<u>4,627</u>	<u>18</u>	<u>92</u>	<u>77</u>
<u>Huimin</u>		<u>Shandong</u>	<u>37.50</u>	<u>N</u>	<u>117.53</u>	<u>E</u>	<u>39</u>	<u>5,009</u>	<u>4,270</u>	<u>12</u>	<u>91</u>	<u>75</u>
<u>Jinan/Sinan</u>		<u>Shandong</u>	<u>36.68</u>	<u>N</u>	<u>116.98</u>	<u>E</u>	<u>190</u>	<u>4,161</u>	<u>5,036</u>	<u>18</u>	<u>93</u>	<u>74</u>
<u>Linyi</u>		<u>Shandong</u>	<u>35.05</u>	<u>N</u>	<u>118.35</u>	<u>E</u>	<u>282</u>	<u>4,388</u>	<u>4,395</u>	<u>18</u>	<u>90</u>	<u>76</u>
<u>Longkou</u>		<u>Shandong</u>	<u>37.62</u>	<u>N</u>	<u>120.32</u>	<u>E</u>	<u>16</u>	<u>5,167</u>	<u>3,822</u>	<u>17</u>	<u>88</u>	<u>76</u>
<u>Quingdao/Singtao</u>		<u>Shandong</u>	<u>36.07</u>	<u>N</u>	<u>120.33</u>	<u>E</u>	<u>253</u>	<u>4,651</u>	<u>3,872</u>	<u>19</u>	<u>86</u>	<u>74</u>
<u>Rizhao</u>		<u>Shandong</u>	<u>35.38</u>	<u>N</u>	<u>119.53</u>	<u>E</u>	<u>49</u>	<u>4,595</u>	<u>3,926</u>	<u>19</u>	<u>85</u>	<u>78</u>
<u>Tai Shan (Mtns)</u>		<u>Shandong</u>	<u>36.25</u>	<u>N</u>	<u>117.10</u>	<u>E</u>	<u>5,039</u>	<u>8,288</u>	<u>1,537</u>	<u>2</u>	<u>71</u>	<u>63</u>
<u>Weifang</u>		<u>Shandong</u>	<u>36.70</u>	<u>N</u>	<u>119.08</u>	<u>E</u>	<u>167</u>	<u>4,816</u>	<u>4,315</u>	<u>12</u>	<u>91</u>	<u>75</u>
<u>Xinxian</u>		<u>Shandong</u>	<u>36.03</u>	<u>N</u>	<u>115.58</u>	<u>E</u>	<u>154</u>	<u>4,619</u>	<u>4,426</u>	<u>16</u>	<u>92</u>	<u>77</u>
<u>Yanzhou</u>		<u>Shandong</u>	<u>35.57</u>	<u>N</u>	<u>116.85</u>	<u>E</u>	<u>174</u>	<u>4,526</u>	<u>4,412</u>	<u>15</u>	<u>92</u>	<u>76</u>
<u>Yiyuan/Nanma</u>		<u>Shandong</u>	<u>36.18</u>	<u>N</u>	<u>118.15</u>	<u>E</u>	<u>991</u>	<u>5,093</u>	<u>3,949</u>	<u>12</u>	<u>89</u>	<u>72</u>
<u>Datong</u>		<u>Shanxi</u>	<u>40.10</u>	<u>N</u>	<u>113.33</u>	<u>E</u>	<u>3,507</u>	<u>7,877</u>	<u>2,512</u>	<u>-5</u>	<u>86</u>	<u>63</u>
<u>Hequ</u>		<u>Shanxi</u>	<u>39.38</u>	<u>N</u>	<u>111.15</u>	<u>E</u>	<u>2,825</u>	<u>7,336</u>	<u>2,879</u>	<u>-7</u>	<u>89</u>	<u>66</u>
<u>Jiexiu</u>		<u>Shanxi</u>	<u>37.05</u>	<u>N</u>	<u>111.93</u>	<u>E</u>	<u>2,461</u>	<u>5,700</u>	<u>3,285</u>	<u>8</u>	<u>89</u>	<u>68</u>
<u>Lishi</u>		<u>Shanxi</u>	<u>37.50</u>	<u>N</u>	<u>111.10</u>	<u>E</u>	<u>3,120</u>	<u>6,542</u>	<u>2,959</u>	<u>1</u>	<u>88</u>	<u>66</u>
<u>Taiyuan/Wusu/Wusu</u>		<u>Shanxi</u>	<u>37.78</u>	<u>N</u>	<u>112.55</u>	<u>E</u>	<u>2,556</u>	<u>6,066</u>	<u>3,132</u>	<u>5</u>	<u>88</u>	<u>69</u>
<u>Wutai Shan (Mtn)</u>		<u>Shanxi</u>	<u>39.03</u>	<u>N</u>	<u>113.53</u>	<u>E</u>	<u>9,508</u>	<u>14,214</u>	<u>100</u>	<u>-19</u>	<u>63</u>	<u>53</u>
<u>Yangcheng</u>		<u>Shanxi</u>	<u>35.48</u>	<u>N</u>	<u>112.40</u>	<u>E</u>	<u>2,162</u>	<u>5,057</u>	<u>3,714</u>	<u>14</u>	<u>88</u>	<u>69</u>
<u>Yuanping</u>		<u>Shanxi</u>	<u>38.75</u>	<u>N</u>	<u>112.70</u>	<u>E</u>	<u>2,749</u>	<u>6,705</u>	<u>2,943</u>	<u>2</u>	<u>88</u>	<u>66</u>
<u>Yuncheng</u>		<u>Shanxi</u>	<u>35.03</u>	<u>N</u>	<u>111.02</u>	<u>E</u>	<u>1,234</u>	<u>4,433</u>	<u>4,553</u>	<u>18</u>	<u>94</u>	<u>72</u>
<u>Yushe</u>		<u>Shanxi</u>	<u>37.07</u>	<u>N</u>	<u>112.98</u>	<u>E</u>	<u>3,419</u>	<u>6,482</u>	<u>2,777</u>	<u>3</u>	<u>85</u>	<u>64</u>
<u>Barkam</u>		<u>Sichuan</u>	<u>31.90</u>	<u>N</u>	<u>102.23</u>	<u>E</u>	<u>8,747</u>	<u>5,419</u>	<u>1,882</u>	<u>13</u>	<u>79</u>	<u>59</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Batang</u>		<u>Sichuan</u>	<u>30.00</u>	<u>N</u>	<u>99.10</u>	<u>E</u>	<u>8,494</u>	<u>3,599</u>	<u>3,267</u>	<u>22</u>	<u>85</u>	<u>59</u>
<u>Chengdu</u>		<u>Sichuan</u>	<u>30.67</u>	<u>N</u>	<u>104.02</u>	<u>E</u>	<u>1,667</u>	<u>2,708</u>	<u>4,843</u>	<u>33</u>	<u>88</u>	<u>76</u>
<u>Da Xian</u>		<u>Sichuan</u>	<u>31.20</u>	<u>N</u>	<u>107.50</u>	<u>E</u>	<u>1,020</u>	<u>2,498</u>	<u>5,455</u>	<u>34</u>	<u>94</u>	<u>78</u>
<u>Daocheng/Dabba</u>		<u>Sichuan</u>	<u>29.05</u>	<u>N</u>	<u>100.30</u>	<u>E</u>	<u>12,234</u>	<u>8,614</u>	<u>624</u>	<u>4</u>	<u>68</u>	<u>49</u>
<u>Dawu</u>		<u>Sichuan</u>	<u>30.98</u>	<u>N</u>	<u>101.12</u>	<u>E</u>	<u>9,708</u>	<u>6,110</u>	<u>1,639</u>	<u>11</u>	<u>77</u>	<u>57</u>
<u>Emei Shan</u>		<u>Sichuan</u>	<u>29.52</u>	<u>N</u>	<u>103.33</u>	<u>E</u>	<u>10,003</u>	<u>9,458</u>	<u>381</u>	<u>8</u>	<u>61</u>	<u>54</u>
<u>Fengjie</u>		<u>Sichuan</u>	<u>31.05</u>	<u>N</u>	<u>109.50</u>	<u>E</u>	<u>1,991</u>	<u>2,889</u>	<u>5,043</u>	<u>32</u>	<u>92</u>	<u>75</u>
<u>Garze</u>		<u>Sichuan</u>	<u>31.62</u>	<u>N</u>	<u>100.00</u>	<u>E</u>	<u>11,135</u>	<u>7,656</u>	<u>991</u>	<u>5</u>	<u>72</u>	<u>53</u>
<u>Jiulong/Gyaisi</u>		<u>Sichuan</u>	<u>29.00</u>	<u>N</u>	<u>101.50</u>	<u>E</u>	<u>9,823</u>	<u>5,505</u>	<u>1,568</u>	<u>18</u>	<u>75</u>	<u>55</u>
<u>Kangding/Dardo</u>		<u>Sichuan</u>	<u>30.05</u>	<u>N</u>	<u>101.97</u>	<u>E</u>	<u>8,586</u>	<u>6,870</u>	<u>1,224</u>	<u>17</u>	<u>71</u>	<u>58</u>
<u>Langzhong</u>		<u>Sichuan</u>	<u>31.58</u>	<u>N</u>	<u>105.97</u>	<u>E</u>	<u>1,263</u>	<u>2,553</u>	<u>5,192</u>	<u>34</u>	<u>92</u>	<u>77</u>
<u>Liangping</u>		<u>Sichuan</u>	<u>30.68</u>	<u>N</u>	<u>107.80</u>	<u>E</u>	<u>1,493</u>	<u>2,733</u>	<u>5,111</u>	<u>33</u>	<u>92</u>	<u>77</u>
<u>Litang</u>		<u>Sichuan</u>	<u>30.00</u>	<u>N</u>	<u>100.27</u>	<u>E</u>	<u>12,959</u>	<u>9,367</u>	<u>370</u>	<u>1</u>	<u>65</u>	<u>48</u>
<u>Luzhou</u>		<u>Sichuan</u>	<u>28.88</u>	<u>N</u>	<u>105.43</u>	<u>E</u>	<u>1,102</u>	<u>2,150</u>	<u>5,690</u>	<u>38</u>	<u>93</u>	<u>78</u>
<u>Mianyang</u>		<u>Sichuan</u>	<u>31.47</u>	<u>N</u>	<u>104.68</u>	<u>E</u>	<u>1,549</u>	<u>2,771</u>	<u>4,943</u>	<u>31</u>	<u>90</u>	<u>75</u>
<u>Nanchong</u>		<u>Sichuan</u>	<u>30.80</u>	<u>N</u>	<u>106.08</u>	<u>E</u>	<u>1,017</u>	<u>2,446</u>	<u>5,422</u>	<u>35</u>	<u>93</u>	<u>78</u>
<u>Neijiang</u>		<u>Sichuan</u>	<u>29.58</u>	<u>N</u>	<u>105.05</u>	<u>E</u>	<u>1,171</u>	<u>2,235</u>	<u>5,591</u>	<u>36</u>	<u>93</u>	<u>78</u>
<u>Pingwu</u>		<u>Sichuan</u>	<u>32.42</u>	<u>N</u>	<u>104.52</u>	<u>E</u>	<u>2,877</u>	<u>3,115</u>	<u>4,327</u>	<u>30</u>	<u>88</u>	<u>71</u>
<u>Songpan/Sungqu</u>		<u>Sichuan</u>	<u>32.65</u>	<u>N</u>	<u>103.57</u>	<u>E</u>	<u>9,357</u>	<u>7,329</u>	<u>1,094</u>	<u>8</u>	<u>74</u>	<u>56</u>
<u>Wanyuan</u>		<u>Sichuan</u>	<u>32.07</u>	<u>N</u>	<u>108.03</u>	<u>E</u>	<u>2,211</u>	<u>3,354</u>	<u>4,305</u>	<u>28</u>	<u>90</u>	<u>73</u>
<u>Xichang</u>		<u>Sichuan</u>	<u>27.90</u>	<u>N</u>	<u>102.27</u>	<u>E</u>	<u>5,246</u>	<u>1,736</u>	<u>5,211</u>	<u>35</u>	<u>87</u>	<u>65</u>
<u>Ya'An</u>		<u>Sichuan</u>	<u>29.98</u>	<u>N</u>	<u>103.00</u>	<u>E</u>	<u>2,064</u>	<u>2,584</u>	<u>4,962</u>	<u>34</u>	<u>88</u>	<u>76</u>
<u>Yibin</u>		<u>Sichuan</u>	<u>28.80</u>	<u>N</u>	<u>104.60</u>	<u>E</u>	<u>1,122</u>	<u>2,043</u>	<u>5,715</u>	<u>38</u>	<u>92</u>	<u>78</u>
<u>Youyang</u>		<u>Sichuan</u>	<u>28.83</u>	<u>N</u>	<u>108.77</u>	<u>E</u>	<u>2,182</u>	<u>3,311</u>	<u>4,486</u>	<u>29</u>	<u>88</u>	<u>74</u>
<u>Baigoin</u>		<u>Tibet</u>	<u>31.37</u>	<u>N</u>	<u>90.02</u>	<u>E</u>	<u>15,423</u>	<u>12,487</u>	<u>70</u>	<u>-7</u>	<u>60</u>	<u>42</u>
<u>Dengqen</u>		<u>Tibet</u>	<u>31.42</u>	<u>N</u>	<u>95.60</u>	<u>E</u>	<u>12,710</u>	<u>9,327</u>	<u>508</u>	<u>4</u>	<u>68</u>	<u>50</u>
<u>Lhasa</u>		<u>Tibet</u>	<u>29.67</u>	<u>N</u>	<u>91.13</u>	<u>E</u>	<u>11,975</u>	<u>6,560</u>	<u>1,433</u>	<u>14</u>	<u>75</u>	<u>52</u>
<u>Lhunze</u>		<u>Tibet</u>	<u>28.42</u>	<u>N</u>	<u>92.47</u>	<u>E</u>	<u>12,667</u>	<u>7,949</u>	<u>864</u>	<u>8</u>	<u>69</u>	<u>49</u>
<u>Nagqu</u>		<u>Tibet</u>	<u>31.48</u>	<u>N</u>	<u>92.07</u>	<u>E</u>	<u>14,790</u>	<u>12,539</u>	<u>64</u>	<u>-11</u>	<u>62</u>	<u>44</u>
<u>Nyingchi</u>		<u>Tibet</u>	<u>29.57</u>	<u>N</u>	<u>94.47</u>	<u>E</u>	<u>9,846</u>	<u>5,624</u>	<u>1,610</u>	<u>19</u>	<u>73</u>	<u>57</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
Pagri		Tibet	<u>27.73</u>	<u>N</u>	<u>89.08</u>	<u>E</u>	<u>14,111</u>	<u>11,576</u>	<u>12</u>	<u>-5</u>	<u>55</u>	<u>45</u>
Qamdo		Tibet	<u>31.15</u>	<u>N</u>	<u>97.17</u>	<u>E</u>	<u>10,850</u>	<u>6,550</u>	<u>1,533</u>	<u>10</u>	<u>78</u>	<u>55</u>
Shiquanhe		Tibet	<u>32.50</u>	<u>N</u>	<u>80.08</u>	<u>E</u>	<u>14,039</u>	<u>12,092</u>	<u>517</u>	<u>-14</u>	<u>70</u>	<u>45</u>
Sog Xian		Tibet	<u>31.88</u>	<u>N</u>	<u>93.78</u>	<u>E</u>	<u>13,202</u>	<u>10,546</u>	<u>316</u>	<u>-6</u>	<u>67</u>	<u>49</u>
Tingri/Xegar		Tibet	<u>28.63</u>	<u>N</u>	<u>87.08</u>	<u>E</u>	<u>14,114</u>	<u>9,994</u>	<u>456</u>	<u>0</u>	<u>67</u>	<u>46</u>
Xainza		Tibet	<u>30.95</u>	<u>N</u>	<u>88.63</u>	<u>E</u>	<u>15,325</u>	<u>11,849</u>	<u>98</u>	<u>-5</u>	<u>62</u>	<u>42</u>
Xigaze		Tibet	<u>29.25</u>	<u>N</u>	<u>88.88</u>	<u>E</u>	<u>12,589</u>	<u>7,635</u>	<u>1,064</u>	<u>6</u>	<u>72</u>	<u>51</u>
Akqi		Xinjiang	<u>40.93</u>	<u>N</u>	<u>78.45</u>	<u>E</u>	<u>6,516</u>	<u>7,653</u>	<u>2,055</u>	<u>0</u>	<u>81</u>	<u>57</u>
Alar		Xinjiang	<u>40.50</u>	<u>N</u>	<u>81.05</u>	<u>E</u>	<u>3,323</u>	<u>5,921</u>	<u>3,882</u>	<u>3</u>	<u>92</u>	<u>67</u>
Altay		Xinjiang	<u>47.73</u>	<u>N</u>	<u>88.08</u>	<u>E</u>	<u>2,418</u>	<u>9,426</u>	<u>2,390</u>	<u>-21</u>	<u>85</u>	<u>63</u>
Andir		Xinjiang	<u>37.93</u>	<u>N</u>	<u>83.65</u>	<u>E</u>	<u>4,147</u>	<u>6,189</u>	<u>3,804</u>	<u>-1</u>	<u>96</u>	<u>62</u>
Bachu		Xinjiang	<u>39.80</u>	<u>N</u>	<u>78.57</u>	<u>E</u>	<u>3,665</u>	<u>5,431</u>	<u>4,284</u>	<u>7</u>	<u>94</u>	<u>65</u>
Balguntay		Xinjiang	<u>42.67</u>	<u>N</u>	<u>86.33</u>	<u>E</u>	<u>5,751</u>	<u>7,609</u>	<u>1,963</u>	<u>1</u>	<u>81</u>	<u>56</u>
Bayanbulak		Xinjiang	<u>43.03</u>	<u>N</u>	<u>84.15</u>	<u>E</u>	<u>8,068</u>	<u>15,010</u>	<u>204</u>	<u>-37</u>	<u>67</u>	<u>50</u>
Baytik Shan (Mtns)		Xinjiang	<u>45.37</u>	<u>N</u>	<u>90.53</u>	<u>E</u>	<u>5,417</u>	<u>10,272</u>	<u>1,357</u>	<u>-11</u>	<u>78</u>	<u>53</u>
Fuyun		Xinjiang	<u>46.98</u>	<u>N</u>	<u>89.52</u>	<u>E</u>	<u>2,713</u>	<u>10,149</u>	<u>2,386</u>	<u>-27</u>	<u>89</u>	<u>60</u>
Hami		Xinjiang	<u>42.82</u>	<u>N</u>	<u>93.52</u>	<u>E</u>	<u>2,425</u>	<u>6,518</u>	<u>3,926</u>	<u>-1</u>	<u>95</u>	<u>66</u>
Hoboksar		Xinjiang	<u>46.78</u>	<u>N</u>	<u>85.72</u>	<u>E</u>	<u>4,245</u>	<u>9,445</u>	<u>1,739</u>	<u>-9</u>	<u>81</u>	<u>57</u>
Hotan		Xinjiang	<u>37.13</u>	<u>N</u>	<u>79.93</u>	<u>E</u>	<u>4,511</u>	<u>5,069</u>	<u>4,215</u>	<u>12</u>	<u>92</u>	<u>65</u>
Jinghe		Xinjiang	<u>44.62</u>	<u>N</u>	<u>82.90</u>	<u>E</u>	<u>1,053</u>	<u>7,844</u>	<u>3,610</u>	<u>-15</u>	<u>94</u>	<u>69</u>
Kaba He		Xinjiang	<u>48.05</u>	<u>N</u>	<u>86.35</u>	<u>E</u>	<u>1,752</u>	<u>9,156</u>	<u>2,491</u>	<u>-20</u>	<u>87</u>	<u>65</u>
Karamay		Xinjiang	<u>45.60</u>	<u>N</u>	<u>84.85</u>	<u>E</u>	<u>1,404</u>	<u>7,867</u>	<u>4,225</u>	<u>-14</u>	<u>95</u>	<u>63</u>
Kashi		Xinjiang	<u>39.47</u>	<u>N</u>	<u>75.98</u>	<u>E</u>	<u>4,236</u>	<u>5,421</u>	<u>3,784</u>	<u>8</u>	<u>90</u>	<u>65</u>
Korla		Xinjiang	<u>41.75</u>	<u>N</u>	<u>86.13</u>	<u>E</u>	<u>3,061</u>	<u>5,680</u>	<u>4,212</u>	<u>7</u>	<u>93</u>	<u>66</u>
Kuqa		Xinjiang	<u>41.72</u>	<u>N</u>	<u>82.95</u>	<u>E</u>	<u>3,609</u>	<u>5,703</u>	<u>3,945</u>	<u>6</u>	<u>91</u>	<u>64</u>
Mangnai		Xinjiang	<u>38.25</u>	<u>N</u>	<u>90.85</u>	<u>E</u>	<u>9,662</u>	<u>10,445</u>	<u>727</u>	<u>-3</u>	<u>76</u>	<u>48</u>
Pishan		Xinjiang	<u>37.62</u>	<u>N</u>	<u>78.28</u>	<u>E</u>	<u>4,514</u>	<u>5,337</u>	<u>4,071</u>	<u>8</u>	<u>93</u>	<u>65</u>
Qijiaojing		Xinjiang	<u>43.48</u>	<u>N</u>	<u>91.63</u>	<u>E</u>	<u>2,867</u>	<u>7,117</u>	<u>3,691</u>	<u>-2</u>	<u>95</u>	<u>60</u>
Qitai		Xinjiang	<u>44.02</u>	<u>N</u>	<u>89.57</u>	<u>E</u>	<u>2,605</u>	<u>8,861</u>	<u>2,793</u>	<u>-20</u>	<u>90</u>	<u>63</u>
Ruoqiang		Xinjiang	<u>39.03</u>	<u>N</u>	<u>88.17</u>	<u>E</u>	<u>2,917</u>	<u>5,751</u>	<u>4,280</u>	<u>5</u>	<u>98</u>	<u>66</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
Shache		Xinjiang	38.43	N 77.27	E 4,042	5,408	3,871	9	91	66
Tacheng		Xinjiang	46.73	N 83.00	E 1,755	7,772	2,834	-11	90	64
Tikanlik		Xinjiang	40.63	N 87.70	E 2,779	6,093	4,132	1	96	67
Turpan		Xinjiang	42.93	N 89.20	E 121	5,256	6,038	7	104	70
Urumqi		Xinjiang	43.78	N 87.62	E 3,015	8,214	3,015	-7	89	61
Yining		Xinjiang	43.95	N 81.33	E 2,175	6,617	3,085	-8	89	66
Yiwu/Araturuk		Xinjiang	43.27	N 94.70	E 5,673	9,362	1,538	-7	78	56
Baoshan		Yunnan	25.13	N 99.22	E 5,430	2,150	4,324	34	81	66
Chuxiong		Yunnan	25.02	N 101.53	E 5,817	2,102	4,413	33	82	63
Dali		Yunnan	25.70	N 100.18	E 6,535	2,398	3,815	34	79	64
Deqen		Yunnan	28.50	N 98.90	E 11,444	7,883	668	18	66	53
Guangnan		Yunnan	24.07	N 105.07	E 4,104	1,837	5,381	33	85	67
Huili		Yunnan	26.65	N 102.25	E 5,866	2,471	4,074	30	82	64
Huize		Yunnan	26.42	N 103.28	E 6,923	3,522	3,015	25	78	62
Jiangcheng		Yunnan	22.62	N 101.82	E 3,678	757	6,438	42	85	68
Jinghong		Yunnan	22.02	N 100.80	E 1,814	92	9,106	49	93	72
Kunming/Wujiaba		Yunnan	25.02	N 102.68	E 6,207	2,461	3,766	33	79	63
Lancang/Menglangba		Yunnan	22.57	N 99.93	E 3,458	491	7,158	41	88	66
Lijiang		Yunnan	26.83	N 100.47	E 7,854	3,389	2,818	30	76	60
Lincang		Yunnan	23.95	N 100.22	E 4,931	1,131	5,588	39	83	64
Luxi		Yunnan	24.53	N 103.77	E 5,604	2,254	4,341	31	81	63
Mengding		Yunnan	23.57	N 99.08	E 1,680	168	8,782	46	93	72
Mengla		Yunnan	21.50	N 101.58	E 2,077	133	8,686	47	91	72
Mengzi		Yunnan	23.38	N 103.38	E 4,272	947	6,397	39	86	66
Ruili		Yunnan	24.02	N 97.83	E 2,546	478	7,544	43	88	70
Simao		Yunnan	22.77	N 100.98	E 4,275	796	6,251	42	85	64
Tengchong		Yunnan	25.12	N 98.48	E 5,410	2,161	4,008	34	78	64
Yuanjiang		Yunnan	23.60	N 101.98	E 1,306	166	9,856	48	98	75
Yuanmou		Yunnan	25.73	N 101.87	E 3,675	503	8,165	41	93	67
Zhanyi		Yunnan	25.58	N 103.83	E 6,234	2,526	3,855	30	80	61

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
Zhaotong		Yunnan	27.33	N 103.75	E 6,398	4,062	2,977	23	80	63
Dachen Island		Zhejiang	28.45	N 121.88	E 276	2,708	4,966	34	84	80
Dinghai		Zhejiang	30.03	N 122.12	E 121	2,799	5,158	31	88	80
Hangzhou/Jianqiao		Zhejiang	30.23	N 120.17	E 141	3,069	5,353	28	95	81
Kuocang Shan		Zhejiang	28.82	N 120.92	E 4,498	5,430	2,585	13	77	70
Lishui		Zhejiang	28.45	N 119.92	E 203	2,311	6,205	30	96	79
Qixian Shan		Zhejiang	27.95	N 117.83	E 4,623	4,321	3,155	19	77	70
Qu Xian		Zhejiang	28.97	N 118.87	E 233	2,724	5,740	30	95	80
Shengsi/Caiyuanzhen		Zhejiang	30.73	N 122.45	E 266	2,955	4,905	31	87	79
Shengxian		Zhejiang	29.60	N 120.82	E 354	2,999	5,431	27	94	80
Shipu		Zhejiang	29.20	N 121.95	E 417	2,785	5,166	31	88	80
Taishan		Zhejiang	27.00	N 120.70	E 348	2,271	5,424	38	85	79
Tianmu Shan (Mtns)		Zhejiang	30.35	N 119.42	E 4,902	6,115	2,225	11	75	69
Wenzhou		Zhejiang	28.02	N 120.67	E 23	2,104	5,981	34	91	81
Taiwan										
Tainan		-	22.95	N 120.20	E 52	150	9,729	51	94	84
Taipei			25.03	N 121.52	E 26	438	8,896	48	93	80
Alisan Shan			23.52	N 120.80	E 7,894	4,406	1,958	N.A.	N.A.	N.A.
Chiayi (TW-AFB)			23.50	N 120.42	E 92	318	8,926	48	91	81
Chiayyi			23.47	N 120.38	E 82	275	9,288	47	92	82
Chilung			25.13	N 121.75	E 10	472	8,554	50	91	79
Chinmen			24.43	N 118.43	E 39	974	7,420	N.A.	N.A.	N.A.
Dawu			22.35	N 120.90	E 30	24	10,355	N.A.	N.A.	N.A.
Hengchun			22.00	N 120.75	E 79	23	10,120	60	90	80
Hengchun/Wu Lu Tien			22.03	N 120.72	E 43	21	10,407	N.A.	N.A.	N.A.
Hsinchu/Singio			24.82	N 120.93	E 26	482	8,567	48	91	82
Hua Lien			23.97	N 121.62	E 62	220	8,872	N.A.	N.A.	N.A.
Hwalien			24.02	N 121.62	E 49	221	9,043	N.A.	N.A.	N.A.
Joyutang			23.88	N 120.85	E 3,330	583	7,136	N.A.	N.A.	N.A.
Kao Hsiung Intl. Arpt.			22.57	N 120.35	E 26	111	9,702	53	91	80

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
<u>Kao Hsiung</u>			<u>22.62</u> N	<u>120.27</u> E	<u>95</u>	<u>70</u>	<u>9,940</u>	<u>54</u>	<u>90</u>	<u>81</u>
<u>Kungkuan</u>			<u>24.27</u> N	<u>120.62</u> E	<u>666</u>	<u>541</u>	<u>8,306</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Kungshan</u>			<u>22.78</u> N	<u>120.25</u> E	<u>33</u>	<u>158</u>	<u>9,526</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Lan Yu</u>			<u>22.03</u> N	<u>121.55</u> E	<u>1,066</u>	<u>95</u>	<u>8,765</u>	<u>57</u>	<u>84</u>	<u>80</u>
<u>Makung</u>			<u>23.57</u> N	<u>119.62</u> E	<u>102</u>	<u>283</u>	<u>8,957</u>	<u>52</u>	<u>89</u>	<u>82</u>
<u>Matsu Island</u>			<u>26.17</u> N	<u>119.93</u> E	<u>302</u>	<u>1,948</u>	<u>5,898</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>North Pingtung</u>			<u>22.70</u> N	<u>120.47</u> E	<u>95</u>	<u>88</u>	<u>10,049</u>	<u>52</u>	<u>93</u>	<u>81</u>
<u>Peng Hu</u>			<u>23.52</u> N	<u>119.57</u> E	<u>69</u>	<u>287</u>	<u>9,068</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Penkaiyu</u>			<u>25.63</u> N	<u>122.07</u> E	<u>335</u>	<u>531</u>	<u>8,160</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Sing Jo</u>			<u>24.80</u> N	<u>120.97</u> E	<u>108</u>	<u>534</u>	<u>8,480</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Sinkung</u>			<u>23.10</u> N	<u>121.37</u> E	<u>121</u>	<u>88</u>	<u>9,601</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>South Pingtung</u>			<u>22.67</u> N	<u>120.45</u> E	<u>79</u>	<u>71</u>	<u>10,228</u>	<u>53</u>	<u>93</u>	<u>81</u>
<u>Taichung</u>			<u>24.15</u> N	<u>120.68</u> E	<u>256</u>	<u>312</u>	<u>8,991</u>	<u>49</u>	<u>91</u>	<u>79</u>
<u>Taichung/Shui Nan</u>			<u>24.18</u> N	<u>120.65</u> E	<u>364</u>	<u>381</u>	<u>8,915</u>	<u>46</u>	<u>93</u>	<u>82</u>
<u>Tainan (TW-AFB)</u>			<u>22.95</u> N	<u>120.20</u> E	<u>52</u>	<u>150</u>	<u>9,729</u>	<u>50</u>	<u>91</u>	<u>82</u>
<u>Tainan</u>			<u>23.00</u> N	<u>120.22</u> E	<u>46</u>	<u>178</u>	<u>9,577</u>	<u>51</u>	<u>91</u>	<u>81</u>
<u>Taipei</u>			<u>25.03</u> N	<u>121.52</u> E	<u>26</u>	<u>438</u>	<u>8,896</u>	<u>48</u>	<u>93</u>	<u>80</u>
<u>Taipei/Chiang Kai Shek</u>			<u>25.08</u> N	<u>121.23</u> E	<u>75</u>	<u>594</u>	<u>8,456</u>	<u>48</u>	<u>92</u>	<u>80</u>
<u>Taipei/Sungshan</u>			<u>25.07</u> N	<u>121.53</u> E	<u>20</u>	<u>506</u>	<u>8,454</u>	<u>48</u>	<u>93</u>	<u>81</u>
<u>Taitung</u>			<u>22.75</u> N	<u>121.15</u> E	<u>33</u>	<u>74</u>	<u>9,754</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Taitung/Fongyentsun</u>			<u>22.80</u> N	<u>121.18</u> E	<u>121</u>	<u>72</u>	<u>9,767</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Taoyuan (AB)</u>			<u>25.07</u> N	<u>121.23</u> E	<u>164</u>	<u>626</u>	<u>8,315</u>	<u>47</u>	<u>92</u>	<u>82</u>
<u>Tung Shih</u>			<u>23.27</u> N	<u>119.67</u> E	<u>148</u>	<u>191</u>	<u>9,217</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Wu-Chi</u>			<u>24.25</u> N	<u>120.52</u> E	<u>16</u>	<u>405</u>	<u>8,691</u>	<u>50</u>	<u>90</u>	<u>81</u>
<u>Yilan</u>			<u>24.77</u> N	<u>121.75</u> E	<u>23</u>	<u>411</u>	<u>8,416</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
Malaysia										
<u>Kuala Lumpur</u>			<u>3.13</u> N	<u>101.55</u> E	<u>56</u>	<u>0</u>	<u>11,530</u>	<u>71</u>	<u>93</u>	<u>78</u>
<u>Penang/Bayan Lepas</u>			<u>5.30</u> N	<u>100.27</u> E	<u>10</u>	<u>0</u>	<u>N</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>

TABLE D-3 International Climatic Data (I-P)

Country	City	Province or Region	Lat	Long	Elev. (ft)	HDD65	CDD50	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Kuala Lumpur</u>			<u>3.13</u>	<u>N</u>	<u>101.55</u>	<u>E</u>	<u>56</u>	<u>0</u>	<u>11,530</u>	<u>71</u>	<u>93</u>	<u>78</u>
<u>Penang/Bayan Lepas</u>			<u>5.30</u>	<u>N</u>	<u>100.27</u>	<u>E</u>	<u>10</u>	<u>0</u>	<u>11,472</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
Mexico												
<u>Mexico City</u>		<u>Distrito Federal</u>	<u>19.40</u>	<u>N</u>	<u>99.20</u>	<u>W</u>	<u>5,213</u>	<u>701</u>	<u>6,121</u>	<u>39</u>	<u>82</u>	<u>57</u>
<u>Guadalajara</u>		<u>Jalisco</u>	<u>20.67</u>	<u>N</u>	<u>103.38</u>	<u>W</u>	<u>30</u>	<u>10</u>	<u>11,122</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Monterrey</u>		<u>Nuevo Laredo</u>	<u>25.87</u>	<u>N</u>	<u>100.20</u>	<u>W</u>	<u>6,368</u>	<u>745</u>	<u>5,542</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Tampico</u>		<u>Tamaulipas</u>	<u>22.22</u>	<u>N</u>	<u>97.85</u>	<u>W</u>	<u>551</u>	<u>0</u>	<u>10,760</u>	<u>50</u>	<u>90</u>	<u>80</u>
<u>Veracruz</u>		<u>Veracruz</u>	<u>19.15</u>	<u>N</u>	<u>96.12</u>	<u>W</u>	<u>7,156</u>	<u>2,198</u>	<u>3,850</u>	<u>57</u>	<u>92</u>	<u>80</u>
<u>Merida</u>		<u>Yucatan</u>	<u>20.98</u>	<u>N</u>	<u>89.65</u>	<u>W</u>	<u>72</u>	<u>1,191</u>	<u>10,439</u>	<u>57</u>	<u>98</u>	<u>76</u>
<u>Mexico City</u>		<u>Distrito Federal</u>	<u>19.40</u>	<u>N</u>	<u>99.20</u>	<u>W</u>	<u>7,572</u>	<u>1,203</u>	<u>4,762</u>	<u>39</u>	<u>82</u>	<u>57</u>
<u>Guadalajara</u>		<u>Jalisco</u>	<u>20.67</u>	<u>N</u>	<u>103.38</u>	<u>W</u>	<u>5,213</u>	<u>701</u>	<u>6,121</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Monterrey</u>		<u>Nuevo Laredo</u>	<u>25.87</u>	<u>N</u>	<u>100.20</u>	<u>W</u>	<u>1,476</u>	<u>844</u>	<u>8,326</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Tampico</u>		<u>Tamaulipas</u>	<u>22.22</u>	<u>N</u>	<u>97.85</u>	<u>W</u>	<u>39</u>	<u>216</u>	<u>9,870</u>	<u>50</u>	<u>90</u>	<u>80</u>
<u>Veracruz</u>		<u>Veracruz</u>	<u>19.15</u>	<u>N</u>	<u>96.12</u>	<u>W</u>	<u>52</u>	<u>17</u>	<u>10,006</u>	<u>57</u>	<u>92</u>	<u>80</u>
<u>Merida</u>		<u>Yucatan</u>	<u>20.98</u>	<u>N</u>	<u>89.65</u>	<u>W</u>	<u>30</u>	<u>10</u>	<u>11,122</u>	<u>57</u>	<u>98</u>	<u>76</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
China												
	Shanghai/Hongqiao		31.17	N	121.43	E	5	1,768	2,847	-3	33	27
	Beijing/Peking	Municipalities	39.93	N	116.28	E	55	2,918	2,286	-11	33	22
	Cangzhou	Municipalities	38.33	N	116.83	E	11	2,716	2,502	-10	33	23
	Hong Kong Intl Arpt	Special Admin. Region	22.33	N	114.18	E	24	302	4,386	9	33	26
	Shanghai	Municipalities	31.40	N	121.47	E	4	1,768	2,847	-2	33	27
	Shanghai/Hongqiao	Municipalities	31.17	N	121.43	E	7	1,769	2,848	-3	33	28
	Tianjin/Tientsin	Municipalities	39.10	N	117.17	E	5	2,749	2,472	-10	33	23
	Anqing	Anhui	30.53	N	117.05	E	20	1,718	3,042	-2	34	27
	Bengbu	Anhui	32.95	N	117.37	E	22	2,025	2,807	-5	34	26
	Fuyang	Anhui	32.93	N	115.83	E	39	2,022	2,780	-5	34	26
	Hefei/Luogang	Anhui	31.87	N	117.23	E	36	1,926	2,839	-4	34	27
	Huang Shan (Mtns)	Anhui	30.13	N	118.15	E	1,836	3,735	915	-13	21	18
	Huoshan	Anhui	31.40	N	116.33	E	68	1,953	2,726	-5	34	27
	Changting	Fujian	25.85	N	116.37	E	311	1,057	3,494	-1	33	25
	Fuding	Fujian	27.33	N	120.20	E	38	1,038	3,487	1	33	27
	Fuzhou	Fujian	26.08	N	119.28	E	85	775	3,915	4	34	27
	Jiuxian Shan	Fujian	25.72	N	118.10	E	1,651	2,180	1,535	-5	23	20
	Longyan	Fujian	25.10	N	117.02	E	341	622	4,027	3	34	24
	Nanping	Fujian	26.65	N	118.17	E	128	861	3,881	1	35	26
	Pingtan	Fujian	25.52	N	119.78	E	31	821	3,639	6	31	26
	Pucheng	Fujian	27.92	N	118.53	E	275	1,292	3,300	-2	34	25
	Shaowu	Fujian	27.33	N	117.43	E	192	1,153	3,462	-1	34	26
	Xiamen	Fujian	24.48	N	118.08	E	139	563	4,070	6	33	26
	Yong'An	Fujian	25.97	N	117.35	E	204	872	3,843	1	35	25
	Dunhuang	Gansu	40.15	N	94.68	E	1,140	3,629	1,818	-17	34	18
	Hezuo	Gansu	35.00	N	102.90	E	2,910	5,422	273	-20	21	12
	Huajialing	Gansu	35.38	N	105.00	E	2,450	5,153	484	-16	21	13

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
	<u>Jiuquan/Suzhou</u>	<u>Gansu</u>	<u>39.77</u>	<u>N</u>	<u>98.48</u>	<u>E</u>	<u>1,478</u>	<u>4,065</u>	<u>1,374</u>	<u>-19</u>	<u>30</u>	<u>17</u>
	<u>Lanzhou</u>	<u>Gansu</u>	<u>36.05</u>	<u>N</u>	<u>103.88</u>	<u>E</u>	<u>1,518</u>	<u>3,250</u>	<u>1,641</u>	<u>-12</u>	<u>31</u>	<u>17</u>
	<u>Mazong Shan (Mount)</u>	<u>Gansu</u>	<u>41.80</u>	<u>N</u>	<u>97.03</u>	<u>E</u>	<u>1,770</u>	<u>5,104</u>	<u>971</u>	<u>-23</u>	<u>29</u>	<u>13</u>
	<u>Minqin</u>	<u>Gansu</u>	<u>38.63</u>	<u>N</u>	<u>103.08</u>	<u>E</u>	<u>1,367</u>	<u>3,914</u>	<u>1,572</u>	<u>-18</u>	<u>32</u>	<u>16</u>
	<u>Pingliang</u>	<u>Gansu</u>	<u>35.55</u>	<u>N</u>	<u>106.67</u>	<u>E</u>	<u>1,348</u>	<u>3,471</u>	<u>1,337</u>	<u>-13</u>	<u>29</u>	<u>18</u>
	<u>Ruo'ergai</u>	<u>Gansu</u>	<u>33.58</u>	<u>N</u>	<u>102.97</u>	<u>E</u>	<u>3,441</u>	<u>6,014</u>	<u>129</u>	<u>-22</u>	<u>18</u>	<u>11</u>
	<u>Tianshui</u>	<u>Gansu</u>	<u>34.58</u>	<u>N</u>	<u>105.75</u>	<u>E</u>	<u>1,143</u>	<u>2,885</u>	<u>1,707</u>	<u>-9</u>	<u>30</u>	<u>19</u>
	<u>Wudu</u>	<u>Gansu</u>	<u>33.40</u>	<u>N</u>	<u>104.92</u>	<u>E</u>	<u>1,079</u>	<u>1,899</u>	<u>2,361</u>	<u>-2</u>	<u>32</u>	<u>20</u>
	<u>Wushaoling (Pass)</u>	<u>Gansu</u>	<u>37.20</u>	<u>N</u>	<u>102.87</u>	<u>E</u>	<u>3,044</u>	<u>6,499</u>	<u>146</u>	<u>-20</u>	<u>18</u>	<u>10</u>
	<u>Xifengzhen</u>	<u>Gansu</u>	<u>35.73</u>	<u>N</u>	<u>107.63</u>	<u>E</u>	<u>1,423</u>	<u>3,595</u>	<u>1,327</u>	<u>-12</u>	<u>28</u>	<u>17</u>
	<u>Yumenzhen</u>	<u>Gansu</u>	<u>40.27</u>	<u>N</u>	<u>97.03</u>	<u>E</u>	<u>1,527</u>	<u>4,230</u>	<u>1,315</u>	<u>-19</u>	<u>30</u>	<u>15</u>
	<u>Zhangye</u>	<u>Gansu</u>	<u>38.93</u>	<u>N</u>	<u>100.43</u>	<u>E</u>	<u>1,483</u>	<u>4,049</u>	<u>1,355</u>	<u>-19</u>	<u>31</u>	<u>17</u>
	<u>Fogang</u>	<u>Guangdong</u>	<u>23.87</u>	<u>N</u>	<u>113.53</u>	<u>E</u>	<u>68</u>	<u>590</u>	<u>4,283</u>	<u>4</u>	<u>34</u>	<u>26</u>
	<u>Gaoyao</u>	<u>Guangdong</u>	<u>23.05</u>	<u>N</u>	<u>112.47</u>	<u>E</u>	<u>12</u>	<u>400</u>	<u>4,718</u>	<u>6</u>	<u>34</u>	<u>27</u>
	<u>Guangzhou/Baiyun</u>	<u>Guangdong</u>	<u>23.13</u>	<u>N</u>	<u>113.32</u>	<u>E</u>	<u>8</u>	<u>409</u>	<u>4,640</u>	<u>6</u>	<u>34</u>	<u>26</u>
	<u>Heyuan</u>	<u>Guangdong</u>	<u>23.73</u>	<u>N</u>	<u>114.68</u>	<u>E</u>	<u>41</u>	<u>501</u>	<u>4,488</u>	<u>4</u>	<u>34</u>	<u>26</u>
	<u>Lian Xian</u>	<u>Guangdong</u>	<u>24.78</u>	<u>N</u>	<u>112.38</u>	<u>E</u>	<u>98</u>	<u>922</u>	<u>3,899</u>	<u>2</u>	<u>35</u>	<u>26</u>
	<u>Lianping</u>	<u>Guangdong</u>	<u>24.37</u>	<u>N</u>	<u>114.48</u>	<u>E</u>	<u>214</u>	<u>723</u>	<u>3,994</u>	<u>2</u>	<u>34</u>	<u>25</u>
	<u>Meixian</u>	<u>Guangdong</u>	<u>24.30</u>	<u>N</u>	<u>116.12</u>	<u>E</u>	<u>84</u>	<u>520</u>	<u>4,454</u>	<u>4</u>	<u>34</u>	<u>26</u>
	<u>Shangchuan Island</u>	<u>Guangdong</u>	<u>21.73</u>	<u>N</u>	<u>112.77</u>	<u>E</u>	<u>18</u>	<u>285</u>	<u>4,789</u>	<u>8</u>	<u>32</u>	<u>27</u>
	<u>Shantou</u>	<u>Guangdong</u>	<u>23.40</u>	<u>N</u>	<u>116.68</u>	<u>E</u>	<u>3</u>	<u>433</u>	<u>4,302</u>	<u>7</u>	<u>32</u>	<u>27</u>
	<u>Shanwei</u>	<u>Guangdong</u>	<u>22.78</u>	<u>N</u>	<u>115.37</u>	<u>E</u>	<u>5</u>	<u>293</u>	<u>4,595</u>	<u>8</u>	<u>32</u>	<u>26</u>
	<u>Shaoguan</u>	<u>Guangdong</u>	<u>24.80</u>	<u>N</u>	<u>113.58</u>	<u>E</u>	<u>68</u>	<u>761</u>	<u>4,203</u>	<u>3</u>	<u>35</u>	<u>26</u>
	<u>Shenzhen</u>	<u>Guangdong</u>	<u>22.55</u>	<u>N</u>	<u>114.10</u>	<u>E</u>	<u>18</u>	<u>295</u>	<u>4,776</u>	<u>7</u>	<u>33</u>	<u>26</u>
	<u>Xinyi</u>	<u>Guangdong</u>	<u>22.35</u>	<u>N</u>	<u>110.93</u>	<u>E</u>	<u>84</u>	<u>316</u>	<u>4,868</u>	<u>6</u>	<u>34</u>	<u>26</u>
	<u>Yangjiang</u>	<u>Guangdong</u>	<u>21.87</u>	<u>N</u>	<u>111.97</u>	<u>E</u>	<u>22</u>	<u>304</u>	<u>4,705</u>	<u>7</u>	<u>32</u>	<u>26</u>
	<u>Zhangjiang</u>	<u>Guangdong</u>	<u>21.22</u>	<u>N</u>	<u>110.40</u>	<u>E</u>	<u>28</u>	<u>235</u>	<u>5,001</u>	<u>8</u>	<u>33</u>	<u>27</u>
	<u>Beihai</u>	<u>Guangxi</u>	<u>21.48</u>	<u>N</u>	<u>109.10</u>	<u>E</u>	<u>16</u>	<u>345</u>	<u>4,903</u>	<u>6</u>	<u>33</u>	<u>27</u>
	<u>Bose</u>	<u>Guangxi</u>	<u>23.90</u>	<u>N</u>	<u>106.60</u>	<u>E</u>	<u>242</u>	<u>398</u>	<u>4,716</u>	<u>6</u>	<u>35</u>	<u>26</u>
	<u>Guilin</u>	<u>Guangxi</u>	<u>25.33</u>	<u>N</u>	<u>110.30</u>	<u>E</u>	<u>166</u>	<u>1,095</u>	<u>3,638</u>	<u>1</u>	<u>34</u>	<u>26</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Guiping</u>		<u>Guangxi</u>	<u>23.40</u>	<u>N</u>	<u>110.08</u>	<u>E</u>	<u>44</u>	<u>531</u>	<u>4,491</u>	<u>5</u>	<u>34</u>	<u>27</u>
<u>Hechi/Inchengjiang</u>		<u>Guangxi</u>	<u>24.70</u>	<u>N</u>	<u>108.05</u>	<u>E</u>	<u>214</u>	<u>683</u>	<u>4,161</u>	<u>4</u>	<u>34</u>	<u>26</u>
<u>Lingling</u>		<u>Guangxi</u>	<u>26.23</u>	<u>N</u>	<u>111.62</u>	<u>E</u>	<u>174</u>	<u>1,449</u>	<u>3,330</u>	<u>0</u>	<u>34</u>	<u>26</u>
<u>Liuzhou</u>		<u>Guangxi</u>	<u>24.35</u>	<u>N</u>	<u>109.40</u>	<u>E</u>	<u>97</u>	<u>761</u>	<u>4,225</u>	<u>3</u>	<u>34</u>	<u>26</u>
<u>Longzhou</u>		<u>Guangxi</u>	<u>22.37</u>	<u>N</u>	<u>106.75</u>	<u>E</u>	<u>129</u>	<u>378</u>	<u>4,776</u>	<u>6</u>	<u>35</u>	<u>27</u>
<u>Mengshan</u>		<u>Guangxi</u>	<u>24.20</u>	<u>N</u>	<u>110.52</u>	<u>E</u>	<u>145</u>	<u>825</u>	<u>3,958</u>	<u>2</u>	<u>33</u>	<u>26</u>
<u>Nanning/Wuxu</u>		<u>Guangxi</u>	<u>22.82</u>	<u>N</u>	<u>108.35</u>	<u>E</u>	<u>73</u>	<u>476</u>	<u>4,619</u>	<u>5</u>	<u>34</u>	<u>26</u>
<u>Napo</u>		<u>Guangxi</u>	<u>23.30</u>	<u>N</u>	<u>105.95</u>	<u>E</u>	<u>794</u>	<u>713</u>	<u>3,594</u>	<u>3</u>	<u>31</u>	<u>23</u>
<u>Qinzhou</u>		<u>Guangxi</u>	<u>21.95</u>	<u>N</u>	<u>108.62</u>	<u>E</u>	<u>6</u>	<u>427</u>	<u>4,675</u>	<u>6</u>	<u>33</u>	<u>27</u>
<u>Wuzhou</u>		<u>Guangxi</u>	<u>23.48</u>	<u>N</u>	<u>111.30</u>	<u>E</u>	<u>120</u>	<u>597</u>	<u>4,408</u>	<u>4</u>	<u>34</u>	<u>26</u>
<u>Bijie</u>		<u>Guizhou</u>	<u>27.30</u>	<u>N</u>	<u>105.23</u>	<u>E</u>	<u>1,511</u>	<u>2,132</u>	<u>1,942</u>	<u>-3</u>	<u>28</u>	<u>20</u>
<u>Dushan</u>		<u>Guizhou</u>	<u>25.83</u>	<u>N</u>	<u>107.55</u>	<u>E</u>	<u>1,018</u>	<u>1,679</u>	<u>2,516</u>	<u>-3</u>	<u>28</u>	<u>22</u>
<u>Guiyang</u>		<u>Guizhou</u>	<u>26.58</u>	<u>N</u>	<u>106.72</u>	<u>E</u>	<u>1,074</u>	<u>1,599</u>	<u>2,605</u>	<u>-2</u>	<u>29</u>	<u>21</u>
<u>Luodian</u>		<u>Guizhou</u>	<u>25.43</u>	<u>N</u>	<u>106.77</u>	<u>E</u>	<u>441</u>	<u>751</u>	<u>3,926</u>	<u>3</u>	<u>34</u>	<u>25</u>
<u>Rongjiang/Guzhou</u>		<u>Guizhou</u>	<u>25.97</u>	<u>N</u>	<u>108.53</u>	<u>E</u>	<u>287</u>	<u>1,093</u>	<u>3,534</u>	<u>1</u>	<u>34</u>	<u>25</u>
<u>Sansui</u>		<u>Guizhou</u>	<u>26.97</u>	<u>N</u>	<u>108.67</u>	<u>E</u>	<u>611</u>	<u>1,846</u>	<u>2,588</u>	<u>-2</u>	<u>31</u>	<u>24</u>
<u>Sinan</u>		<u>Guizhou</u>	<u>27.95</u>	<u>N</u>	<u>108.25</u>	<u>E</u>	<u>418</u>	<u>1,385</u>	<u>3,177</u>	<u>1</u>	<u>34</u>	<u>24</u>
<u>Weining</u>		<u>Guizhou</u>	<u>26.87</u>	<u>N</u>	<u>104.28</u>	<u>E</u>	<u>2,236</u>	<u>2,573</u>	<u>1,301</u>	<u>-6</u>	<u>24</u>	<u>16</u>
<u>Xingren</u>		<u>Guizhou</u>	<u>25.43</u>	<u>N</u>	<u>105.18</u>	<u>E</u>	<u>1,379</u>	<u>1,441</u>	<u>2,515</u>	<u>-1</u>	<u>28</u>	<u>20</u>
<u>Zunyi</u>		<u>Guizhou</u>	<u>27.70</u>	<u>N</u>	<u>106.88</u>	<u>E</u>	<u>845</u>	<u>1,717</u>	<u>2,596</u>	<u>-1</u>	<u>31</u>	<u>23</u>
<u>Danxian/Nada</u>		<u>Hainan</u>	<u>19.52</u>	<u>N</u>	<u>109.58</u>	<u>E</u>	<u>169</u>	<u>136</u>	<u>5,337</u>	<u>9</u>	<u>34</u>	<u>26</u>
<u>Dongfang/Basuo</u>		<u>Hainan</u>	<u>19.10</u>	<u>N</u>	<u>108.62</u>	<u>E</u>	<u>8</u>	<u>59</u>	<u>5,649</u>	<u>12</u>	<u>33</u>	<u>27</u>
<u>Haikou</u>		<u>Hainan</u>	<u>20.03</u>	<u>N</u>	<u>110.35</u>	<u>E</u>	<u>15</u>	<u>117</u>	<u>5,366</u>	<u>11</u>	<u>34</u>	<u>27</u>
<u>Qionghai/Jiaji</u>		<u>Hainan</u>	<u>19.23</u>	<u>N</u>	<u>110.47</u>	<u>E</u>	<u>25</u>	<u>74</u>	<u>5,490</u>	<u>11</u>	<u>34</u>	<u>27</u>
<u>Sanhu Island</u>		<u>Hainan</u>	<u>16.53</u>	<u>N</u>	<u>111.62</u>	<u>E</u>	<u>5</u>	<u>0</u>	<u>6,268</u>	<u>20</u>	<u>32</u>	<u>28</u>
<u>Xisha Island</u>		<u>Hainan</u>	<u>16.83</u>	<u>N</u>	<u>112.33</u>	<u>E</u>	<u>5</u>	<u>0</u>	<u>6,234</u>	<u>20</u>	<u>32</u>	<u>28</u>
<u>Yaxian/Sanya</u>		<u>Hainan</u>	<u>18.23</u>	<u>N</u>	<u>109.52</u>	<u>E</u>	<u>7</u>	<u>4</u>	<u>5,964</u>	<u>16</u>	<u>32</u>	<u>27</u>
<u>Baoding</u>		<u>Hebei</u>	<u>38.85</u>	<u>N</u>	<u>115.57</u>	<u>E</u>	<u>19</u>	<u>2,750</u>	<u>2,450</u>	<u>-10</u>	<u>34</u>	<u>23</u>
<u>Chengde</u>		<u>Hebei</u>	<u>40.97</u>	<u>N</u>	<u>117.93</u>	<u>E</u>	<u>374</u>	<u>3,766</u>	<u>1,864</u>	<u>-18</u>	<u>32</u>	<u>21</u>
<u>Fengning/Dagezhen</u>		<u>Hebei</u>	<u>41.22</u>	<u>N</u>	<u>116.63</u>	<u>E</u>	<u>661</u>	<u>4,384</u>	<u>1,430</u>	<u>-20</u>	<u>30</u>	<u>19</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
Huailai/Shacheng		Hebei	40.40	N 115.50	E 538	3.605	1.891	-15	32	20
Leting		Hebei	39.43	N 118.90	E 12	3.288	1.979	-14	31	24
Qinglong		Hebei	40.40	N 118.95	E 228	3.673	1.812	-18	31	22
Shijiazhuang		Hebei	38.03	N 114.42	E 81	2.608	2.483	-9	34	23
Tangshan		Hebei	39.67	N 118.15	E 29	3.153	2.149	-13	32	23
Weichang/Zhuizishan		Hebei	41.93	N 117.75	E 844	4.778	1.223	-21	29	18
Xingtai		Hebei	37.07	N 114.50	E 78	2.503	2.570	-8	34	23
Yu Xian		Hebei	39.83	N 114.57	E 910	4.416	1.414	-23	30	18
Zhangjiakou		Hebei	40.78	N 114.88	E 726	3.790	1.779	-17	31	19
Aihui		Heilongjiang	50.25	N 127.45	E 166	6.578	1.022	-33	28	20
Anda		Heilongjiang	46.38	N 125.32	E 150	5.592	1.379	-29	30	20
Baoqing		Heilongjiang	46.32	N 132.18	E 83	5.406	1.322	-27	29	21
Fujin		Heilongjiang	47.23	N 131.98	E 65	5.703	1.309	-28	29	21
Hailun		Heilongjiang	47.43	N 126.97	E 240	6.121	1.187	-31	29	20
Harbin		Heilongjiang	45.75	N 126.77	E 143	5.461	1.379	-29	30	21
Hulin		Heilongjiang	45.77	N 132.97	E 103	5.543	1.238	-27	28	21
Huma		Heilongjiang	51.72	N 126.65	E 179	7.032	978	-38	29	20
Jixi		Heilongjiang	45.28	N 130.95	E 234	5.288	1.288	-26	29	21
Keshan		Heilongjiang	48.05	N 125.88	E 237	6.171	1.180	-32	29	20
Mudanjiang		Heilongjiang	44.57	N 129.60	E 242	5.258	1.361	-27	30	21
Qiqihar		Heilongjiang	47.38	N 123.92	E 148	5.513	1.397	-28	30	20
Shangzhi		Heilongjiang	45.22	N 127.97	E 191	5.744	1.216	-32	29	21
Suifenhe		Heilongjiang	44.38	N 131.15	E 498	5.677	952	-27	27	20
Sunwu		Heilongjiang	49.43	N 127.35	E 235	6.852	880	-36	28	20
Tailai		Heilongjiang	46.40	N 123.42	E 150	5.239	1.480	-26	31	20
Tonghe		Heilongjiang	45.97	N 128.73	E 110	5.899	1.228	-31	29	22
Yichun		Heilongjiang	47.72	N 128.90	E 232	6.244	1.091	-33	28	20
Anyang/Zhangde		Henan	36.12	N 114.37	E 76	2.399	2.582	-8	34	24
Boxian		Henan	33.88	N 115.77	E 42	2.226	2.642	-7	34	25
Gushi		Henan	32.17	N 115.67	E 58	1.982	2.758	-4	34	27

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Lushi</u>		<u>Henan</u>	<u>34.05</u>	<u>N</u>	<u>111.03</u>	<u>E</u>	<u>570</u>	<u>2,540</u>	<u>2,147</u>	<u>-8</u>	<u>32</u>	<u>23</u>
<u>Nanyang</u>		<u>Henan</u>	<u>33.03</u>	<u>N</u>	<u>112.58</u>	<u>E</u>	<u>131</u>	<u>2,099</u>	<u>2,639</u>	<u>-5</u>	<u>33</u>	<u>25</u>
<u>Xihua</u>		<u>Henan</u>	<u>33.78</u>	<u>N</u>	<u>114.52</u>	<u>E</u>	<u>53</u>	<u>2,240</u>	<u>2,569</u>	<u>-6</u>	<u>34</u>	<u>26</u>
<u>Xinyang</u>		<u>Henan</u>	<u>32.13</u>	<u>N</u>	<u>114.05</u>	<u>E</u>	<u>115</u>	<u>1,987</u>	<u>2,734</u>	<u>-5</u>	<u>33</u>	<u>26</u>
<u>Zhengzhou</u>		<u>Henan</u>	<u>34.72</u>	<u>N</u>	<u>113.65</u>	<u>E</u>	<u>111</u>	<u>2,303</u>	<u>2,563</u>	<u>-7</u>	<u>34</u>	<u>24</u>
<u>Zhumadian</u>		<u>Henan</u>	<u>33.00</u>	<u>N</u>	<u>114.02</u>	<u>E</u>	<u>83</u>	<u>2,159</u>	<u>2,621</u>	<u>-6</u>	<u>34</u>	<u>25</u>
<u>Fangxian</u>		<u>Hubei</u>	<u>32.03</u>	<u>N</u>	<u>110.77</u>	<u>E</u>	<u>435</u>	<u>2,049</u>	<u>2,491</u>	<u>-5</u>	<u>33</u>	<u>24</u>
<u>Guanghua</u>		<u>Hubei</u>	<u>32.38</u>	<u>N</u>	<u>111.67</u>	<u>E</u>	<u>91</u>	<u>1,914</u>	<u>2,771</u>	<u>-3</u>	<u>34</u>	<u>26</u>
<u>Jiangling/Jingzhou</u>		<u>Hubei</u>	<u>30.33</u>	<u>N</u>	<u>112.18</u>	<u>E</u>	<u>33</u>	<u>1,702</u>	<u>2,959</u>	<u>-2</u>	<u>34</u>	<u>27</u>
<u>Macheng</u>		<u>Hubei</u>	<u>31.18</u>	<u>N</u>	<u>114.97</u>	<u>E</u>	<u>59</u>	<u>1,759</u>	<u>2,979</u>	<u>-3</u>	<u>35</u>	<u>27</u>
<u>Wuhan/Nanhu</u>		<u>Hubei</u>	<u>30.62</u>	<u>N</u>	<u>114.13</u>	<u>E</u>	<u>23</u>	<u>1,744</u>	<u>3,018</u>	<u>-2</u>	<u>34</u>	<u>27</u>
<u>Yichang</u>		<u>Hubei</u>	<u>30.70</u>	<u>N</u>	<u>111.30</u>	<u>E</u>	<u>134</u>	<u>1,562</u>	<u>3,042</u>	<u>-1</u>	<u>34</u>	<u>26</u>
<u>Zaoyang</u>		<u>Hubei</u>	<u>32.15</u>	<u>N</u>	<u>112.67</u>	<u>E</u>	<u>127</u>	<u>1,924</u>	<u>2,797</u>	<u>-4</u>	<u>34</u>	<u>26</u>
<u>Zhongxiang</u>		<u>Hubei</u>	<u>31.17</u>	<u>N</u>	<u>112.57</u>	<u>E</u>	<u>66</u>	<u>1,773</u>	<u>2,911</u>	<u>-2</u>	<u>33</u>	<u>27</u>
<u>Changde</u>		<u>Hunan</u>	<u>29.05</u>	<u>N</u>	<u>111.68</u>	<u>E</u>	<u>35</u>	<u>1,609</u>	<u>3,067</u>	<u>-1</u>	<u>35</u>	<u>27</u>
<u>Chenzhou</u>		<u>Hunan</u>	<u>25.80</u>	<u>N</u>	<u>113.03</u>	<u>E</u>	<u>185</u>	<u>1,387</u>	<u>3,475</u>	<u>-1</u>	<u>35</u>	<u>25</u>
<u>Nanyue</u>		<u>Hunan</u>	<u>27.30</u>	<u>N</u>	<u>112.70</u>	<u>E</u>	<u>1,279</u>	<u>2,703</u>	<u>1,717</u>	<u>-8</u>	<u>25</u>	<u>22</u>
<u>Sangzhi</u>		<u>Hunan</u>	<u>29.40</u>	<u>N</u>	<u>110.17</u>	<u>E</u>	<u>322</u>	<u>1,609</u>	<u>2,905</u>	<u>-1</u>	<u>34</u>	<u>25</u>
<u>Shaoyang</u>		<u>Hunan</u>	<u>27.23</u>	<u>N</u>	<u>111.47</u>	<u>E</u>	<u>248</u>	<u>1,552</u>	<u>3,140</u>	<u>-1</u>	<u>34</u>	<u>25</u>
<u>Tongdao/Shuangjiang</u>		<u>Hunan</u>	<u>26.17</u>	<u>N</u>	<u>109.78</u>	<u>E</u>	<u>397</u>	<u>1,503</u>	<u>3,022</u>	<u>-1</u>	<u>32</u>	<u>25</u>
<u>Wugang</u>		<u>Hunan</u>	<u>26.73</u>	<u>N</u>	<u>110.63</u>	<u>E</u>	<u>340</u>	<u>1,585</u>	<u>3,013</u>	<u>-1</u>	<u>33</u>	<u>25</u>
<u>Yuanling</u>		<u>Hunan</u>	<u>28.47</u>	<u>N</u>	<u>110.40</u>	<u>E</u>	<u>143</u>	<u>1,565</u>	<u>3,023</u>	<u>-1</u>	<u>34</u>	<u>26</u>
<u>Yueyang</u>		<u>Hunan</u>	<u>29.38</u>	<u>N</u>	<u>113.08</u>	<u>E</u>	<u>52</u>	<u>1,594</u>	<u>3,156</u>	<u>-1</u>	<u>34</u>	<u>27</u>
<u>Zhijiang</u>		<u>Hunan</u>	<u>27.45</u>	<u>N</u>	<u>109.68</u>	<u>E</u>	<u>273</u>	<u>1,587</u>	<u>2,992</u>	<u>-1</u>	<u>33</u>	<u>26</u>
<u>Abag Qi/Xin Hot</u>		<u>Inner Mongolia</u>	<u>44.02</u>	<u>N</u>	<u>114.95</u>	<u>E</u>	<u>1,128</u>	<u>6,252</u>	<u>1,029</u>	<u>-32</u>	<u>29</u>	<u>16</u>
<u>Arxan</u>		<u>Inner Mongolia</u>	<u>47.17</u>	<u>N</u>	<u>119.95</u>	<u>E</u>	<u>1,028</u>	<u>7,668</u>	<u>536</u>	<u>-37</u>	<u>25</u>	<u>16</u>
<u>Bailing-Miao</u>		<u>Inner Mongolia</u>	<u>41.70</u>	<u>N</u>	<u>110.43</u>	<u>E</u>	<u>1,377</u>	<u>5,222</u>	<u>1,114</u>	<u>-26</u>	<u>29</u>	<u>15</u>
<u>Bayan Mod</u>		<u>Inner Mongolia</u>	<u>40.75</u>	<u>N</u>	<u>104.50</u>	<u>E</u>	<u>1,329</u>	<u>4,312</u>	<u>1,617</u>	<u>-21</u>	<u>32</u>	<u>15</u>
<u>Bugt</u>		<u>Inner Mongolia</u>	<u>48.77</u>	<u>N</u>	<u>121.92</u>	<u>E</u>	<u>739</u>	<u>6,801</u>	<u>659</u>	<u>-30</u>	<u>26</u>	<u>17</u>
<u>Bugt</u>		<u>Inner Mongolia</u>	<u>42.33</u>	<u>N</u>	<u>120.70</u>	<u>E</u>	<u>401</u>	<u>4,363</u>	<u>1,586</u>	<u>-20</u>	<u>31</u>	<u>20</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
	<u>Chifeng/Ulanhad</u>	<u>Inner Mongolia</u>	<u>42.27</u>	<u>N</u>	<u>118.97</u>	<u>E</u>	<u>572</u>	<u>4.206</u>	<u>1.675</u>	<u>-20</u>	<u>31</u>	<u>19</u>
	<u>Dongsheng</u>	<u>Inner Mongolia</u>	<u>39.83</u>	<u>N</u>	<u>109.98</u>	<u>E</u>	<u>1,459</u>	<u>4.527</u>	<u>1,223</u>	<u>-20</u>	<u>28</u>	<u>15</u>
	<u>Duolun/Dolonnur</u>	<u>Inner Mongolia</u>	<u>42.18</u>	<u>N</u>	<u>116.47</u>	<u>E</u>	<u>1,247</u>	<u>5.779</u>	<u>859</u>	<u>-28</u>	<u>27</u>	<u>16</u>
	<u>Ejin Qi</u>	<u>Inner Mongolia</u>	<u>41.95</u>	<u>N</u>	<u>101.07</u>	<u>E</u>	<u>941</u>	<u>4.063</u>	<u>1,995</u>	<u>-21</u>	<u>35</u>	<u>16</u>
	<u>Erenhot</u>	<u>Inner Mongolia</u>	<u>43.65</u>	<u>N</u>	<u>112.00</u>	<u>E</u>	<u>966</u>	<u>5.483</u>	<u>1,356</u>	<u>-29</u>	<u>32</u>	<u>16</u>
	<u>Guaizihu</u>	<u>Inner Mongolia</u>	<u>41.37</u>	<u>N</u>	<u>102.37</u>	<u>E</u>	<u>960</u>	<u>3.994</u>	<u>2,094</u>	<u>-20</u>	<u>36</u>	<u>16</u>
	<u>Hailar</u>	<u>Inner Mongolia</u>	<u>49.22</u>	<u>N</u>	<u>119.75</u>	<u>E</u>	<u>611</u>	<u>7.072</u>	<u>891</u>	<u>-35</u>	<u>28</u>	<u>18</u>
	<u>Hails</u>	<u>Inner Mongolia</u>	<u>41.45</u>	<u>N</u>	<u>106.38</u>	<u>E</u>	<u>1,510</u>	<u>4.946</u>	<u>1,287</u>	<u>-24</u>	<u>30</u>	<u>14</u>
	<u>Haliut</u>	<u>Inner Mongolia</u>	<u>41.57</u>	<u>N</u>	<u>108.52</u>	<u>E</u>	<u>1,290</u>	<u>4.959</u>	<u>1,280</u>	<u>-23</u>	<u>30</u>	<u>16</u>
	<u>Hohhot</u>	<u>Inner Mongolia</u>	<u>40.82</u>	<u>N</u>	<u>111.68</u>	<u>E</u>	<u>1,065</u>	<u>4.457</u>	<u>1,394</u>	<u>-20</u>	<u>30</u>	<u>17</u>
	<u>Huade</u>	<u>Inner Mongolia</u>	<u>41.90</u>	<u>N</u>	<u>114.00</u>	<u>E</u>	<u>1,484</u>	<u>5.627</u>	<u>889</u>	<u>-25</u>	<u>27</u>	<u>15</u>
	<u>Jartai</u>	<u>Inner Mongolia</u>	<u>39.78</u>	<u>N</u>	<u>105.75</u>	<u>E</u>	<u>1,033</u>	<u>3.867</u>	<u>1,920</u>	<u>-19</u>	<u>34</u>	<u>17</u>
	<u>Jarud Qi/Lubei</u>	<u>Inner Mongolia</u>	<u>44.57</u>	<u>N</u>	<u>120.90</u>	<u>E</u>	<u>266</u>	<u>4.581</u>	<u>1,587</u>	<u>-22</u>	<u>32</u>	<u>20</u>
	<u>Jining</u>	<u>Inner Mongolia</u>	<u>41.03</u>	<u>N</u>	<u>113.07</u>	<u>E</u>	<u>1,416</u>	<u>5.154</u>	<u>950</u>	<u>-23</u>	<u>27</u>	<u>15</u>
	<u>Jurh</u>	<u>Inner Mongolia</u>	<u>42.40</u>	<u>N</u>	<u>112.90</u>	<u>E</u>	<u>1,152</u>	<u>5.037</u>	<u>1,334</u>	<u>-25</u>	<u>31</u>	<u>15</u>
	<u>Lindong/Bairin Zuoq</u>	<u>Inner Mongolia</u>	<u>43.98</u>	<u>N</u>	<u>119.40</u>	<u>E</u>	<u>485</u>	<u>4.974</u>	<u>1,307</u>	<u>-24</u>	<u>30</u>	<u>19</u>
	<u>Linhe</u>	<u>Inner Mongolia</u>	<u>40.77</u>	<u>N</u>	<u>107.40</u>	<u>E</u>	<u>1,041</u>	<u>4.057</u>	<u>1,664</u>	<u>-18</u>	<u>32</u>	<u>18</u>
	<u>Linxi</u>	<u>Inner Mongolia</u>	<u>43.60</u>	<u>N</u>	<u>118.07</u>	<u>E</u>	<u>800</u>	<u>5.086</u>	<u>1,206</u>	<u>-23</u>	<u>29</u>	<u>18</u>
	<u>Mandal</u>	<u>Inner Mongolia</u>	<u>42.53</u>	<u>N</u>	<u>110.13</u>	<u>E</u>	<u>1,223</u>	<u>4.981</u>	<u>1,340</u>	<u>-23</u>	<u>31</u>	<u>15</u>
	<u>Naran Bulag</u>	<u>Inner Mongolia</u>	<u>44.62</u>	<u>N</u>	<u>114.15</u>	<u>E</u>	<u>1,183</u>	<u>6.497</u>	<u>920</u>	<u>-31</u>	<u>29</u>	<u>15</u>
	<u>Nenjiang</u>	<u>Inner Mongolia</u>	<u>49.17</u>	<u>N</u>	<u>125.23</u>	<u>E</u>	<u>243</u>	<u>6.656</u>	<u>1,044</u>	<u>-35</u>	<u>29</u>	<u>19</u>
	<u>Otog Qi/Ulan</u>	<u>Inner Mongolia</u>	<u>39.10</u>	<u>N</u>	<u>107.98</u>	<u>E</u>	<u>1,381</u>	<u>4.290</u>	<u>1,392</u>	<u>-20</u>	<u>30</u>	<u>15</u>
	<u>Tongliao</u>	<u>Inner Mongolia</u>	<u>43.60</u>	<u>N</u>	<u>122.27</u>	<u>E</u>	<u>180</u>	<u>4.621</u>	<u>1,639</u>	<u>-23</u>	<u>31</u>	<u>21</u>
	<u>Tulihe</u>	<u>Inner Mongolia</u>	<u>50.45</u>	<u>N</u>	<u>121.70</u>	<u>E</u>	<u>733</u>	<u>8.217</u>	<u>501</u>	<u>-41</u>	<u>26</u>	<u>17</u>
	<u>Uliastai</u>	<u>Inner Mongolia</u>	<u>45.52</u>	<u>N</u>	<u>116.97</u>	<u>E</u>	<u>840</u>	<u>6.301</u>	<u>1,051</u>	<u>-31</u>	<u>30</u>	<u>17</u>
	<u>Xi Ujimqin Qi</u>	<u>Inner Mongolia</u>	<u>44.58</u>	<u>N</u>	<u>117.60</u>	<u>E</u>	<u>997</u>	<u>6.187</u>	<u>920</u>	<u>-30</u>	<u>28</u>	<u>16</u>
	<u>Xilin Hot/Abagnar</u>	<u>Inner Mongolia</u>	<u>43.95</u>	<u>N</u>	<u>116.07</u>	<u>E</u>	<u>991</u>	<u>5.822</u>	<u>1,139</u>	<u>-29</u>	<u>30</u>	<u>16</u>
	<u>Xin Barag Youqi</u>	<u>Inner Mongolia</u>	<u>48.67</u>	<u>N</u>	<u>116.82</u>	<u>E</u>	<u>556</u>	<u>6.423</u>	<u>1,080</u>	<u>-31</u>	<u>30</u>	<u>17</u>
	<u>Dongtai</u>	<u>Jiangsu</u>	<u>32.87</u>	<u>N</u>	<u>120.32</u>	<u>E</u>	<u>5</u>	<u>2.118</u>	<u>2,562</u>	<u>-5</u>	<u>33</u>	<u>27</u>
	<u>Ganyu/Dayishan</u>	<u>Jiangsu</u>	<u>34.83</u>	<u>N</u>	<u>119.13</u>	<u>E</u>	<u>10</u>	<u>2.451</u>	<u>2,364</u>	<u>-7</u>	<u>32</u>	<u>26</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Liyang</u>		<u>Jiangsu</u>	<u>31.43</u>	<u>N</u>	<u>119.48</u>	<u>E</u>	<u>8</u>	<u>1,954</u>	<u>2,727</u>	<u>-4</u>	<u>34</u>	<u>27</u>
<u>Lusi</u>		<u>Jiangsu</u>	<u>32.07</u>	<u>N</u>	<u>121.60</u>	<u>E</u>	<u>10</u>	<u>2,007</u>	<u>2,540</u>	<u>-3</u>	<u>32</u>	<u>27</u>
<u>Qingjiang</u>		<u>Jiangsu</u>	<u>33.60</u>	<u>N</u>	<u>119.03</u>	<u>E</u>	<u>19</u>	<u>2,232</u>	<u>2,534</u>	<u>-6</u>	<u>32</u>	<u>27</u>
<u>Shenyang/Hede</u>		<u>Jiangsu</u>	<u>33.77</u>	<u>N</u>	<u>120.25</u>	<u>E</u>	<u>7</u>	<u>2,277</u>	<u>2,428</u>	<u>-6</u>	<u>32</u>	<u>27</u>
<u>Xuzhou</u>		<u>Jiangsu</u>	<u>34.28</u>	<u>N</u>	<u>117.15</u>	<u>E</u>	<u>42</u>	<u>2,267</u>	<u>2,609</u>	<u>-7</u>	<u>33</u>	<u>25</u>
<u>Ganzhou</u>		<u>Jiangxi</u>	<u>25.85</u>	<u>N</u>	<u>114.95</u>	<u>E</u>	<u>125</u>	<u>1,069</u>	<u>3,844</u>	<u>1</u>	<u>35</u>	<u>26</u>
<u>Guangchang</u>		<u>Jiangxi</u>	<u>26.85</u>	<u>N</u>	<u>116.33</u>	<u>E</u>	<u>142</u>	<u>1,272</u>	<u>3,540</u>	<u>-1</u>	<u>35</u>	<u>26</u>
<u>Ji'An</u>		<u>Jiangxi</u>	<u>27.12</u>	<u>N</u>	<u>114.97</u>	<u>E</u>	<u>78</u>	<u>1,321</u>	<u>3,543</u>	<u>0</u>	<u>35</u>	<u>26</u>
<u>Jingdezhen</u>		<u>Jiangxi</u>	<u>29.30</u>	<u>N</u>	<u>117.20</u>	<u>E</u>	<u>60</u>	<u>1,456</u>	<u>3,272</u>	<u>-2</u>	<u>35</u>	<u>26</u>
<u>Lu Shan (Mountain)</u>		<u>Jiangxi</u>	<u>29.58</u>	<u>N</u>	<u>115.98</u>	<u>E</u>	<u>1,165</u>	<u>2,652</u>	<u>1,800</u>	<u>-9</u>	<u>26</u>	<u>22</u>
<u>Nanchang</u>		<u>Jiangxi</u>	<u>28.60</u>	<u>N</u>	<u>115.92</u>	<u>E</u>	<u>50</u>	<u>1,492</u>	<u>3,320</u>	<u>-1</u>	<u>35</u>	<u>27</u>
<u>Nancheng</u>		<u>Jiangxi</u>	<u>27.58</u>	<u>N</u>	<u>116.65</u>	<u>E</u>	<u>82</u>	<u>1,394</u>	<u>3,400</u>	<u>-1</u>	<u>34</u>	<u>26</u>
<u>Xiushui</u>		<u>Jiangxi</u>	<u>29.03</u>	<u>N</u>	<u>114.58</u>	<u>E</u>	<u>147</u>	<u>1,585</u>	<u>3,101</u>	<u>-3</u>	<u>35</u>	<u>26</u>
<u>Xunwu</u>		<u>Jiangxi</u>	<u>24.95</u>	<u>N</u>	<u>115.65</u>	<u>E</u>	<u>299</u>	<u>921</u>	<u>3,714</u>	<u>1</u>	<u>33</u>	<u>25</u>
<u>Yichun</u>		<u>Jiangxi</u>	<u>27.80</u>	<u>N</u>	<u>114.38</u>	<u>E</u>	<u>129</u>	<u>1,509</u>	<u>3,181</u>	<u>-1</u>	<u>34</u>	<u>26</u>
<u>Changbai</u>		<u>Jilin</u>	<u>41.35</u>	<u>N</u>	<u>128.17</u>	<u>E</u>	<u>1,018</u>	<u>5,807</u>	<u>834</u>	<u>-27</u>	<u>26</u>	<u>19</u>
<u>Changchun</u>		<u>Jilin</u>	<u>43.90</u>	<u>N</u>	<u>125.22</u>	<u>E</u>	<u>238</u>	<u>4,914</u>	<u>1,504</u>	<u>-25</u>	<u>29</u>	<u>21</u>
<u>Changling</u>		<u>Jilin</u>	<u>44.25</u>	<u>N</u>	<u>123.97</u>	<u>E</u>	<u>190</u>	<u>4,966</u>	<u>1,514</u>	<u>-25</u>	<u>30</u>	<u>21</u>
<u>Dunhua</u>		<u>Jilin</u>	<u>43.37</u>	<u>N</u>	<u>128.20</u>	<u>E</u>	<u>526</u>	<u>5,513</u>	<u>1,050</u>	<u>-27</u>	<u>27</u>	<u>20</u>
<u>Huadian</u>		<u>Jilin</u>	<u>42.98</u>	<u>N</u>	<u>126.75</u>	<u>E</u>	<u>264</u>	<u>5,181</u>	<u>1,380</u>	<u>-32</u>	<u>29</u>	<u>22</u>
<u>Ji'An</u>		<u>Jilin</u>	<u>41.10</u>	<u>N</u>	<u>126.15</u>	<u>E</u>	<u>179</u>	<u>4,229</u>	<u>1,635</u>	<u>-23</u>	<u>30</u>	<u>22</u>
<u>Linjiang</u>		<u>Jilin</u>	<u>41.72</u>	<u>N</u>	<u>126.92</u>	<u>E</u>	<u>333</u>	<u>4,803</u>	<u>1,429</u>	<u>-26</u>	<u>29</u>	<u>21</u>
<u>Qian Gorlos</u>		<u>Jilin</u>	<u>45.12</u>	<u>N</u>	<u>124.83</u>	<u>E</u>	<u>138</u>	<u>5,034</u>	<u>1,539</u>	<u>-26</u>	<u>30</u>	<u>22</u>
<u>Yanji</u>		<u>Jilin</u>	<u>42.88</u>	<u>N</u>	<u>129.47</u>	<u>E</u>	<u>178</u>	<u>4,822</u>	<u>1,331</u>	<u>-23</u>	<u>29</u>	<u>21</u>
<u>Chaoyang</u>		<u>Liaoning</u>	<u>41.55</u>	<u>N</u>	<u>120.45</u>	<u>E</u>	<u>176</u>	<u>3,929</u>	<u>1,887</u>	<u>-20</u>	<u>32</u>	<u>21</u>
<u>Dalian/Dairen/Luda</u>		<u>Liaoning</u>	<u>38.90</u>	<u>N</u>	<u>121.63</u>	<u>E</u>	<u>97</u>	<u>3,138</u>	<u>1,912</u>	<u>-12</u>	<u>30</u>	<u>23</u>
<u>Dandong</u>		<u>Liaoning</u>	<u>40.05</u>	<u>N</u>	<u>124.33</u>	<u>E</u>	<u>14</u>	<u>3,690</u>	<u>1,674</u>	<u>-17</u>	<u>29</u>	<u>23</u>
<u>Haiyang Island</u>		<u>Liaoning</u>	<u>39.05</u>	<u>N</u>	<u>123.22</u>	<u>E</u>	<u>10</u>	<u>3,041</u>	<u>1,856</u>	<u>-10</u>	<u>28</u>	<u>25</u>
<u>Jinzhou</u>		<u>Liaoning</u>	<u>41.13</u>	<u>N</u>	<u>121.12</u>	<u>E</u>	<u>70</u>	<u>3,665</u>	<u>1,887</u>	<u>-17</u>	<u>30</u>	<u>22</u>
<u>Kuandian</u>		<u>Liaoning</u>	<u>40.72</u>	<u>N</u>	<u>124.78</u>	<u>E</u>	<u>261</u>	<u>4,302</u>	<u>1,482</u>	<u>-24</u>	<u>29</u>	<u>22</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Qingyuan</u>		<u>Liaoning</u>	<u>42.10</u>	<u>N</u>	<u>124.95</u>	<u>E</u>	<u>235</u>	<u>4.652</u>	<u>1,527</u>	<u>-27</u>	<u>30</u>	<u>22</u>
<u>Shenyang/Dongta</u>		<u>Liaoning</u>	<u>41.77</u>	<u>N</u>	<u>123.43</u>	<u>E</u>	<u>43</u>	<u>4.010</u>	<u>1,847</u>	<u>-22</u>	<u>31</u>	<u>23</u>
<u>Siping</u>		<u>Liaoning</u>	<u>43.18</u>	<u>N</u>	<u>124.33</u>	<u>E</u>	<u>165</u>	<u>4.578</u>	<u>1,610</u>	<u>-24</u>	<u>30</u>	<u>22</u>
<u>Yingkou</u>		<u>Liaoning</u>	<u>40.67</u>	<u>N</u>	<u>122.20</u>	<u>E</u>	<u>4</u>	<u>3.758</u>	<u>1,891</u>	<u>-18</u>	<u>30</u>	<u>24</u>
<u>Zhangwu</u>		<u>Liaoning</u>	<u>42.42</u>	<u>N</u>	<u>122.53</u>	<u>E</u>	<u>84</u>	<u>4.308</u>	<u>1,700</u>	<u>-22</u>	<u>30</u>	<u>22</u>
<u>Yanchi</u>		<u>Ningxia</u>	<u>37.78</u>	<u>N</u>	<u>107.40</u>	<u>E</u>	<u>1,349</u>	<u>3.841</u>	<u>1,541</u>	<u>-19</u>	<u>31</u>	<u>16</u>
<u>Yinchuan</u>		<u>Ningxia</u>	<u>38.48</u>	<u>N</u>	<u>106.22</u>	<u>E</u>	<u>1,112</u>	<u>3.676</u>	<u>1,655</u>	<u>-17</u>	<u>31</u>	<u>19</u>
<u>Zhongning</u>		<u>Ningxia</u>	<u>37.48</u>	<u>N</u>	<u>105.67</u>	<u>E</u>	<u>1,185</u>	<u>3.454</u>	<u>1,705</u>	<u>-16</u>	<u>31</u>	<u>19</u>
<u>Daqaidam</u>		<u>Qinghai</u>	<u>37.85</u>	<u>N</u>	<u>95.37</u>	<u>E</u>	<u>3,174</u>	<u>5.986</u>	<u>408</u>	<u>-24</u>	<u>24</u>	<u>9</u>
<u>Darlag</u>		<u>Qinghai</u>	<u>33.75</u>	<u>N</u>	<u>99.65</u>	<u>E</u>	<u>3,968</u>	<u>6.742</u>	<u>56</u>	<u>-25</u>	<u>16</u>	<u>9</u>
<u>Delingha</u>		<u>Qinghai</u>	<u>37.37</u>	<u>N</u>	<u>97.37</u>	<u>E</u>	<u>2,982</u>	<u>5.103</u>	<u>650</u>	<u>-20</u>	<u>25</u>	<u>11</u>
<u>Dulan/Qagan Us</u>		<u>Qinghai</u>	<u>36.30</u>	<u>N</u>	<u>98.10</u>	<u>E</u>	<u>3,192</u>	<u>5.371</u>	<u>428</u>	<u>-18</u>	<u>24</u>	<u>10</u>
<u>Gangca/Shaliuhe</u>		<u>Qinghai</u>	<u>37.33</u>	<u>N</u>	<u>100.13</u>	<u>E</u>	<u>3,301</u>	<u>6.551</u>	<u>97</u>	<u>-22</u>	<u>18</u>	<u>10</u>
<u>Golmud</u>		<u>Qinghai</u>	<u>36.42</u>	<u>N</u>	<u>94.90</u>	<u>E</u>	<u>2,809</u>	<u>4.674</u>	<u>801</u>	<u>-17</u>	<u>26</u>	<u>11</u>
<u>Henan</u>		<u>Qinghai</u>	<u>34.73</u>	<u>N</u>	<u>101.60</u>	<u>E</u>	<u>3,500</u>	<u>6.448</u>	<u>86</u>	<u>-27</u>	<u>18</u>	<u>10</u>
<u>Lenghu</u>		<u>Qinghai</u>	<u>38.83</u>	<u>N</u>	<u>93.38</u>	<u>E</u>	<u>2,734</u>	<u>5.589</u>	<u>634</u>	<u>-22</u>	<u>26</u>	<u>10</u>
<u>Madoi/Huangheyan</u>		<u>Qinghai</u>	<u>34.92</u>	<u>N</u>	<u>98.22</u>	<u>E</u>	<u>4,273</u>	<u>7.853</u>	<u>17</u>	<u>-28</u>	<u>15</u>	<u>6</u>
<u>Qumarleb</u>		<u>Qinghai</u>	<u>34.13</u>	<u>N</u>	<u>95.78</u>	<u>E</u>	<u>4,176</u>	<u>7.320</u>	<u>37</u>	<u>-27</u>	<u>17</u>	<u>8</u>
<u>Tongde</u>		<u>Qinghai</u>	<u>35.27</u>	<u>N</u>	<u>100.65</u>	<u>E</u>	<u>3,290</u>	<u>6.233</u>	<u>160</u>	<u>-26</u>	<u>20</u>	<u>10</u>
<u>Tuotuohe/Tanggulash</u>		<u>Qinghai</u>	<u>34.22</u>	<u>N</u>	<u>92.43</u>	<u>E</u>	<u>4,535</u>	<u>8.058</u>	<u>12</u>	<u>-29</u>	<u>16</u>	<u>6</u>
<u>Wudaoliang</u>		<u>Qinghai</u>	<u>35.22</u>	<u>N</u>	<u>93.08</u>	<u>E</u>	<u>4,613</u>	<u>8.397</u>	<u>5</u>	<u>-27</u>	<u>13</u>	<u>4</u>
<u>Xining</u>		<u>Qinghai</u>	<u>36.62</u>	<u>N</u>	<u>101.77</u>	<u>E</u>	<u>2,262</u>	<u>4.121</u>	<u>900</u>	<u>-16</u>	<u>26</u>	<u>14</u>
<u>Yushu</u>		<u>Qinghai</u>	<u>33.02</u>	<u>N</u>	<u>97.02</u>	<u>E</u>	<u>3,682</u>	<u>5.197</u>	<u>306</u>	<u>-19</u>	<u>21</u>	<u>11</u>
<u>Zadoi</u>		<u>Qinghai</u>	<u>32.90</u>	<u>N</u>	<u>95.30</u>	<u>E</u>	<u>4,068</u>	<u>6.254</u>	<u>121</u>	<u>-23</u>	<u>18</u>	<u>9</u>
<u>Ankang/Xing'an</u>		<u>Shaanxi</u>	<u>32.72</u>	<u>N</u>	<u>109.03</u>	<u>E</u>	<u>291</u>	<u>1.801</u>	<u>2,733</u>	<u>-2</u>	<u>34</u>	<u>25</u>
<u>Baoji</u>		<u>Shaanxi</u>	<u>34.35</u>	<u>N</u>	<u>107.13</u>	<u>E</u>	<u>610</u>	<u>2.414</u>	<u>2,214</u>	<u>-6</u>	<u>33</u>	<u>21</u>
<u>Hanzhong</u>		<u>Shaanxi</u>	<u>33.07</u>	<u>N</u>	<u>107.03</u>	<u>E</u>	<u>509</u>	<u>2.042</u>	<u>2,363</u>	<u>-3</u>	<u>32</u>	<u>24</u>
<u>Hua Shan (Mount)</u>		<u>Shaanxi</u>	<u>34.48</u>	<u>N</u>	<u>110.08</u>	<u>E</u>	<u>2,063</u>	<u>4.385</u>	<u>842</u>	<u>-15</u>	<u>22</u>	<u>15</u>
<u>Tongchuan</u>		<u>Shaanxi</u>	<u>35.17</u>	<u>N</u>	<u>109.05</u>	<u>E</u>	<u>914</u>	<u>3.039</u>	<u>1,732</u>	<u>-10</u>	<u>30</u>	<u>19</u>
<u>Xi'An</u>		<u>Shaanxi</u>	<u>34.30</u>	<u>N</u>	<u>108.93</u>	<u>E</u>	<u>398</u>	<u>2.407</u>	<u>2,376</u>	<u>-6</u>	<u>34</u>	<u>23</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Yan An</u>		<u>Shaanxi</u>	<u>36.60</u>	<u>N</u>	<u>109.50</u>	<u>E</u>	<u>959</u>	<u>3,262</u>	<u>1,740</u>	<u>-15</u>	<u>31</u>	<u>19</u>
<u>Yulin</u>		<u>Shaanxi</u>	<u>38.23</u>	<u>N</u>	<u>109.70</u>	<u>E</u>	<u>1,058</u>	<u>3,911</u>	<u>1,574</u>	<u>-20</u>	<u>31</u>	<u>18</u>
<u>Chengshantou (Cape)</u>		<u>Shandong</u>	<u>37.40</u>	<u>N</u>	<u>122.68</u>	<u>E</u>	<u>47</u>	<u>2,847</u>	<u>1,751</u>	<u>-6</u>	<u>26</u>	<u>23</u>
<u>Dezhou</u>		<u>Shandong</u>	<u>37.43</u>	<u>N</u>	<u>116.32</u>	<u>E</u>	<u>22</u>	<u>2,579</u>	<u>2,551</u>	<u>-9</u>	<u>33</u>	<u>24</u>
<u>Haiyang</u>		<u>Shandong</u>	<u>36.77</u>	<u>N</u>	<u>121.17</u>	<u>E</u>	<u>64</u>	<u>2,746</u>	<u>2,079</u>	<u>-9</u>	<u>29</u>	<u>24</u>
<u>Heze/Caozhou</u>		<u>Shandong</u>	<u>35.25</u>	<u>N</u>	<u>115.43</u>	<u>E</u>	<u>51</u>	<u>2,378</u>	<u>2,571</u>	<u>-8</u>	<u>33</u>	<u>25</u>
<u>Huimin</u>		<u>Shandong</u>	<u>37.50</u>	<u>N</u>	<u>117.53</u>	<u>E</u>	<u>12</u>	<u>2,783</u>	<u>2,372</u>	<u>-11</u>	<u>33</u>	<u>24</u>
<u>Jinan/Sinan</u>		<u>Shandong</u>	<u>36.68</u>	<u>N</u>	<u>116.98</u>	<u>E</u>	<u>58</u>	<u>2,312</u>	<u>2,798</u>	<u>-8</u>	<u>34</u>	<u>24</u>
<u>Linyi</u>		<u>Shandong</u>	<u>35.05</u>	<u>N</u>	<u>118.35</u>	<u>E</u>	<u>86</u>	<u>2,438</u>	<u>2,442</u>	<u>-8</u>	<u>32</u>	<u>24</u>
<u>Longkou</u>		<u>Shandong</u>	<u>37.62</u>	<u>N</u>	<u>120.32</u>	<u>E</u>	<u>5</u>	<u>2,871</u>	<u>2,124</u>	<u>-9</u>	<u>31</u>	<u>24</u>
<u>Qingdao/Singtao</u>		<u>Shandong</u>	<u>36.07</u>	<u>N</u>	<u>120.33</u>	<u>E</u>	<u>77</u>	<u>2,584</u>	<u>2,151</u>	<u>-8</u>	<u>30</u>	<u>23</u>
<u>Rizhao</u>		<u>Shandong</u>	<u>35.38</u>	<u>N</u>	<u>119.53</u>	<u>E</u>	<u>15</u>	<u>2,553</u>	<u>2,181</u>	<u>-7</u>	<u>29</u>	<u>25</u>
<u>Tai Shan (Mtns)</u>		<u>Shandong</u>	<u>36.25</u>	<u>N</u>	<u>117.10</u>	<u>E</u>	<u>1,536</u>	<u>4,605</u>	<u>854</u>	<u>-17</u>	<u>21</u>	<u>17</u>
<u>Weifang</u>		<u>Shandong</u>	<u>36.70</u>	<u>N</u>	<u>119.08</u>	<u>E</u>	<u>51</u>	<u>2,676</u>	<u>2,397</u>	<u>-11</u>	<u>33</u>	<u>24</u>
<u>Xinxian</u>		<u>Shandong</u>	<u>36.03</u>	<u>N</u>	<u>115.58</u>	<u>E</u>	<u>47</u>	<u>2,566</u>	<u>2,459</u>	<u>-9</u>	<u>33</u>	<u>25</u>
<u>Yanzhou</u>		<u>Shandong</u>	<u>35.57</u>	<u>N</u>	<u>116.85</u>	<u>E</u>	<u>53</u>	<u>2,515</u>	<u>2,451</u>	<u>-10</u>	<u>33</u>	<u>24</u>
<u>Yiyuan/Nanma</u>		<u>Shandong</u>	<u>36.18</u>	<u>N</u>	<u>118.15</u>	<u>E</u>	<u>302</u>	<u>2,830</u>	<u>2,194</u>	<u>-11</u>	<u>32</u>	<u>22</u>
<u>Datong</u>		<u>Shanxi</u>	<u>40.10</u>	<u>N</u>	<u>113.33</u>	<u>E</u>	<u>1,069</u>	<u>4,376</u>	<u>1,396</u>	<u>-21</u>	<u>30</u>	<u>17</u>
<u>Hequ</u>		<u>Shanxi</u>	<u>39.38</u>	<u>N</u>	<u>111.15</u>	<u>E</u>	<u>861</u>	<u>4,075</u>	<u>1,600</u>	<u>-21</u>	<u>32</u>	<u>19</u>
<u>Jiexiu</u>		<u>Shanxi</u>	<u>37.05</u>	<u>N</u>	<u>111.93</u>	<u>E</u>	<u>750</u>	<u>3,166</u>	<u>1,825</u>	<u>-13</u>	<u>32</u>	<u>20</u>
<u>Lishi</u>		<u>Shanxi</u>	<u>37.50</u>	<u>N</u>	<u>111.10</u>	<u>E</u>	<u>951</u>	<u>3,634</u>	<u>1,644</u>	<u>-17</u>	<u>31</u>	<u>19</u>
<u>Taiyuan/Wusu/Wusu</u>		<u>Shanxi</u>	<u>37.78</u>	<u>N</u>	<u>112.55</u>	<u>E</u>	<u>779</u>	<u>3,370</u>	<u>1,740</u>	<u>-15</u>	<u>31</u>	<u>20</u>
<u>Wutai Shan (Mtn)</u>		<u>Shanxi</u>	<u>39.03</u>	<u>N</u>	<u>113.53</u>	<u>E</u>	<u>2,898</u>	<u>7,897</u>	<u>56</u>	<u>-29</u>	<u>17</u>	<u>11</u>
<u>Yangcheng</u>		<u>Shanxi</u>	<u>35.48</u>	<u>N</u>	<u>112.40</u>	<u>E</u>	<u>659</u>	<u>2,809</u>	<u>2,063</u>	<u>-10</u>	<u>31</u>	<u>21</u>
<u>Yuanping</u>		<u>Shanxi</u>	<u>38.75</u>	<u>N</u>	<u>112.70</u>	<u>E</u>	<u>838</u>	<u>3,725</u>	<u>1,635</u>	<u>-17</u>	<u>31</u>	<u>19</u>
<u>Yuncheng</u>		<u>Shanxi</u>	<u>35.03</u>	<u>N</u>	<u>111.02</u>	<u>E</u>	<u>376</u>	<u>2,463</u>	<u>2,529</u>	<u>-8</u>	<u>35</u>	<u>22</u>
<u>Yushe</u>		<u>Shanxi</u>	<u>37.07</u>	<u>N</u>	<u>112.98</u>	<u>E</u>	<u>1,042</u>	<u>3,601</u>	<u>1,543</u>	<u>-16</u>	<u>30</u>	<u>18</u>
<u>Barkam</u>		<u>Sichuan</u>	<u>31.90</u>	<u>N</u>	<u>102.23</u>	<u>E</u>	<u>2,666</u>	<u>3,011</u>	<u>1,046</u>	<u>-10</u>	<u>26</u>	<u>15</u>
<u>Batang</u>		<u>Sichuan</u>	<u>30.00</u>	<u>N</u>	<u>99.10</u>	<u>E</u>	<u>2,589</u>	<u>2,000</u>	<u>1,815</u>	<u>-5</u>	<u>29</u>	<u>15</u>
<u>Chengdu</u>		<u>Sichuan</u>	<u>30.67</u>	<u>N</u>	<u>104.02</u>	<u>E</u>	<u>508</u>	<u>1,505</u>	<u>2,691</u>	<u>0</u>	<u>31</u>	<u>25</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
Da Xian		Sichuan	<u>31.20</u>	<u>N</u>	<u>107.50</u>	<u>E</u>	<u>311</u>	<u>1,388</u>	<u>3,030</u>	<u>1</u>	<u>34</u>	<u>25</u>
Daocheng/Dabba		Sichuan	<u>29.05</u>	<u>N</u>	<u>100.30</u>	<u>E</u>	<u>3,729</u>	<u>4,785</u>	<u>347</u>	<u>-15</u>	<u>20</u>	<u>9</u>
Dawu		Sichuan	<u>30.98</u>	<u>N</u>	<u>101.12</u>	<u>E</u>	<u>2,959</u>	<u>3,394</u>	<u>911</u>	<u>-12</u>	<u>25</u>	<u>14</u>
Emei Shan		Sichuan	<u>29.52</u>	<u>N</u>	<u>103.33</u>	<u>E</u>	<u>3,049</u>	<u>5,254</u>	<u>212</u>	<u>-13</u>	<u>16</u>	<u>12</u>
Fengjie		Sichuan	<u>31.05</u>	<u>N</u>	<u>109.50</u>	<u>E</u>	<u>607</u>	<u>1,605</u>	<u>2,802</u>	<u>0</u>	<u>33</u>	<u>24</u>
Garze		Sichuan	<u>31.62</u>	<u>N</u>	<u>100.00</u>	<u>E</u>	<u>3,394</u>	<u>4,253</u>	<u>551</u>	<u>-15</u>	<u>22</u>	<u>12</u>
Jiulong/Gyaisi		Sichuan	<u>29.00</u>	<u>N</u>	<u>101.50</u>	<u>E</u>	<u>2,994</u>	<u>3,058</u>	<u>871</u>	<u>-8</u>	<u>24</u>	<u>13</u>
Kangding/Dardo		Sichuan	<u>30.05</u>	<u>N</u>	<u>101.97</u>	<u>E</u>	<u>2,617</u>	<u>3,817</u>	<u>680</u>	<u>-9</u>	<u>22</u>	<u>14</u>
Langzhong		Sichuan	<u>31.58</u>	<u>N</u>	<u>105.97</u>	<u>E</u>	<u>385</u>	<u>1,418</u>	<u>2,884</u>	<u>1</u>	<u>33</u>	<u>25</u>
Liangping		Sichuan	<u>30.68</u>	<u>N</u>	<u>107.80</u>	<u>E</u>	<u>455</u>	<u>1,518</u>	<u>2,840</u>	<u>1</u>	<u>33</u>	<u>25</u>
Litang		Sichuan	<u>30.00</u>	<u>N</u>	<u>100.27</u>	<u>E</u>	<u>3,950</u>	<u>5,204</u>	<u>205</u>	<u>-17</u>	<u>18</u>	<u>9</u>
Luzhou		Sichuan	<u>28.88</u>	<u>N</u>	<u>105.43</u>	<u>E</u>	<u>336</u>	<u>1,194</u>	<u>3,161</u>	<u>3</u>	<u>34</u>	<u>25</u>
Mianyang		Sichuan	<u>31.47</u>	<u>N</u>	<u>104.68</u>	<u>E</u>	<u>472</u>	<u>1,540</u>	<u>2,746</u>	<u>-1</u>	<u>32</u>	<u>24</u>
Nanchong		Sichuan	<u>30.80</u>	<u>N</u>	<u>106.08</u>	<u>E</u>	<u>310</u>	<u>1,359</u>	<u>3,012</u>	<u>1</u>	<u>34</u>	<u>25</u>
Neijiang		Sichuan	<u>29.58</u>	<u>N</u>	<u>105.05</u>	<u>E</u>	<u>357</u>	<u>1,242</u>	<u>3,106</u>	<u>2</u>	<u>34</u>	<u>25</u>
Pingwu		Sichuan	<u>32.42</u>	<u>N</u>	<u>104.52</u>	<u>E</u>	<u>877</u>	<u>1,730</u>	<u>2,404</u>	<u>-1</u>	<u>31</u>	<u>22</u>
Songpan/Sungqu		Sichuan	<u>32.65</u>	<u>N</u>	<u>103.57</u>	<u>E</u>	<u>2,852</u>	<u>4,072</u>	<u>608</u>	<u>-13</u>	<u>23</u>	<u>13</u>
Wanyuan		Sichuan	<u>32.07</u>	<u>N</u>	<u>108.03</u>	<u>E</u>	<u>674</u>	<u>1,864</u>	<u>2,391</u>	<u>-2</u>	<u>32</u>	<u>23</u>
Xichang		Sichuan	<u>27.90</u>	<u>N</u>	<u>102.27</u>	<u>E</u>	<u>1,599</u>	<u>965</u>	<u>2,895</u>	<u>1</u>	<u>31</u>	<u>19</u>
Ya'An		Sichuan	<u>29.98</u>	<u>N</u>	<u>103.00</u>	<u>E</u>	<u>629</u>	<u>1,435</u>	<u>2,756</u>	<u>1</u>	<u>31</u>	<u>25</u>
Yibin		Sichuan	<u>28.80</u>	<u>N</u>	<u>104.60</u>	<u>E</u>	<u>342</u>	<u>1,135</u>	<u>3,175</u>	<u>3</u>	<u>33</u>	<u>26</u>
Youyang		Sichuan	<u>28.83</u>	<u>N</u>	<u>108.77</u>	<u>E</u>	<u>665</u>	<u>1,839</u>	<u>2,492</u>	<u>-2</u>	<u>31</u>	<u>23</u>
Baingoin		Tibet	<u>31.37</u>	<u>N</u>	<u>90.02</u>	<u>E</u>	<u>4,701</u>	<u>6,937</u>	<u>39</u>	<u>-22</u>	<u>16</u>	<u>6</u>
Dengqen		Tibet	<u>31.42</u>	<u>N</u>	<u>95.60</u>	<u>E</u>	<u>3,874</u>	<u>5,182</u>	<u>282</u>	<u>-15</u>	<u>20</u>	<u>10</u>
Lhasa		Tibet	<u>29.67</u>	<u>N</u>	<u>91.13</u>	<u>E</u>	<u>3,650</u>	<u>3,645</u>	<u>796</u>	<u>-10</u>	<u>24</u>	<u>11</u>
Lhunze		Tibet	<u>28.42</u>	<u>N</u>	<u>92.47</u>	<u>E</u>	<u>3,861</u>	<u>4,416</u>	<u>480</u>	<u>-13</u>	<u>20</u>	<u>9</u>
Nagqu		Tibet	<u>31.48</u>	<u>N</u>	<u>92.07</u>	<u>E</u>	<u>4,508</u>	<u>6,966</u>	<u>35</u>	<u>-24</u>	<u>16</u>	<u>6</u>
Nyingchi		Tibet	<u>29.57</u>	<u>N</u>	<u>94.47</u>	<u>E</u>	<u>3,001</u>	<u>3,124</u>	<u>894</u>	<u>-7</u>	<u>23</u>	<u>14</u>
Pagri		Tibet	<u>27.73</u>	<u>N</u>	<u>89.08</u>	<u>E</u>	<u>4,301</u>	<u>6,431</u>	<u>6</u>	<u>-20</u>	<u>13</u>	<u>7</u>
Qamdo		Tibet	<u>31.15</u>	<u>N</u>	<u>97.17</u>	<u>E</u>	<u>3,307</u>	<u>3,639</u>	<u>852</u>	<u>-12</u>	<u>25</u>	<u>13</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
Shiquanhe		Tibet	<u>32.50</u>	<u>N</u>	<u>80.08</u>	<u>E</u>	<u>4,279</u>	<u>6,718</u>	<u>287</u>	<u>-26</u>	<u>21</u>	<u>7</u>
Sog Xian		Tibet	<u>31.88</u>	<u>N</u>	<u>93.78</u>	<u>E</u>	<u>4,024</u>	<u>5,859</u>	<u>175</u>	<u>-21</u>	<u>19</u>	<u>9</u>
Tingri/Xegar		Tibet	<u>28.63</u>	<u>N</u>	<u>87.08</u>	<u>E</u>	<u>4,302</u>	<u>5,552</u>	<u>254</u>	<u>-18</u>	<u>19</u>	<u>8</u>
Xainza		Tibet	<u>30.95</u>	<u>N</u>	<u>88.63</u>	<u>E</u>	<u>4,671</u>	<u>6,583</u>	<u>55</u>	<u>-20</u>	<u>17</u>	<u>6</u>
Xigaze		Tibet	<u>29.25</u>	<u>N</u>	<u>88.88</u>	<u>E</u>	<u>3,837</u>	<u>4,242</u>	<u>591</u>	<u>-14</u>	<u>22</u>	<u>10</u>
Akqi		Xinjiang	<u>40.93</u>	<u>N</u>	<u>78.45</u>	<u>E</u>	<u>1,986</u>	<u>4,251</u>	<u>1,142</u>	<u>-18</u>	<u>27</u>	<u>14</u>
Alar		Xinjiang	<u>40.50</u>	<u>N</u>	<u>81.05</u>	<u>E</u>	<u>1,013</u>	<u>3,290</u>	<u>2,157</u>	<u>-16</u>	<u>33</u>	<u>19</u>
Altay		Xinjiang	<u>47.73</u>	<u>N</u>	<u>88.08</u>	<u>E</u>	<u>737</u>	<u>5,236</u>	<u>1,328</u>	<u>-29</u>	<u>30</u>	<u>17</u>
Andir		Xinjiang	<u>37.93</u>	<u>N</u>	<u>83.65</u>	<u>E</u>	<u>1,264</u>	<u>3,438</u>	<u>2,113</u>	<u>-18</u>	<u>36</u>	<u>17</u>
Bachu		Xinjiang	<u>39.80</u>	<u>N</u>	<u>78.57</u>	<u>E</u>	<u>1,117</u>	<u>3,017</u>	<u>2,380</u>	<u>-14</u>	<u>34</u>	<u>18</u>
Balguntay		Xinjiang	<u>42.67</u>	<u>N</u>	<u>86.33</u>	<u>E</u>	<u>1,753</u>	<u>4,227</u>	<u>1,091</u>	<u>-17</u>	<u>27</u>	<u>14</u>
Bayanbulak		Xinjiang	<u>43.03</u>	<u>N</u>	<u>84.15</u>	<u>E</u>	<u>2,459</u>	<u>8,339</u>	<u>113</u>	<u>-38</u>	<u>19</u>	<u>10</u>
Baytik Shan (Mtns)		Xinjiang	<u>45.37</u>	<u>N</u>	<u>90.53</u>	<u>E</u>	<u>1,651</u>	<u>5,707</u>	<u>754</u>	<u>-24</u>	<u>26</u>	<u>12</u>
Fuyun		Xinjiang	<u>46.98</u>	<u>N</u>	<u>89.52</u>	<u>E</u>	<u>827</u>	<u>5,639</u>	<u>1,326</u>	<u>-33</u>	<u>32</u>	<u>16</u>
Hami		Xinjiang	<u>42.82</u>	<u>N</u>	<u>93.52</u>	<u>E</u>	<u>739</u>	<u>3,621</u>	<u>2,181</u>	<u>-18</u>	<u>35</u>	<u>19</u>
Hoboksar		Xinjiang	<u>46.78</u>	<u>N</u>	<u>85.72</u>	<u>E</u>	<u>1,294</u>	<u>5,247</u>	<u>966</u>	<u>-23</u>	<u>27</u>	<u>14</u>
Hotan		Xinjiang	<u>37.13</u>	<u>N</u>	<u>79.93</u>	<u>E</u>	<u>1,375</u>	<u>2,816</u>	<u>2,341</u>	<u>-11</u>	<u>33</u>	<u>18</u>
Jinghe		Xinjiang	<u>44.62</u>	<u>N</u>	<u>82.90</u>	<u>E</u>	<u>321</u>	<u>4,358</u>	<u>2,006</u>	<u>-26</u>	<u>34</u>	<u>20</u>
Kaba He		Xinjiang	<u>48.05</u>	<u>N</u>	<u>86.35</u>	<u>E</u>	<u>534</u>	<u>5,086</u>	<u>1,384</u>	<u>-29</u>	<u>31</u>	<u>18</u>
Karamay		Xinjiang	<u>45.60</u>	<u>N</u>	<u>84.85</u>	<u>E</u>	<u>428</u>	<u>4,370</u>	<u>2,347</u>	<u>-26</u>	<u>35</u>	<u>17</u>
Kashi		Xinjiang	<u>39.47</u>	<u>N</u>	<u>75.98</u>	<u>E</u>	<u>1,291</u>	<u>3,011</u>	<u>2,102</u>	<u>-13</u>	<u>32</u>	<u>18</u>
Korla		Xinjiang	<u>41.75</u>	<u>N</u>	<u>86.13</u>	<u>E</u>	<u>933</u>	<u>3,156</u>	<u>2,340</u>	<u>-14</u>	<u>34</u>	<u>19</u>
Kuqa		Xinjiang	<u>41.72</u>	<u>N</u>	<u>82.95</u>	<u>E</u>	<u>1,100</u>	<u>3,169</u>	<u>2,192</u>	<u>-15</u>	<u>33</u>	<u>18</u>
Mangnai		Xinjiang	<u>38.25</u>	<u>N</u>	<u>90.85</u>	<u>E</u>	<u>2,945</u>	<u>5,803</u>	<u>404</u>	<u>-20</u>	<u>24</u>	<u>9</u>
Pishan		Xinjiang	<u>37.62</u>	<u>N</u>	<u>78.28</u>	<u>E</u>	<u>1,376</u>	<u>2,965</u>	<u>2,262</u>	<u>-13</u>	<u>34</u>	<u>18</u>
Qijiaoqing		Xinjiang	<u>43.48</u>	<u>N</u>	<u>91.63</u>	<u>E</u>	<u>874</u>	<u>3,954</u>	<u>2,051</u>	<u>-19</u>	<u>35</u>	<u>16</u>
Qitai		Xinjiang	<u>44.02</u>	<u>N</u>	<u>89.57</u>	<u>E</u>	<u>794</u>	<u>4,923</u>	<u>1,552</u>	<u>-29</u>	<u>32</u>	<u>17</u>
Ruoqiang		Xinjiang	<u>39.03</u>	<u>N</u>	<u>88.17</u>	<u>E</u>	<u>889</u>	<u>3,195</u>	<u>2,378</u>	<u>-15</u>	<u>37</u>	<u>19</u>
Shache		Xinjiang	<u>38.43</u>	<u>N</u>	<u>77.27</u>	<u>E</u>	<u>1,232</u>	<u>3,004</u>	<u>2,150</u>	<u>-13</u>	<u>33</u>	<u>19</u>
Tacheng		Xinjiang	<u>46.73</u>	<u>N</u>	<u>83.00</u>	<u>E</u>	<u>535</u>	<u>4,318</u>	<u>1,575</u>	<u>-24</u>	<u>32</u>	<u>18</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Tikanlik</u>		<u>Xinjiang</u>	<u>40.63</u>	<u>N</u>	<u>87.70</u>	<u>E</u>	<u>847</u>	<u>3,385</u>	<u>2,296</u>	<u>-17</u>	<u>36</u>	<u>19</u>
<u>Turpan</u>		<u>Xinjiang</u>	<u>42.93</u>	<u>N</u>	<u>89.20</u>	<u>E</u>	<u>37</u>	<u>2,920</u>	<u>3,355</u>	<u>-14</u>	<u>40</u>	<u>21</u>
<u>Urumqi</u>		<u>Xinjiang</u>	<u>43.78</u>	<u>N</u>	<u>87.62</u>	<u>E</u>	<u>919</u>	<u>4,563</u>	<u>1,675</u>	<u>-22</u>	<u>32</u>	<u>16</u>
<u>Yining</u>		<u>Xinjiang</u>	<u>43.95</u>	<u>N</u>	<u>81.33</u>	<u>E</u>	<u>663</u>	<u>3,676</u>	<u>1,714</u>	<u>-22</u>	<u>32</u>	<u>19</u>
<u>Yiwu/Araturuk</u>		<u>Xinjiang</u>	<u>43.27</u>	<u>N</u>	<u>94.70</u>	<u>E</u>	<u>1,729</u>	<u>5,201</u>	<u>854</u>	<u>-22</u>	<u>26</u>	<u>13</u>
<u>Baoshan</u>		<u>Yunnan</u>	<u>25.13</u>	<u>N</u>	<u>99.22</u>	<u>E</u>	<u>1,655</u>	<u>1,195</u>	<u>2,402</u>	<u>1</u>	<u>27</u>	<u>19</u>
<u>Chuxiong</u>		<u>Yunnan</u>	<u>25.02</u>	<u>N</u>	<u>101.53</u>	<u>E</u>	<u>1,773</u>	<u>1,168</u>	<u>2,452</u>	<u>0</u>	<u>28</u>	<u>17</u>
<u>Dali</u>		<u>Yunnan</u>	<u>25.70</u>	<u>N</u>	<u>100.18</u>	<u>E</u>	<u>1,992</u>	<u>1,332</u>	<u>2,119</u>	<u>1</u>	<u>26</u>	<u>18</u>
<u>Deqen</u>		<u>Yunnan</u>	<u>28.50</u>	<u>N</u>	<u>98.90</u>	<u>E</u>	<u>3,488</u>	<u>4,380</u>	<u>371</u>	<u>-8</u>	<u>19</u>	<u>12</u>
<u>Guangnan</u>		<u>Yunnan</u>	<u>24.07</u>	<u>N</u>	<u>105.07</u>	<u>E</u>	<u>1,251</u>	<u>1,020</u>	<u>2,990</u>	<u>0</u>	<u>30</u>	<u>20</u>
<u>Huili</u>		<u>Yunnan</u>	<u>26.65</u>	<u>N</u>	<u>102.25</u>	<u>E</u>	<u>1,788</u>	<u>1,373</u>	<u>2,264</u>	<u>-1</u>	<u>28</u>	<u>18</u>
<u>Huize</u>		<u>Yunnan</u>	<u>26.42</u>	<u>N</u>	<u>103.28</u>	<u>E</u>	<u>2,110</u>	<u>1,957</u>	<u>1,675</u>	<u>-4</u>	<u>25</u>	<u>17</u>
<u>Jiangcheng</u>		<u>Yunnan</u>	<u>22.62</u>	<u>N</u>	<u>101.82</u>	<u>E</u>	<u>1,121</u>	<u>421</u>	<u>3,577</u>	<u>6</u>	<u>29</u>	<u>20</u>
<u>Jinghong</u>		<u>Yunnan</u>	<u>22.02</u>	<u>N</u>	<u>100.80</u>	<u>E</u>	<u>553</u>	<u>51</u>	<u>5,059</u>	<u>10</u>	<u>34</u>	<u>22</u>
<u>Kunming/Wujiaba</u>		<u>Yunnan</u>	<u>25.02</u>	<u>N</u>	<u>102.68</u>	<u>E</u>	<u>1,892</u>	<u>1,367</u>	<u>2,092</u>	<u>0</u>	<u>26</u>	<u>17</u>
<u>Lancang/Menglangba</u>		<u>Yunnan</u>	<u>22.57</u>	<u>N</u>	<u>99.93</u>	<u>E</u>	<u>1,054</u>	<u>273</u>	<u>3,977</u>	<u>5</u>	<u>31</u>	<u>19</u>
<u>Lijiang</u>		<u>Yunnan</u>	<u>26.83</u>	<u>N</u>	<u>100.47</u>	<u>E</u>	<u>2,394</u>	<u>1,883</u>	<u>1,565</u>	<u>-1</u>	<u>25</u>	<u>16</u>
<u>Lincang</u>		<u>Yunnan</u>	<u>23.95</u>	<u>N</u>	<u>100.22</u>	<u>E</u>	<u>1,503</u>	<u>628</u>	<u>3,105</u>	<u>4</u>	<u>28</u>	<u>18</u>
<u>Luxi</u>		<u>Yunnan</u>	<u>24.53</u>	<u>N</u>	<u>103.77</u>	<u>E</u>	<u>1,708</u>	<u>1,252</u>	<u>2,412</u>	<u>-1</u>	<u>27</u>	<u>17</u>
<u>Mengding</u>		<u>Yunnan</u>	<u>23.57</u>	<u>N</u>	<u>99.08</u>	<u>E</u>	<u>512</u>	<u>93</u>	<u>4,879</u>	<u>8</u>	<u>34</u>	<u>22</u>
<u>Mengla</u>		<u>Yunnan</u>	<u>21.50</u>	<u>N</u>	<u>101.58</u>	<u>E</u>	<u>633</u>	<u>74</u>	<u>4,825</u>	<u>9</u>	<u>33</u>	<u>22</u>
<u>Mengzi</u>		<u>Yunnan</u>	<u>23.38</u>	<u>N</u>	<u>103.38</u>	<u>E</u>	<u>1,302</u>	<u>526</u>	<u>3,554</u>	<u>4</u>	<u>30</u>	<u>19</u>
<u>Ruili</u>		<u>Yunnan</u>	<u>24.02</u>	<u>N</u>	<u>97.83</u>	<u>E</u>	<u>776</u>	<u>265</u>	<u>4,191</u>	<u>6</u>	<u>31</u>	<u>21</u>
<u>Simao</u>		<u>Yunnan</u>	<u>22.77</u>	<u>N</u>	<u>100.98</u>	<u>E</u>	<u>1,303</u>	<u>442</u>	<u>3,473</u>	<u>6</u>	<u>29</u>	<u>18</u>
<u>Tengchong</u>		<u>Yunnan</u>	<u>25.12</u>	<u>N</u>	<u>98.48</u>	<u>E</u>	<u>1,649</u>	<u>1,200</u>	<u>2,227</u>	<u>1</u>	<u>26</u>	<u>18</u>
<u>Yuanjiang</u>		<u>Yunnan</u>	<u>23.60</u>	<u>N</u>	<u>101.98</u>	<u>E</u>	<u>398</u>	<u>92</u>	<u>5,476</u>	<u>9</u>	<u>36</u>	<u>24</u>
<u>Yuanmou</u>		<u>Yunnan</u>	<u>25.73</u>	<u>N</u>	<u>101.87</u>	<u>E</u>	<u>1,120</u>	<u>279</u>	<u>4,536</u>	<u>5</u>	<u>34</u>	<u>19</u>
<u>Zhanyi</u>		<u>Yunnan</u>	<u>25.58</u>	<u>N</u>	<u>103.83</u>	<u>E</u>	<u>1,900</u>	<u>1,403</u>	<u>2,142</u>	<u>-1</u>	<u>27</u>	<u>16</u>
<u>Zhaotong</u>		<u>Yunnan</u>	<u>27.33</u>	<u>N</u>	<u>103.75</u>	<u>E</u>	<u>1,950</u>	<u>2,257</u>	<u>1,654</u>	<u>-5</u>	<u>27</u>	<u>17</u>
<u>Dachen Island</u>		<u>Zhejiang</u>	<u>28.45</u>	<u>N</u>	<u>121.88</u>	<u>E</u>	<u>84</u>	<u>1,505</u>	<u>2,759</u>	<u>1</u>	<u>29</u>	<u>27</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
	<u>Dinghai</u>	<u>Zhejiang</u>	<u>30.03</u> N	<u>122.12</u> E	<u>37</u>	<u>1,555</u>	<u>2,866</u>	<u>-1</u>	<u>31</u>	<u>27</u>
	<u>Hangzhou/Jianqiao</u>	<u>Zhejiang</u>	<u>30.23</u> N	<u>120.17</u> E	<u>43</u>	<u>1,705</u>	<u>2,974</u>	<u>-2</u>	<u>35</u>	<u>27</u>
	<u>Kuocang Shan</u>	<u>Zhejiang</u>	<u>28.82</u> N	<u>120.92</u> E	<u>1,371</u>	<u>3,017</u>	<u>1,436</u>	<u>-10</u>	<u>25</u>	<u>21</u>
	<u>Lishui</u>	<u>Zhejiang</u>	<u>28.45</u> N	<u>119.92</u> E	<u>62</u>	<u>1,284</u>	<u>3,447</u>	<u>-1</u>	<u>36</u>	<u>26</u>
	<u>Qixian Shan</u>	<u>Zhejiang</u>	<u>27.95</u> N	<u>117.83</u> E	<u>1,409</u>	<u>2,401</u>	<u>1,753</u>	<u>-7</u>	<u>25</u>	<u>21</u>
	<u>Qu Xian</u>	<u>Zhejiang</u>	<u>28.97</u> N	<u>118.87</u> E	<u>71</u>	<u>1,514</u>	<u>3,189</u>	<u>-1</u>	<u>35</u>	<u>26</u>
	<u>Shengsi/Caiyuanzhen</u>	<u>Zhejiang</u>	<u>30.73</u> N	<u>122.45</u> E	<u>81</u>	<u>1,642</u>	<u>2,725</u>	<u>-1</u>	<u>30</u>	<u>26</u>
	<u>Shengxian</u>	<u>Zhejiang</u>	<u>29.60</u> N	<u>120.82</u> E	<u>108</u>	<u>1,666</u>	<u>3,017</u>	<u>-3</u>	<u>35</u>	<u>26</u>
	<u>Shipu</u>	<u>Zhejiang</u>	<u>29.20</u> N	<u>121.95</u> E	<u>127</u>	<u>1,547</u>	<u>2,870</u>	<u>-1</u>	<u>31</u>	<u>27</u>
	<u>Taishan</u>	<u>Zhejiang</u>	<u>27.00</u> N	<u>120.70</u> E	<u>106</u>	<u>1,262</u>	<u>3,014</u>	<u>3</u>	<u>29</u>	<u>26</u>
	<u>Tianmu Shan (Mtns)</u>	<u>Zhejiang</u>	<u>30.35</u> N	<u>119.42</u> E	<u>1,494</u>	<u>3,397</u>	<u>1,236</u>	<u>-12</u>	<u>24</u>	<u>21</u>
	<u>Wenzhou</u>	<u>Zhejiang</u>	<u>28.02</u> N	<u>120.67</u> E	<u>7</u>	<u>1,169</u>	<u>3,323</u>	<u>1</u>	<u>33</u>	<u>27</u>
	Taiwan									
	<u>Tainan</u>	-	<u>22.95</u> N	<u>120.20</u> E	<u>16</u>	<u>83</u>	<u>5,405</u>	<u>11</u>	<u>33</u>	<u>27</u>
	<u>Taipei</u>		<u>25.03</u> N	<u>121.52</u> E	<u>8</u>	<u>243</u>	<u>4,942</u>	<u>9</u>	<u>34</u>	<u>27</u>
	<u>Alisan Shan</u>		<u>23.52</u> N	<u>120.80</u> E	<u>2,406</u>	<u>2,448</u>	<u>1,088</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Chiayi (TW-AFB)</u>		<u>23.50</u> N	<u>120.42</u> E	<u>28</u>	<u>177</u>	<u>4,959</u>	<u>9</u>	<u>33</u>	<u>27</u>
	<u>Chiayyi</u>		<u>23.47</u> N	<u>120.38</u> E	<u>25</u>	<u>153</u>	<u>5,160</u>	<u>8</u>	<u>33</u>	<u>28</u>
	<u>Chilung</u>		<u>25.13</u> N	<u>121.75</u> E	<u>3</u>	<u>262</u>	<u>4,752</u>	<u>10</u>	<u>33</u>	<u>26</u>
	<u>Chinmen</u>		<u>24.43</u> N	<u>118.43</u> E	<u>12</u>	<u>541</u>	<u>4,122</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Dawu</u>		<u>22.35</u> N	<u>120.90</u> E	<u>9</u>	<u>13</u>	<u>5,753</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Hengchun</u>		<u>22.00</u> N	<u>120.75</u> E	<u>24</u>	<u>13</u>	<u>5,622</u>	<u>16</u>	<u>32</u>	<u>27</u>
	<u>Hengchun/Wu Lu Tien</u>		<u>22.03</u> N	<u>120.72</u> E	<u>13</u>	<u>12</u>	<u>5,782</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Hsinchu/Singio</u>		<u>24.82</u> N	<u>120.93</u> E	<u>8</u>	<u>268</u>	<u>4,759</u>	<u>9</u>	<u>33</u>	<u>28</u>
	<u>Hua Lien</u>		<u>23.97</u> N	<u>121.62</u> E	<u>19</u>	<u>122</u>	<u>4,929</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Hwalien</u>		<u>24.02</u> N	<u>121.62</u> E	<u>15</u>	<u>123</u>	<u>5,024</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Joyutang</u>		<u>23.88</u> N	<u>120.85</u> E	<u>1,015</u>	<u>324</u>	<u>3,964</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Kao Hsiung Intl. Arpt.</u>		<u>22.57</u> N	<u>120.35</u> E	<u>8</u>	<u>62</u>	<u>5,390</u>	<u>12</u>	<u>33</u>	<u>26</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling	
									DB 1.0%	WB 1.0%
	<u>Kao Hsiung</u>		<u>22.62</u> N	<u>120.27</u> E	<u>29</u>	<u>39</u>	<u>5,522</u>	<u>12</u>	<u>32</u>	<u>27</u>
	<u>Kungkuan</u>		<u>24.27</u> N	<u>120.62</u> E	<u>203</u>	<u>300</u>	<u>4,614</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Kungshan</u>		<u>22.78</u> N	<u>120.25</u> E	<u>10</u>	<u>88</u>	<u>5,292</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Lan Yu</u>		<u>22.03</u> N	<u>121.55</u> E	<u>325</u>	<u>53</u>	<u>4,870</u>	<u>14</u>	<u>29</u>	<u>27</u>
	<u>Makung</u>		<u>23.57</u> N	<u>119.62</u> E	<u>31</u>	<u>157</u>	<u>4,976</u>	<u>11</u>	<u>32</u>	<u>28</u>
	<u>Matsu Island</u>		<u>26.17</u> N	<u>119.93</u> E	<u>92</u>	<u>1,082</u>	<u>3,277</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>North Pingtung</u>		<u>22.70</u> N	<u>120.47</u> E	<u>29</u>	<u>49</u>	<u>5,583</u>	<u>11</u>	<u>34</u>	<u>27</u>
	<u>Peng Hu</u>		<u>23.52</u> N	<u>119.57</u> E	<u>21</u>	<u>159</u>	<u>5,038</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Penkaiyu</u>		<u>25.63</u> N	<u>122.07</u> E	<u>102</u>	<u>295</u>	<u>4,533</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Sing Jo</u>		<u>24.80</u> N	<u>120.97</u> E	<u>33</u>	<u>297</u>	<u>4,711</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Sinkung</u>		<u>23.10</u> N	<u>121.37</u> E	<u>37</u>	<u>49</u>	<u>5,334</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>South Pingtung</u>		<u>22.67</u> N	<u>120.45</u> E	<u>24</u>	<u>39</u>	<u>5,682</u>	<u>12</u>	<u>34</u>	<u>27</u>
	<u>Taichung</u>		<u>24.15</u> N	<u>120.68</u> E	<u>78</u>	<u>173</u>	<u>4,995</u>	<u>9</u>	<u>33</u>	<u>26</u>
	<u>Taichung/Shui Nan</u>		<u>24.18</u> N	<u>120.65</u> E	<u>111</u>	<u>212</u>	<u>4,953</u>	<u>8</u>	<u>34</u>	<u>28</u>
	<u>Tainan (TW-AFB)</u>		<u>22.95</u> N	<u>120.20</u> E	<u>16</u>	<u>83</u>	<u>5,405</u>	<u>10</u>	<u>33</u>	<u>28</u>
	<u>Tainan</u>		<u>23.00</u> N	<u>120.22</u> E	<u>14</u>	<u>99</u>	<u>5,320</u>	<u>11</u>	<u>33</u>	<u>27</u>
	<u>Taipei</u>		<u>25.03</u> N	<u>121.52</u> E	<u>8</u>	<u>243</u>	<u>4,942</u>	<u>9</u>	<u>34</u>	<u>27</u>
	<u>Taipei/Chiang Kai Shek</u>		<u>25.08</u> N	<u>121.23</u> E	<u>23</u>	<u>330</u>	<u>4,698</u>	<u>9</u>	<u>33</u>	<u>27</u>
	<u>Taipei/Sungshan</u>		<u>25.07</u> N	<u>121.53</u> E	<u>6</u>	<u>281</u>	<u>4,697</u>	<u>9</u>	<u>34</u>	<u>27</u>
	<u>Taitung</u>		<u>22.75</u> N	<u>121.15</u> E	<u>10</u>	<u>41</u>	<u>5,419</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Taitung/Fongyentsun</u>		<u>22.80</u> N	<u>121.18</u> E	<u>37</u>	<u>40</u>	<u>5,426</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Taoyuan (AB)</u>		<u>25.07</u> N	<u>121.23</u> E	<u>50</u>	<u>348</u>	<u>4,620</u>	<u>9</u>	<u>33</u>	<u>28</u>
	<u>Tung Shih</u>		<u>23.27</u> N	<u>119.67</u> E	<u>45</u>	<u>106</u>	<u>5,120</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
	<u>Wu-Chi</u>		<u>24.25</u> N	<u>120.52</u> E	<u>5</u>	<u>225</u>	<u>4,828</u>	<u>10</u>	<u>32</u>	<u>27</u>
	<u>Yilan</u>		<u>24.77</u> N	<u>121.75</u> E	<u>7</u>	<u>229</u>	<u>4,676</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
Malaysia										
	<u>Kuala Lumpur</u>		<u>3.13</u> N	<u>101.55</u> E	<u>17</u>	<u>0</u>	<u>6,406</u>	<u>22</u>	<u>34</u>	<u>26</u>
	<u>Penang/Bayan-Lepas</u>		<u>5.30</u> N	<u>100.27</u> E	<u>3</u>	<u>0</u>	<u>N</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>

TABLE D-3 International Climatic Data (SI)

Country	City	Province or Region	Lat	Long	Elev. (m)	HDD18	CDD10	Heating 99.6%	Cooling			
									DB 1.0%	WB 1.0%		
<u>Kuala Lumpur</u>			<u>3.13</u>	<u>N</u>	<u>101.55</u>	<u>E</u>	<u>17</u>	<u>0</u>	<u>6,406</u>	<u>22</u>	<u>34</u>	<u>26</u>
<u>Penang/Bayan Lepas</u>			<u>5.30</u>	<u>N</u>	<u>100.27</u>	<u>E</u>	<u>3</u>	<u>0</u>	<u>6,373</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
Mexico												
<u>Mexico City</u>		<u>Distrito Federal</u>	<u>19.40</u>	<u>N</u>	<u>99.20</u>	<u>W</u>	<u>1589</u>	<u>389</u>	<u>3,401</u>	<u>4</u>	<u>28</u>	<u>14</u>
<u>Guadalajara</u>		<u>Jalisco</u>	<u>20.67</u>	<u>N</u>	<u>103.38</u>	<u>W</u>	<u>9</u>	<u>6</u>	<u>6,179</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Monterrey</u>		<u>Nuevo Laredo</u>	<u>25.87</u>	<u>N</u>	<u>100.20</u>	<u>W</u>	<u>1941</u>	<u>414</u>	<u>3,079</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Tampico</u>		<u>Tamaulipas</u>	<u>22.22</u>	<u>N</u>	<u>97.85</u>	<u>W</u>	<u>168</u>	<u>0</u>	<u>5,978</u>	<u>10</u>	<u>32</u>	<u>27</u>
<u>Veracruz</u>		<u>Veracruz</u>	<u>19.15</u>	<u>N</u>	<u>96.12</u>	<u>W</u>	<u>2181</u>	<u>1,221</u>	<u>2,139</u>	<u>14</u>	<u>33</u>	<u>27</u>
<u>Merida</u>		<u>Yucatan</u>	<u>20.98</u>	<u>N</u>	<u>89.65</u>	<u>W</u>	<u>22</u>	<u>662</u>	<u>5,799</u>	<u>14</u>	<u>37</u>	<u>24</u>
<u>Mexico City</u>		<u>Distrito Federal</u>	<u>19.40</u>	<u>N</u>	<u>99.20</u>	<u>W</u>	<u>2308</u>	<u>668</u>	<u>2,646</u>	<u>4</u>	<u>28</u>	<u>14</u>
<u>Guadalajara</u>		<u>Jalisco</u>	<u>20.67</u>	<u>N</u>	<u>103.38</u>	<u>W</u>	<u>1589</u>	<u>389</u>	<u>3,401</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Monterrey</u>		<u>Nuevo Laredo</u>	<u>25.87</u>	<u>N</u>	<u>100.20</u>	<u>W</u>	<u>450</u>	<u>469</u>	<u>4,626</u>	<u>N.A.</u>	<u>N.A.</u>	<u>N.A.</u>
<u>Tampico</u>		<u>Tamaulipas</u>	<u>22.22</u>	<u>N</u>	<u>97.85</u>	<u>W</u>	<u>12</u>	<u>120</u>	<u>5,483</u>	<u>10</u>	<u>32</u>	<u>27</u>
<u>Veracruz</u>		<u>Veracruz</u>	<u>19.15</u>	<u>N</u>	<u>96.12</u>	<u>W</u>	<u>16</u>	<u>9</u>	<u>5,559</u>	<u>14</u>	<u>33</u>	<u>27</u>
<u>Merida</u>		<u>Yucatan</u>	<u>20.98</u>	<u>N</u>	<u>89.65</u>	<u>W</u>	<u>9</u>	<u>6</u>	<u>6,179</u>	<u>14</u>	<u>37</u>	<u>24</u>

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

This modification addresses the often special lighting needs of certain groups of individuals other than just the “visually impaired,” where spaces are designed specifically for their use. The standard industry light level and design recommendations on which the standard LPDs are based do not specifically include special categories and adjustments for

persons with special lighting needs. Therefore, the existing exemption for “visually impaired” has been reworded to more clearly indicate where lighting exemptions may be granted for medical condition needs..

Addendum p to 90.1-2004 (I-P and SI Editions)

Modify exception (g) to section 9.2.2.3 list of exceptions as follows:

(g) Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired ~~visual impairment~~ and other medical and age related issues.

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FOREWORD

The following changes are an update for ARI Standard 340/360 from 2000 to 2004. The changes in ARI 340/360 include an update in the test method of equipment between 65,000-135,000 Btu.

Addendum r to 90.1-2004 (I-P and SI Editions)

Revise Section 12 as follow (IP and SI units):

12. NORMATIVE REFERENCES

Reference	Title
Air-Conditioning and Refrigeration Institute, 4100 North Fairfax Drive, Suite 200, Arlington, VA 22203 ARI 340/360- 2000 <u>2004</u>	Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

ASHRAE Standard 62.1-2004 is quite different from the current referenced version of ASHRAE Standard 62-1999; as a result, the following changes are required in order to update the reference for ASHRAE Standard 90.1, required changes in the referenced text section, as well as in Section 12. While there are substantive changes, the committee attempted to keep the intent of the referenced sections the same for Standard 90.1..

Addendum s to 90.1-2004 (I-P and SI Editions)

Revise Section 6.4.3.8 as follows (I-P and SI units):

6.4.3.8 Ventilation Controls for High-Occupancy Areas. Systems with design outdoor air capacities greater than 3000 cfm [1400L/s] serving areas having an average design occupancy density exceeding 100 people per 1000 ft² [100m²] shall include means to automatically reduce outdoor air intake below design rates when spaces are partially occupied. ~~Ventilation controls shall be in compliance with ASHRAE Standard 62 and local standards.~~

Revise exception “b” to section 6.5.1 as follows (I-P and SI units):

Exceptions to 6.5.1: Economizers are not required for the systems listed below.

- b. Systems that include ~~gas phase air cleaning in order to meet 6.1.2 of ASHRAE Standard 62~~ non-particu-

late air treatment as required by 6.2.1 of ASHRAE Standard 62.1.

Revise exception “a” to section 6.5.2.1 as follows (I-P and SI units):

Exceptions to 6.5.2.1:

- a. Zones for which the volume of air that is reheated, recooled, or mixed is no greater than the larger of the following:
 1. The volume of outdoor air required to meet the ventilation requirements of Section ~~6.1.3~~ 6.2 of ASHRAE Standard 62.1 for the zone,
 2. 0.4 cfm/ft² [2L/s/m²] of the zone conditioned floor area,
 3. 30% of the zone design peak supply rate,
 4. 300 cfm [140L/s]—this exception is for zones whose peak flow rate totals no more than 10% of the total fan system flow rate,
 5. Any higher rate that can be demonstrated, to the satisfaction of the authority having jurisdiction, to reduce overall system annual energy usage by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system, in accordance with the multiple space requirements defined in ASHRAE Standard 62.

Revise exception “a” to section 6.5.2.3 as follows (I-P and SI units):

Exceptions to 6.5.2.3:

- a. The system is capable of reducing supply air volume to 50% or less of the design airflow rate or the minimum rate specified in ~~6.1.3 of ASHRAE Standard 62~~ 6.2 of ASHRAE Standard 62.1, whichever is larger, before simultaneous heating and cooling takes place.

Revise Section 12 as follows (I-P and SI units):

12. NORMATIVE REFERENCES

Reference	Title
American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1791 Tullie Circle, NE, Atlanta, GA 30329 ANSI/ASHRAE Standard 62-1999 <u>62.1 - 2004</u>	Ventilation for Acceptable Indoor Air Quality

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

The following change to Table 6.8.1F adds an additional requirement of combustion efficiency to the current requirement of thermal efficiency for boilers. The change also reflects a new test procedure from DOE that references the H.I. Htg Boiler Std.

Addendum t to 90.1-2004 (I-P and SI Editions)

Revise Table 6.8.1F as follow (I-P units):

TABLE 6.8.1F Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements

Equipment Type ^a	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency ^b	Test Procedure ^c
Boilers, Gas-Fired	300,000 Btu/h	Hot Water	80% AFUE	DOE 10 CFR Part 430
		Steam	75% AFUE	
	300,000 Btu/h and ≤2,500,000 Btu/h	Maximum Capacity ^d	75% E_t^b and 80% E_c	H.I. Htg Boiler Std. DOE 10 CFR Part 431
	>2,500,000 Btu/h ^a	Hot Water	80% E_c	
Boilers, Oil-Fired	>2,500,000 Btu/h ^a	Steam	80% E_c	
	300,000 Btu/h		80% AFUE	DOE 10 CFR Part 430
	300,000 Btu/h and ≤2,500,000 Btu/h	Maximum Capacity ^d	78% E_t^b and 83% E_c	H.I. Htg Boiler Std. DOE 10 CFR Part 431
	>2,500,000 Btu/h ^a	Hot Water	83% E_c	
Boilers, Oil-Fired (Residual)	>2,500,000 Btu/h ^a	Steam	83% E_c	
	300,000 Btu/h and ≤2,500,000 Btu/h	Maximum Capacity ^d	78% E_t^b and 83% E_c	H.I. Htg Boiler Std. DOE 10 CFR Part 431
	>2,500,000 Btu/h ^a	Hot Water	83% E_c	
	>2,500,000 Btu/h ^a	Steam	83% E_c	

A These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers, and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers

B E_t = thermal efficiency. E_c = combustion efficiency. See reference document for detailed information.

C Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

D Minimum and maximum ratings as provided for and allowed by the unit's controls.

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FOREWORD

This addendum provides guidance for complying with the intent of the baseline building design for HVAC systems 5, 6, 7, and 8, which shall be modeled as floor-by-floor HVAC systems..

Addendum u to 90.1-2004 (I-P and SI Editions)

Add the following text to Appendix G, section number 3.1.1 (Baseline HVAC System Type and Description)

G3.1.1 Baseline HVAC System Type and Description. HVAC systems in the *baseline building design* shall be based on usage, number of floors, conditioned floor area, and heating source as specified in Table G3.1.1A and shall conform with the system descriptions in Table G3.1.1B, For systems 1, 2, 3, and 4, each thermal block shall be modeled with its own HVAC system. For systems 5, 6, 7, and 8, each floor shall be modeled with a separate HVAC system. Floors with identical thermal blocks can be grouped for modeling purposes.

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FOREWORD

Reducing the outdoor air volume when a space is not fully occupied saves energy without compromising the indoor air quality of the building. In recent years this type of control strategy, termed demand control ventilation (DCV), has become increasingly popular and economically attractive as more manufacturers began offering the components needed to implement it, and prices for the equipment significantly decreased.

Following an economic cost justification, the following changes have been applied to the ventilation controls requirements for high occupancy areas.

Addendum v to 90.1-2004 (I-P and SI Editions)

Add the following definition to Section 3.2 Definitions:

demand control ventilation (DCV): a ventilation system capability that provides for the automatic reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than design occupancy.

Revise Section 6.4.3.8 as follows:

6.4.3.8 Ventilation Controls for High-Occupancy Areas. ~~Systems with design outdoor air capacities greater than 3000 cfm (1400 L/s) serving areas having an average design occupancy density exceeding 100 people per 1000 ft² (100 m²) shall include means to automatically reduce outdoor air intake below design rates when spaces are partially occupied. Ventilation controls shall be in compliance with ASHRAE Standard 62 and local standards. Demand Control Ventilation (DCV) is required for spaces larger than 500 ft² (50m²) and with a design occupancy for ventilation of greater than 40 people per 1000 ft² (100 m²) of floor area and served by systems with one or more of the following:~~

- a. an air-side economizer
- b. automatic modulating control of the outdoor air damper, or
- c. a design outdoor airflow greater than 3000 CFM (1,400 L/s)

Exceptions to 6.4.3.8:

- a. Systems with energy recovery complying with 6.5.6.1.
- b. Multiple-zone systems without direct-digital control of individual zones communicating with a central control panel.
- c. System with a design outdoor airflow less than 1,200 CFM (600 L/s).
- d. Spaces where the supply air flow rate minus any make up or outgoing transfer air requirement is less than 1,200 CFM (600 L/s).

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FOREWORD

After a review of Chapter 12, "Normative References," it was decided to update ASTM C1549 to the most current year.

This also updates portions of Appendix G with the changes made to the body of Section 5.

ASTM C1549 was added as a reference to Standard 90.1-2004 in Addendum AD.

Addendum x to 90.1-2004 (I-P and SI Editions)

Revise Section 12 as follows:

12. NORMATIVE REFERENCES

American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959

ASTM C1549-~~02~~04, Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.

Revise Table G3.1, 5 Building Envelope, exception c as follows

5. BUILDING ENVELOPE

- c. For exterior roofs, the roof surface may be modeled with a reflectance of 0.45 if the reflectance of the *proposed design* roof is greater than 0.70 and its emittance is greater than 0.75. Reflectance values shall be based on testing in accordance with ASTM C1549, ASTM E903, ~~ASTM E1175~~, or ASTM E1918, and the emittance values shall be based on testing in accordance with ~~ASTM C835~~, ASTM C1371, or ASTM E408. All other roof surfaces shall be modeled with a reflectance of 0.30.

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FOREWORD

This addendum originally applied to the changes published in ANSI/ASHRAE/IESNA Addendum b to ANSI/ASHRAE/IESNA Standard 90.1-2001. This addendum adds a third party performance certification testing program to the heat rejection equipment requirements in Table 6.2.1G.

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions

specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum ak to 90.1-2004 (I-P and SI Editions)

Reviewer Note: Delete Section 6.4.1.4(f) as follows:

6.4.1.4 Verification of Equipment Efficiencies.
Equipment efficiency information supplied by manufacturers shall be verified as follows:

(f) Products covered in Table 6.8.1G shall have efficiency ratings supported by data furnished by the manufacturer.

Reviewer Note: Revise Table 6.8.1G as follows:

In IP Units:

TABLE 6.8.1G Requirements for Performance Heat Rejection Equipment

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required ^{a b}	Test Procedure ^c
Propeller or Axial Fan Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75°F wb <i>Outdoor Air</i>	≥ 38.2 gpm/hp	CTI ATC-105 and <u>CTI STD-201</u>
Centrifugal Fan Cooling Towers	All	95°F Entering Water 85°F Leaving Water 75°F wb <i>Outdoor Air</i>	≥ 20.0 gpm/hp	CTI ATC-105 and <u>CTI STD-201</u>
Air-Cooled Condensers	All	125°F Condensing Temperature R-22 Test Fluid 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	≥ 176,000 Btu/h-hp	ARI 460
a	For purposes of this table, cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.			
b	For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.			
c	Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.			

In SI Units:

TABLE 6.8.1G Requirements for Performance Heat Rejection Equipment

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required ^{a b}	Test Procedure ^c
Propeller or Axial Fan Cooling Towers	All	35°C Entering Water 29°C Leaving Water 24°C wb Outdoor Air	≥3.23 L/s·kW	CTI ATC-105 <u>and</u> <u>CTI STD-201</u>
Centrifugal Fan Cooling Towers	All	35°C Entering Water 29°C Leaving Water 24°C wb Outdoor Air	≥1.7 L/s·kW	CTI ATC-105 <u>and</u> <u>CTI STD-201</u>
Air-Cooled Condensers	All	52°C Condensing Temperature R-22 Test Fluid 88°C Entering Gas Temperature 8°C Subcooling 35°C Entering db	≥69 COP	ARI 460
a	For purposes of this table, cooling tower performance is defined as the maximum flow rating of the tower divided by the fan nameplate rated motor power.			
b	For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.			
c	Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.			

Reviewer Note: Update the following references in Section 12:

Reference	Title
Cooling Technology Institute, 2611 FM 1960 West, Suite A-101, Houston, TX 77068-3730; P.O. Box 73383, Houston, TX 77273-3383	
CTI ATC-105 - (95) <u>2000</u>	Acceptance Test Code for Water Cooling Towers
CTI STD-201 - (97) <u>2002</u>	Standard for the Certification of Water-Cooling Tower Thermal Performance

(This appendix is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

**APPENDIX
18-MONTH SUPPLEMENT
ADDENDA TO ANSI/ASHRAE STANDARD 90.1-2004**

This 18-month supplement includes Addenda *a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, r, s, t, u, v, x*, and *ak* to ANSI/ASHRAE Standard 90.1-2004. The following table lists each addendum and describes the way in which the standard is affected by the change. It also lists the ASHRAE and ANSI approval dates for each addendum.

Addenda to 90.1-2004	Sections Affected	Description of Changes*	Approval Dates	
			•Standards Committee	•ASHRAE BOD
			•IESNA	•ANSI
90.1a	Informative Appendix G, Performance Rating Method	The changes clarify how windows should be distributed in the baseline simulation model, how uninsulated assemblies should be treated in the baseline simulation model, increases the size range for the use of packaged VAV systems in the baseline model, and provides more detail on how service hot water systems should be modeled	1/21/06	
			1/26/06	
			1/18/06	
			4/10/06	
90.1b	6. HVAC	This proposal corrects the deficiencies in test procedures as well as inconsistencies between the efficiency numbers in the standard and those of federal regulations as noted by DOE on Addendum d to 90.1-2001	6/25/05	
			6/30/05	
			8/3/05	
			8/3/05	
90.1c	5. Building Envelope, 3.2 Definitions and 5.4.3.4 Vestibules	This addendum revises the definition of <i>building entrance</i> to include vestibules and clarifies the requirements and exceptions for vestibules in Section 5.4.3.4.	6/25/05	
			6/30/05	
			8/3/05	
			8/3/05	
90.1d	12. Normative References	This addendum updates the references applicable to the building envelope, Section 5, and deletes references that are not cited in the body of the standard or appendices	6/25/05	
			6/30/05	
			8/3/05	
			8/3/05	
90.1e	9. Lighting: Section 9.1.4 Luminaire Wattage	This addendum recognizes that track and busway type lighting systems can be limited by circuit breakers and permanently installed current limiters below a value of 30 W/lin ft (98 W/lin m)	6/25/05	
			6/30/05	
			8/3/05	
			8/3/05	
90.1f	6. HVAC	This addendum raises the minimum efficiency standard for 3-phase air-cooled central air conditioners and heat pumps less than 65,000 Btu/h in Tables 6.8.1A and 6.8.1B of Standard 90.1-2004 to 13 SEER/7.7	1/21/06	
			1/25/06	
			1/18/06	
			4/10/06	

90.1g	6. HVAC	This addendum amends the minimum efficiency levels of air-cooled air conditioners and heat pumps greater or equal to 65,000 Btu/h contained in Tables 6.8.1 A and 6.8.1B of Standard 90.1-2004.	1/21/06 1/25/06 1/18/06 4/10/06
90.1h	6. HVAC	This addendum revises the exceptions to Sections 6.4.3.1.2 and 6.4.3.6 in Standard 90.1-2004. Table 2.1 of ASHRAE's Thermal Guideline for Data Processing Environments (pg. 10), provides environmental conditions for electronic equipment such as that found in data processing centers.	1/21/06 1/25/06 1/18/06 4/10/06
90.1i	9. Lighting	This addendum adds language to Section 9.1.4(b) that allows additional flexibility in assigning wattage to luminaires with multi-level ballasts where other luminaire components would restrict lamp size	1/21/06 1/25/06 1/18/06 4/10/06
90.1j	9. Lighting	This addendum to Section 9.4.1.3 allows additional flexibility in complying with the controls requirements by allowing additional combinations of commonly available control equipment	1/21/06 1/25/06 1/18/06 4/10/06
90.1k	Appendix A,	This addendum adds U-factors for R-19 insulation to Table A2.3	1/21/06 1/25/06 1/18/06 4/10/06
90.1l	12. Normative References	This addendum updates the reference to the latest version of Standard 140, the 2004 version, which includes additional tests covering unitary cooling equipment models	1/21/06 1/25/06 1/18/06 4/10/06
90.1m	9. Lighting	This addendum to the exception to 9.2.2.3 provides an option for compliance that exempts the commonly used furniture mounted track lighting if it incorporates automatic shutoff	1/21/06 1/25/06 1/18/06 4/10/06
90.1n	5. Building Envelope	This addendum to section 5.5.4.4.1 provides an exception to allow a user to take credit for overhangs towards compliance with the maximum SHGC requirements. It provides clarification on how the credits would apply to louvered overhangs and to partially opaque overhangs.	1/21/06 1/25/06 1/18/06 4/10/06
90.1o	Appendix D: International Climate Data	This addendum increases the amount of International Climate data available for China, Taiwan, Mexico, and Malaysia.	1/21/06 1/25/06 1/18/06 4/10/06
90.1p	9. Lighting	This addendum modifies exception (g) to section 9.2.2.3 to allow for increased lighting for medical and age related issues, in addition to visual impairment	1/21/06 1/25/06 1/18/06 4/10/06

			1/21/06
90.1r	12. Normative References	This addendum updates the reference to ARI 340/260 from the 2000 edition to the 2004 edition	1/25/06
			1/18/06
			4/10/06
90.1s	6. HVAC and 12. Normative References	This addendum updates language in the standard based on differences between 62-1999 and 62.1-2004. The reference has also been updated	1/21/06
			1/25/06
			1/18/06
			4/10/06
90.1t	6. HVAC and 12. Normative References	This addendum changes Table 6.8.1F to add an additional requirement of combustion efficiency to the current requirement of thermal efficiency for boilers	1/21/06
			1/25/06
			1/18/06
			4/10/06
90.1u	Normative Appendix G	This addendum provides guidance for complying with the intent of the baseline building design for HVAC systems 5, 6, 7, and 8 which shall be modeled as floor-by-floor HVAC systems	1/21/06
			1/25/06
			1/18/06
			4/10/06
90.1v	6. HVAC	This changes Section 6.2.3.8, Ventilation Controls for High-Occupancy Areas.	1/21/06
			1/25/06
			1/18/06
			4/10/06
90.1x	5 Envelope, 12 Normative References, and Normative Appendix G	This addendum adds a reference and method of test for deriving SRI (ASTM Test Method E, 1980) for high albedo roofs. The changes in the standard were in both Section 5 and Appendix G	1/21/06
			1/25/06
			1/18/06
			4/10/06
90.1ak	Table 6.2.1G, Performance Requirements for Heat Rejection Equipment, and Section 6.2.1	Proposed change to Table 6.2.1G to add requirements for cooling towers to be tested to CTI test procedures and to update the corresponding references in Section 6.2.1.	6/25/2005
			6/30/2005
			7/1/2005
			8/3/2005

*These descriptions may not be complete and are provided for information only.

**POLICY STATEMENT DEFINING ASHRAE'S CONCERN
FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES**

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

11/09

Errata noted in the list dated 8/21/08 have been corrected.