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AET N° 02/04 - ELABORAÇÃO DE REGULAMENTAÇÃO E CLASSIFICAÇÃO DE EDIFICAÇÕES EFICIENTES

PROCESSAMENTO DE ARQUIVOS CLIMÁTICOS PARA SIMULAÇÃO DO DESEMPENHO ENERGÉTICO DE EDIFICAÇÕES

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Para: ELETROBRÁS/PROCEL

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RESUMO

Dados horários registrando condições climáticas para criação de arquivos climáticos com o objetivo de simular o desempenho térmico de edificações costumam ser escassos e de baixa qualidade. Há poucas estações automáticas no território brasileiro que fornecem dados horários de temperatura de bulbo seco, temperatura de bulbo úmido ou umidade relativa, direção do vento, velocidade do vento, nebulosidade e pressão. Há menos ainda estações que medem a radiação solar, dado necessário para completar a série de dados mínimos utilizados para compilar um arquivo climático.

A partir de arquivos climáticos já existentes, obtidos da INFRAERO na década de 1990, foi realizada uma revisão e correção de dados, preparando-os para novas compilações. Os arquivos climáticos existentes em formatos texto (*.try) e em um formato específico para o programa de simulação de desempenho térmico DOE 2.1-E (*.bin) foram comparados, ajustando os erros encontrados entre estes e que fossem incompatíveis com a realidade climática do local a que o arquivo se referia. Como não havia dados horários medidos de radiação solar, estes foram estimados após avaliação do melhor método a ser adotado para estimação da radiação global horizontal horária.

Dois métodos foram avaliados, um originado de pesquisas realizadas para criação de arquivos com dados climáticos internacionais, arquivos IWEC, e outro originado de pesquisa realizada na Universidade Federal de Santa Catarina. Os dois métodos foram testados para cinco cidades brasileiras, Belém, Recife, Brasília, São Paulo e Porto Alegre, e comparados com médias mensais de totais diários de irradiação solar de bibliografia existente, tanto nacional com internacional. O primeiro método, o método de Kasten, apresentou maiores distorções em relação à principal fonte de dados, o *Atlas de Irradiação solar do Brasil*. O segundo método, método LabEEE, foi então aplicado nos arquivos climáticos referentes às 14 cidades brasileiras com dados disponíveis, Belém, São Luís, Fortaleza, Recife, Natal, Maceió, Salvador, Vitória, Rio de Janeiro, Brasília, São Paulo, Curitiba, Florianópolis e Porto Alegre. Após obtida a radiação global horizontal horária, foram estimadas as radiações direta e difusa horizontais e, a partir dessas, a radiação direta normal. Correções foram realizadas na estimação deste último dado.

Por fim, três tipos de arquivos climáticos foram produzidos. Os arquivos do tipo bin, para o programa DOE 2.1-E foram renovados, contendo a partir de então dados pré-calculados de radiação solar. Os arquivos tipo epw foram gerados pela primeira vez para simulação do desempenho térmico de edificações no programa EnergyPlus. Foram também criados arquivos climáticos para consulta de dados, no formato texto, csv, de forma que o usuário possa não somente consultar mas manipular os dados horário caso seja de seu interesse. Acompanhando estes arquivos, foram também gerados os arquivos estatísticos dos arquivos bin e epw, e planilhas com um resumo dos dados do arquivo csv.

SUMÁRIO

1 INTRODUÇÃO

O desempenho térmico de uma edificação está diretamente relacionado às condicionantes externas do tempo, como temperatura do ar, umidade e radiação. A representação do fenômeno em modelos matemáticos exige então o registro destes dados do clima, razão pela qual os programas computacionais que simulam o desempenho térmico de edificações necessitam dos dados climáticos. Quanto mais detalhado for o programa, mais detalhamento deverá ter um arquivo climático, chegando atualmente ao estágio de ser necessário o registro horário de dados climáticos para atender a programas computacionais como o DOE-2.1E e EnergyPlus. Um ano completo com as quatro estações representadas é composto por 8760 horas, resultando em um grande número de dados, salientando que cada hora contém registrados: temperatura de bulbo seco, temperatura de bulbo úmido, velocidade de vento, direção do vento, etc. Dados climáticos horários são registrados em estações automáticas, mais freqüentes em aeroportos e em estações climáticas que, assim como os aeroportos, geralmente se localizam fora da zona urbana. A localização destas estações implica em uma imprecisão por não registrar os efeitos da cidade no microclima e, portanto, no desempenho térmico de uma edificação. Além disso, deve-se considerar a possibilidade de falhas nos equipamentos ou interrupção nas medições para manutenção, gerando lacunas sem registros nos arquivos.

A dificuldade de obtenção de dados de qualidade é ainda prejudicada pela escassez de estações que meçam a radiação solar, essencial para uma análise de desempenho térmico em um país tropical que tem alta incidência de radiação em todo o seu território. Entretanto, é um fator de difícil obtenção, com poucas estações distribuídas irregularmente em um território de grande variação de latitudes, de condições de céu e de turbidez do ar, relacionadas à localização geográfica, topografia, níveis de poluição, dentre outros. Estas limitações exigem que a geração de arquivos climáticos para a simulação do desempenho térmico de edificações não se restrinja a compilar dados para o formato do programa a ser utilizado, mas que envolva o tratamento dos dados com ajustes de possíveis falhas nos registros e desenvolvimento de modelos que representem os fenômenos cujos dados não foram medidos.

Este relatório apresenta a metodologia usada para revisão de arquivos climáticos, ajustes de modelos para estimativa de dados de radiação e compilação de arquivos em formatos para consulta e compatíveis com dois programas computacionais de simulação de desempenho térmico, o DOE 2.1-E e EnergyPlus. O item 2 deste relatório apresenta um histórico dos arquivos climáticos e dados já existentes, mostrando a necessidade de atualização dos dados. O item 3 apresenta a metodologia de revisão e correção dos arquivos e o item 4 a metodologia de estimativa dos dados de radiação solar. Os resultados da compilação dos novos formatos são apresentados no item 5 e a conclusão, no item 6. Os anexos apresentam gráficos com dados horários estimadas para a radiação global horizontal, os arquivos estatísticos dos novos formatos para simulação e as planilhas diagnóstico dos dados horários.

2 FONTE DE DADOS: ARQUIVOS CLIMÁTICOS EXISTENTES

Os dados utilizados são oriundos de arquivos climáticos existentes no LabEEE, disponibilizados na página eletrônica do laboratório (www.labeee.ufsc.br). Os dados foram medidos em aeroportos em 14 capitais brasileiras e obtidos em fitas magnéticas através da Associação Brasileira de Refrigeração, Ar-condicionado, Ventilação e Aquecimento - Instituto Brasileiro do Frio, ABRAVA/IBF junto ao Centro Técnico Aeroespacial - Instituto de Aeronáutica eEspaço, CTA/IAE INFRAERO (GOULART, 1993).

Estes dados foram tratados, gerando dois tipos de arquivos climáticos: os arquivos cuja extensão é try e os arquivos cuja extensão é bin. Os arquivos climáticos com extensão try são arquivos texto, utilizados pelo programa Analysis Bio, para avaliação das condições de conforto térmico de ambientes internos utilizando uma carta psicrométrica. Os arquivos climáticos .bin são utilizados para simulação do desempenho térmico de edificações no programa DOE - 2.1E. Os arquivos bin não permitem que a simulação se realize no DOE - 2.1E caso as 8760 horas de cada dado não estejam completas, ao contrário dos arquivos com extensão try para o programa Analysis Bio.

É importante não confundir um arquivo com extensão try com um arquivo TRY, *Test Reference Year*, traduzido como Ano Climático de Referência. Um arquivo climático TRY é formado através de uma metodologia baseada na eliminação de anos cujos dados contêm temperaturas médias mensais extremas (altas ou baixas) até que se obtenha apenas um ano de dados médios (GOULART et al, 1997). É um ano sem extremos de temperatura. O TRY é então uma série de dados climáticos tratados segundo uma metodologia e representa uma situação referencial do clima do local em questão, enquanto o arquivo com extensão try é um formato para uso específico em um programa computacional, sendo de difícil visualização.

A figura 1 apresenta o formato de um arquivo com extensão try. Os dados são seguidos, sem espaçamento ou vírgulas separando vários fatores climáticos. Os espaçamentos existentes referem-se a algum dado nulo, além de dados que simplesmente não existem no arquivo, como as camadas de cobertura de nuvens, representadas pelo grande espaço em branco da figura. As separações das casas decimais foram também excluídas. A descrição de cada fator climático existente nos arquivos com extensão try, incluindo sua localização, número de dígitos e unidade, está disponível em Goulart et al (1997) e orienta a consulta dos dados para objetivos distintos ao uso no programa Analysis Bio.

```
83780174159 15120 21 9250 13 16050    .    .    .          54 1 1 0
83780174159 15160 15 9250  0    .    .    .    .          54 1 1 1
83780172161 15170 10 9240  0    .    .    .    .          54 1 1 2
83780172162 15  0  0 9234  0    .    .    .    .          54 1 1 3
83780164159 15 70 10 9234 88 77021    .    .    .          54 1 1 4
83780160156 15 50 77 9234100 87020    .    .    .          54 1 1 5
83780164158 15 30 72 9244100 87020    .    .    .          54 1 1 6
83780168160 15 30 51 9244 75 67020    .    .    .          54 1 1 7
83780178167 16 30 41 9244 38 37020    .    .    .          54 1 1 8
83780195175 16 50 51 9242 13 16025    .    .    .          54 1 1 9
83780222188 17 20 10 9242  0    .    .    .    .          54 1 110
83780250196 17 30 15 9240 13 18080    .    .    .          54 1 111
83780259200 17330 36 9230 63 58080    .    .    .          54 1 112
83780277205 17340 15 9220 75 68080    .    .    .          54 1 113
```

Figura 1. Catorze horas de dados climáticos existentes em um arquivo com extensão try.

Os arquivos bin são gravados em código binário, ou seja, não é possível visualizar seus dados em um editor de texto comum, e são acompanhados de arquivos texto com análises estatísticas dos dados, com extensão sta. Os dados são compostos em unidades inglesas, como temperaturas em *Farenheint* e velocidade do vento em 'nós'. São arquivos exclusivos para uso no programa computacional DOE - 2.1E.

Os arquivos TRY disponíveis na página eletrônica do LabEEE (www.labeee.ufsc.br), em formato try e bin, referem-se às seguintes capitais: Belém, Brasília, Curitiba, Florianópolis, Fortaleza, Maceió, Natal, Porto Alegre, Recife, Rio de Janeiro, Salvador, São Luis, São Paulo e Vitória. Além dos Anos Climáticos de Referência (TRY), há também arquivos com anos reais, ou seja, arquivos climáticos medidos em um ano qualquer, sem ter passado por qualquer tipo de seleção quanto à sua representatividade. Pode ser, então, um conjunto de registros de dados climáticos ocorrido em um ano atípico.

Além destas fontes, foram utilizadas outras fontes de dados para conferência. O *National Climatic Data Center, NCDC* do *Department of Energy, DOE,* dos Estados Unidos reuniu uma base de dados climáticos horários de estações de aeroportos brasileiros. Os dados foram tratados de acordo com a metodologia de criação de um TMY2, *Test Meteorological Year*, versão 2. Enquanto o TRY é um arquivo sem extremos de temperatura de um ano, o TMY2 é uma compilação de meses sem extremos de temperatura provenientes de diferentes anos, gerando um ano climático que nunca existiu mas que apresenta temperaturas sem extremos para cada mês (NREL, 1995). O TMY2 apresenta dados que não existem no formato original do TRY, como dados de radiação solar global horizontal e direta normal, também existentes no formato TMY, porém com séries de longo termo desenvolvidas pelo *National Renewable Energy Laboratory* (CRAWLEY e HUANG, 1997). Os arquivos climáticos IWEC[1],

[1] Deve-se cuidar para não confundir os arquivos IWEC, *International Weather for Energy Calculations*, com arquivos WYEC, *Weather Years for Energy Calculations*. Os arquivos WYEC surgiram em 1980 como uma continuidade do TRY, porém com dados de radiação solar

International Weather for Energy Calculations, resultado do trabalho do NCDC, foram gerados com base no formato TMY2 para depois serem convertidos em outros formatos, como o epw. Os formatos do Energy Plus (epw) são também baseados no formato TMY2. Devido à baixa qualidade dos dados climáticos brasileiros fornecidos ao NCDC, somente quatro cidades brasileiras tiveram processados o seu arquivo IWEC, *International Weather for Energy Calculations*: Belém, Brasília, Recife e São Paulo. Estes arquivos são disponibilizados na página eletrônica do DOE em formato epw, para simulação no *Energy Plus* e foram utilizados para comparação das estimativas de radiação solar.

medidos, quando disponíveis, ou calculados, se preciso, para 51 localidades norte americanas. Uma década depois, o método de cálculo da radiação foi melhorado e novos WYEC foram desenvolvidos a partir de arquivos TMY, porém incluindo iluminância do céu, concomitantemente à geração dos arquivos TMY2 (CRAWLEY e HUANG, 1997).

2.1 LIMITAÇÕES NOS ARQUIVOS

A utilização dos arquivos ao longo dos anos revelou alguns problemas. A visualização dos dados para análise sem uso do programa Analysis Bio é uma limitação, devido ao formato texto contínuo (sem espaçamento dos dados) dos arquivos com extensão try e devido à impossibilidade de visualização dos arquivos com extensão bin. Os arquivos com extensão sta, que acompanham o bin, adotam as unidades de medida inglesas e portanto requerem um tratamento (conversão para sistema internacional) antes de serem analisados. Alguns arquivos apresentaram registros vazios de nebulosidade, outros, as horas a que se referiam estavam defasadas em 3 horas (hora GMT x hora local), e outros apresentavam temperaturas incompatíveis com a realidade climática da cidade. Estas situações indicaram a necessidade de revisão dos arquivos, identificando e corrigindo os possíveis erros.

Além da qualidade dos arquivos climáticos, foi também identificado que a radiação solar era responsável por distorções nos dados. A fonte de dados dos aeroportos não continha radiação solar, somente registros horários de cobertura de nuvens. Os arquivos TRY foram então compilados de duas formas: os com extensão try não continham a radiação solar por serem desnecessários na versão da época do Analysis Bio, e os com extensão bin continham dados horários de cobertura de nuvens que eram utilizados pelo programa DOE-2.1E para calcular a radiação solar horária. Entretanto, em 1999, Krüger e Lamberts compararam a radiação solar horária gerada pelo programa com a radiação solar horária medida na estação do LABSOLAR/UFSC, encontrando um baixo coeficiente de determinação, R^2, de 0,58 para a cidade de Florianópolis, com uma grande dispersão da nuvem de pontos (KRUGER e LAMBERTS, 1999). O estudo mostrou que os dados calculados pelo DOE 2.1-E, cujos algoritmos foram desenvolvidos com dados de radiação do hemisfério norte, não são apropriados para aplicação no Brasil. Como não há radiação solar medida disponível, foi necessário o desenvolvimento de algoritmos próprios com dados medidos locais.

Uma das primeiras iniciativas para desenvolver algoritmos para estimativa da radiação solar adequada ao clima brasileiro resultou nas equações para cálculo dos totais diários de radiação global horizontal para Florianópolis, desenvolvidos por Pitta (2001). No mesmo ano, este método foi adaptado por Carlo e Lamberts (2001) para estimar a radiação global horizontal horária nas cidades do Rio de Janeiro e Manaus, e desmembrar a radiação global nas suas parcelas direta e difusa. Estes métodos fundamentam os atuais estudos para a radiação solar descritos no item 4 deste relatório.

3 REVISÃO

Os arquivos climáticos existentes na página eletrônica do LabEEE foram revisados a fim de se identificar a qualidade de seus dados e a existência de possíveis erros. Foi conferido se todos possuíam as 8760 linhas que formam um ano completo de dados horários e se havia ausência de dados, como temperatura de bulbo seco, TBS, temperatura de bulbo úmido, TBU, nebulosidade e pressão.

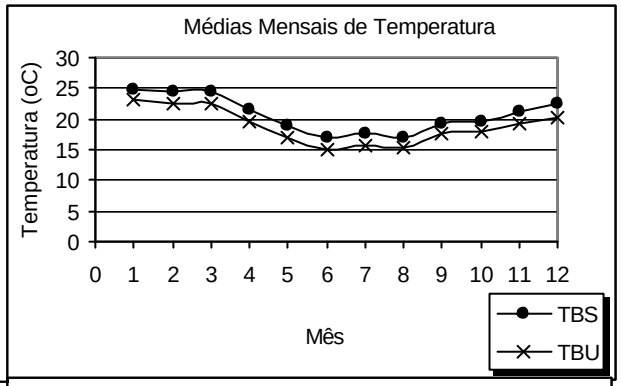
Foi usada uma planilha com um resumo dos dados que indicou possíveis erros, cujo exemplo, para a cidade de Florianópolis, é mostrado na figura 2.

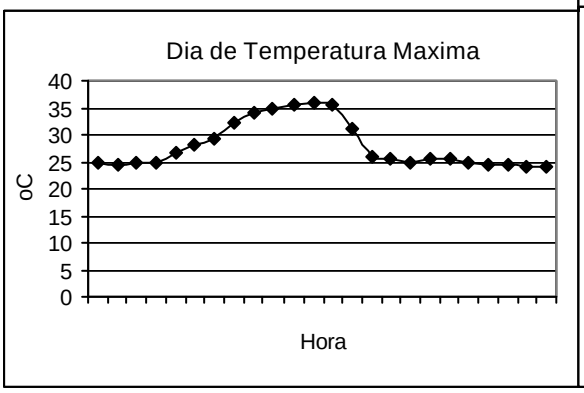
Média dos dados horários							
	tbu	tbs	pressão	neb	rad global	rad direta normal	veloc.do ar
	(oC)	(oC)	(kPa)		(W/m²)	(W/m²)	(m/s)
Máxima	31.7	36.1	102.9	10	0	0	11.8
Média	18.8	20.7	101.5	6.4	0.0	0.0	2.7
Mínima	1.7	2.2	99.9	0	0	0	0

TBS>TBU	há erros
I noturna*=0	OK
I diurna**>0	OK
I>Ib	OK

*Das 21 h às 4 h
**Das 8 h às 17 h

Tmax	
Mês	Dia
1	8





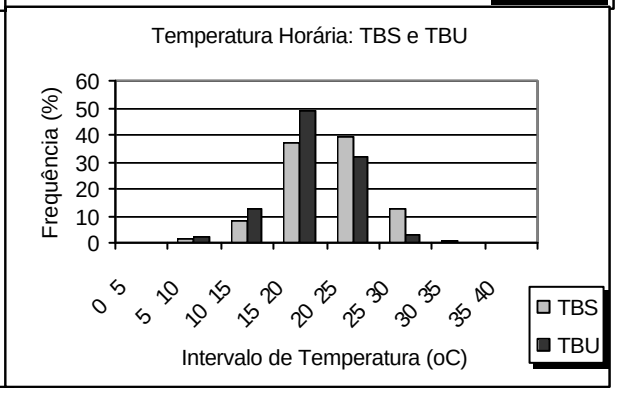


Figura 2. Planilha de análise de dados climáticos, com resumo do TRY de Florianópolis.

Na figura 2, os dados de radiação estão em branco pois ainda não existiam no arquivo climático analisado. As máximas e mínimas apresentam os limites que devem ser compatíveis com a realidade climática da cidade em questão. A planilha também indica os dados com valor zero, que podem significar uma situação de céu claro no caso da nebulosidade, ou ausentes, como no caso da radiação solar. É também necessário que a temperatura de bulbo úmido seja

obrigatoriamente menor que a temperatura de bulbo seco e que haja radiação solar zero no período noturno. A planilha também apresenta as médias mensais de temperatura, indica o dia e mostra a variação horária em que a temperatura máxima ocorre e apresenta a freqüência de ocorrência de temperaturas. Também detalha a variação horária do dia de radiação global máxima e a freqüência de ocorrência da radiação global, como no caso das temperaturas, porém estes gráficos não são mostrados na figura 2 devido à ausência de dados de radiação no arquivo climático.

Foram encontrados erros em três arquivos de extensão TRY e em doze arquivos de extensão BIN, sendo necessário então efetuar a sua correção. A tabela 1 apresenta o total de erros encontrados em cada arquivo. O arquivo climático que mais possuía erros foi o ano real do Rio de Janeiro, com 15,0% de dados incorretos, seguido do ano real de Fortaleza, com 13,4%. O TRY de Salvador já havia sido corrigido em etapa anterior, e não foi incluído na contagem, mas este simplesmente não apresentava dados de nebulosidade no seu formato bin.

Tabela 1. Total de erros encontrados nos arquivos climáticos

Nome do arquivo	Total de erros	Percentual de erros no arquivo (%)	Tipo de arquivo
Rio de Janeiro	24	0,3	try
Salvador	48	0,5	try
Maceió	50	0,6	try
Belém	7	0,1	bin
Brasília	12	0,1	bin
Curitiba	189	2,2	bin
Florianópolis	25	0,3	bin
Fortaleza – Ano real	1175	13,4	bin
Maceió	7	0,1	bin
Petrolina – Ano real	32	0,4	bin
Porto Alegre – Ano real	80	0,9	bin
Porto Alegre	80	0,9	bin
Rio de Janeiro – Ano Real	1316	15,0	bin
Rio de Janeiro	5	0,1	bin
São Paulo	24	0,3	bin

Identificados os erros, os dados foram corrigidos a fim de se completar as 8760 horas necessárias para formar um ano completo. Em caso de dados ausentes em que o número de horas sem dados não ultrapassou 6 horas consecutivas, o procedimento consistiu em interpolar os valores ausentes. Em casos que o número de horas de dados ausentes foi superior a 6 horas, a tendência do gráfico contendo três dias antes e três dias depois do intervalo ausente foi estudada. Quando necessário, mais dias foram acrescentados. De acordo com a tendência da curva, foram copiadas as horas correspondentes de um dia anterior ou posterior.

As figuras 3 e 4 mostram o preenchimento de 10 horas de temperaturas ausentes, das 12h às 24h do dia 8 de janeiro. A tendência das curvas de temperatura mostrou ser mais adequado copiar os dados da mesma hora do dia 9 de janeiro devido a uma queda nas temperaturas nos dois dias anteriores.

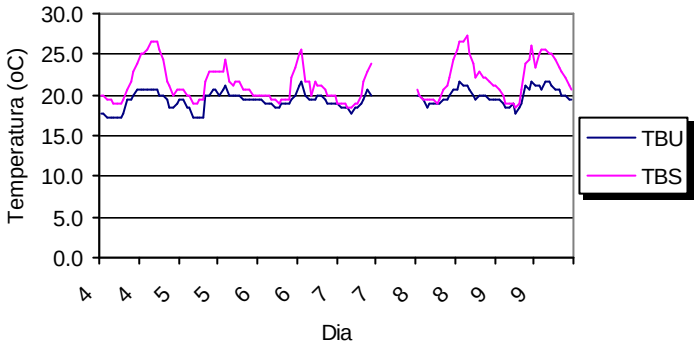


Figura 3. Horas ausentes nos primeiros dias do mês de janeiro para o TRY de Brasília.

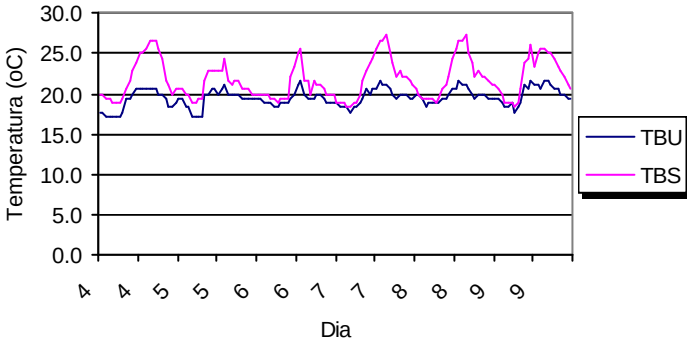


Figura 4. Correção: as horas ausentes são completadas com os dados de horas equivalentes de um dia anterior ou posterior.

4 RADIAÇÃO SOLAR

Quando Kruger e Lamberts (1999) apontaram uma baixa correlação entre a radiação global horizontal calculada pelo programa DOE-2.1E para a cidade de Florianópolis e os dados de radiação solar medidos na cidade pelo LABSOLAR/UFSC, com coeficiente de determinação, R2, de 0,58, percebeu-se uma necessidade de desenvolver método próprio, ou adaptar metodologias já existentes para as condições de céu do Brasil. Kruger e Lamberts (1999) mostraram que a radiação global calculada pelo programa é estatisticamente diferente do medido, assim como outros algoritmos baseados na cobertura de nuvens desenvolvidos no hemisfério norte e testados sem ajustes em seus coeficientes para o céu do Brasil. As estimativas de radiação solar global com o uso de dados horários de nebulosidade do DOE 2.1-E mostraram-se fiéis à realidade somente em situações extremas: com cobertura total de nuvens e com céu claro.

Assim, a carência de dados de radiação solar nos arquivos climáticos, a sua importância nas simulações e a imprecisão dos cálculos por programas computacionais que utilizam dados do hemisfério norte motivaram o estudo de algumas metodologias de estimativa de dados de radiação solar. Os itens a seguir apresentam as metodologias selecionadas dentre diversas estudadas para a estimativa da radiação solar global horizontal, e os procedimentos adotados para a estimativa das radiações direta e difusa horizontais e radiação direta normal.

4.1 RADIAÇÃO SOLAR GLOBAL HORIZONTAL

Dois métodos para a estimativa da Radiação Solar foram estudados, o método Kasten, descrito em Thevenard e Brunger (2001), e o método LabEEE, desenvolvido por Pitta (2001) no Laboratório de Eficiência Energética em Edificações. Esses dois métodos foram, inicialmente, adaptados a quatro diferentes cidades, de modo a se avaliar sua viabilidade. Para isso foi necessário estimar novos coeficientes para os dois métodos, trabalho este que foi feito com base nas médias mensais dos totais diários de radiação global horizontal expressos em Colle e Pereira (1998) do Laboratório de Energia Solar, LABSOLAR, da UFSC.

O modelo de Kasten (THEVENARD e BRUNGER, 2001) é considerado, por vários pesquisadores, um modelo relativamente simples e de fácil utilização. Foi utilizado parcialmente para a geração dos arquivos IWEC, *International Weather for Energy Calculations*, pois, outro modelo, Metstat (THEVENARD e BRUNGER, 2001), foi adotado para cálculos de céu claro e a radiação horária para céu claro encontrada foi aplicada no modelo para céu com nuvens de Kasten (equação 2) . A equação 1 apresenta a equação para céu claro, não utilizada na geração dos arquivos IWEC, enquanto a equação 2 apresenta o modelo para céu nublado e parcialmente nublado, que possui somente a cobertura total de nuvens como dado de entrada, não levando em consideração o tipo das mesmas.

A radiação para céu claro é dada por:

$$I'g = I_0 A \exp(-BT_l m) \qquad \text{(equação 1)}$$

e a radiação global é calculada por:

$$Ig = I'g(1 - aCA^b) \qquad \text{(equação 2)}$$

onde: I_0 = radiação extraterrestre [W/m^2];

T_l = fator de turbidez de Linke;

m = massa de ar [adimensional]

C = nebulosidade [décimas];

a, b, A e B, coeficientes específicos para cada cidade.

O valor da massa de ar (m), é obtido pela expressão descrita em NREL (1995):

$$m = \frac{P}{P_{ref}} x \frac{1}{\cos q + 0{,}50572x(96{,}07995 - q)^{-1{,}6364}} \qquad \text{(equação 3)}$$

onde: P = pressão atmosférica local [Pa];

P_{ref} = 101325 [Pa];

q = ângulo zenital [graus ou radianos].

O cálculo do ângulo zenital foi feito com base em Duffie e Beckman (1991), página 16:

$$\cos q = \text{sen}\, f\, \text{sen}\, d + \cos f \cos d \cosh \qquad \text{(equação 4)}$$

onde : f = latitude [graus ou radianos];

d = declinação [graus ou radianos];

h = ângulo horário [graus ou radianos].

Já o modelo de Pitta (2001) consiste em uma equação para estimar os totais diários de radiação global horizontal (H_g) em Florianópolis a partir da média diária da cobertura total de nuvens e dos totais diários de radiação global horizontal medidos na estação do LABSOLAR-UFSC. A equação possui a nebulosidade média diária e a radiação solar extraterrestre como dados de entrada, tendo ainda os coeficientes a, b e c, que se alteram de mês a mês, em razão do ciclo anual do sol. Estes coeficientes são determinados para cada cidade em estudo.

A estimativa da radiação solar é dada por:

$$Hg = (c + b(C/10) + a(C/10)^2) x H_0 \qquad \text{(equação 5)}$$

sendo: H_g = totais diários de radiação global horizontal;

H_0 = totais diários da radiação global extraterrestre [W/m^2];

C = média diária da cobertura total de nuvens [adimensional];

a, b e *c*, coeficientes mensais.

A estimativa dos totais diários de radiação global horizontal de Pitta (2001) foi avaliada por Carlo e Lamberts (2001) e Carlo (2002) para estimativa da radiação global horizontal horária. A equação 6 é semelhante à equação 5, porém com dados de radiação diária substituídos pelos dados de radiação horária, sendo que a cobertura de nuvens deve ser um dado registrado de hora a hora.

$$Ig = (c + b(N/10) + a(N/10)^2) x I_0 \qquad \text{(equação 6)}$$

sendo: I_g = radiação global horizontal horária

I_0 = radiação global horizontal extraterrestre horária [W/m^2];

N = nebulosidade horária[adimensional];

a, b e *c*, coeficientes mensais.

Após comprovar o uso da equação 6 para estimativa da radiação horária para Florianópolis, Carlo e Lamberts (2001) ajustaram o coeficiente c para a cidade do Rio de Janeiro. Calcularam a radiação global horizontal de hora a hora para obter as médias mensais dos totais diários que foram comparadas às médias mensais de Colle e Pereira (1998). O coeficiente c foi ajustado interativamente de forma a se obter a menor diferença entre as médias estimadas e as médias de Colle e Pereira (1998).

4.1.1. Ajuste do Modelo de Kasten: método Kasten adaptado

Para utilizar o modelo de Kasten sob as condições brasileiras, os coeficientes A e B, da equação 1 e os coeficientes a e b da equação 2 foram ajustados utilizando quatro cidades como referência, selecionadas de acordo com a sua distribuição pelo território brasileiro: Belém, Brasília, Recife e São Paulo.

Os valores mensais de fator de turbidez de Linke foram obtidos de mapas providos pelo sítio www.helioclim.net/linke baseado em KASTEN (1996). Outros dados necessários para a estimativa são: ângulo horário, declinação, e radiação extraterrestre; que foram calculados com base na latitude da cidade em questão e época do ano.

Com estes dados, o modelo Kasten foi implementado e foi obtida a radiação horizontal horária, sendo estes dados convertidos em médias mensais. Os coeficientes foram ajustados empiricamente baseados nas médias mensais de radiação de Colle e Pereira (1998). Em algumas cidades, foi necessário o acréscimo de uma constante C, para correção das médias mensais. Os resultados são apresentados na tabela 2.

Tabela 2.- Coeficientes estimados para o Método Kasten.

	a	B	A	B	C
Belém	0.016	0,009	0,300	0,010	-4400
Brasília	0.020	0,012	3,150	0,020	-1800
Recife	0,010	0,009	3,600	0,028	-2000
São Paulo	0.034	0,082	7,000	0,034	

É interessante notar que a constante C é mais alta nas cidades de baixas latitudes. À medida que a latitude cai, a constante C se reduz, sendo que em São Paulo ela não foi necessária. Este aspecto pode ter relação com o local onde os dados que originaram o modelo foram medidos, a Europa. O método exige então grandes ajustes para as baixas latitudes, como para cidades como Belém e Recife.

4.1.2. Ajuste do Modelo de Pitta: método LabEEE

A metodologia adotada por Carlo e Lamberts (2001) para o Rio de Janeiro e por Carlo (2002) para Manaus fundamentou o ajuste dos coeficientes mensais da equação de Pitta (2001) para as demais cidades em estudo. Primeiramente, notou-se que os coeficientes a e b de Pitta (2001) subestimavam a radiação horária em situações de baixa nebulosidade nos meses de janeiro e fevereiro para as outras cidades. Foi identificado que não ocorreu dias de céu claro, ou seja, nebulosidade zero, nos referidos meses em Florianópolis. Utilizando dados de nebulosidade zero, os coeficientes a e b fora ajustados em função do índice kt (PITTA, 2001), fator inicial de análise para o desenvolvimento da equação 5. Na tabela 3 estão apresentados os coeficientes a e b para todos os meses do ano com os devidos ajustes para os meses de janeiro e fevereiro.

Tabela 3. Coeficientes mensais a e b do método LabEEE

	jan	fev	mar	abr	mai	jun	jul	ago	set	out	nov	dez
a	-0,5	-0,5	-0,5	-0,39	-0,26	-0,46	-0,64	-0,66	-0,58	-0,77	-0,6	-0,4
b	0,1	0,1	0,1	-0,04	-0,08	0,03	0,14	0,23	0,15	0,29	0,2	-0,1

Tabela 4. Coeficiente c para cidades brasileiras

	jan	fev	mar	abr	mai	jun	jul	ago	set	out	nov	dez
Belém	0,86	0,85	0,825	0,855	0,72	0,71	0,70	0,69	0,84	0,73	0,67	0,83
Brasília	0,95	0,91	0,81	0,80	0,77	0,77	0,65	0,81	0,83	0,955	0,815	1,01
Porto Alegre	0,71	0,75	0,73	0,81	0,70	0,86	0,79	0,68	0,80	0,76	0,64	0,80
Recife	0,67	0,73	0,78	0,79	0,75	0,79	0,68	0,60	0,71	0,66	0,71	0,84
São Paulo	0,77	0,80	0,78	0,83	0,81	0,84	0,81	0,77	0,73	0,85	0,71	0,90

Em seguida, a radiação solar horária gerada pela equação 6, cujos coeficientes mensais a e b já estavam ajustados para os meses de janeiro e fevereiro, foi convertida em médias mensais de totais diários e foram comparados com as médias mensais de Colle e

Pereira (1998), procedendo conforme realizado por Carlo (2002). Os coeficientes mensais c obtidos para as quatro cidades piloto são mostrados na tabela 4.

4.1.3. Resultados Parciais

As médias mensais de totais diários de radiação global horizontal obtidas pelos dois métodos para as quatro cidades estudadas foram então comparadas com outras fontes além de Colle e Pereira (1998), provenientes de arquivos IWEC – radiação calculada por Thevernard e Brunger (2001) e de uma das fontes para o cálculo dos arquivos IWEC, a radiação fornecida pela *NASA Langley Research Center* (NASA, 2003). Desta, forma, espera-se que as radiações destas últimas duas fontes sejam semelhantes.

Na figura 4, onde é abordado o caso referente à cidade de Belém, as médias do método LabEEE coincidem com as médias de LABSOLAR em todos os meses do ano. As médias dos totais diários de radiação global horizontal calculadas pelo método Kasten aproximam-se às médias do LABSOLAR (COLLE e PEREIRA, 1998) nos meses de fevereiro a agosto e dezembro. Já nos meses de janeiro, setembro, outubro e novembro, houve uma diferença de cerca de 500Wh/m^2 entre estas médias. As médias dos totais diários fornecidos pela NASA *Langley Research Center* e as médias calculadas pela radiação existentes nos arquivos climáticos IWEC se assemelham entre si, como esperado, mas diferem significativamente das médias do LABSOLAR nos meses de janeiro a abril e em setembro.

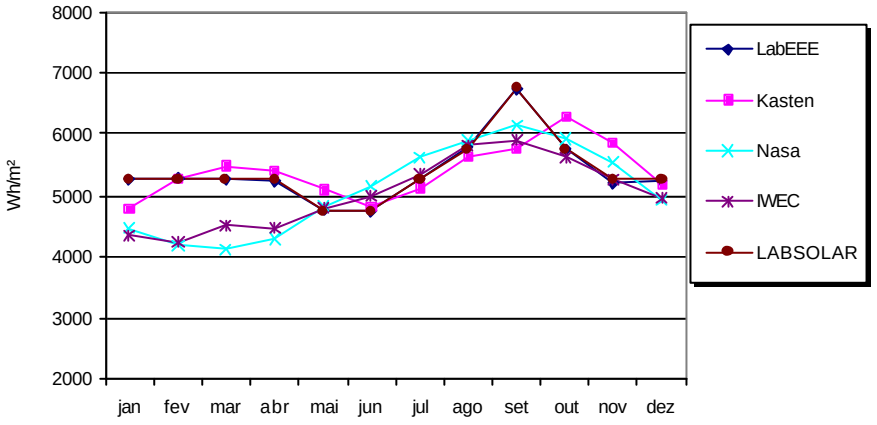


Figura 4. Médias mensais dos totais diários de radiação global horizontal calculadas para Belém

Já as médias calculadas pelo método de Kasten para a cidade do Recife acompanharam melhor a curva das médias do LABSOLAR (COLLE e PEREIRA, 1998). Ainda assim, a figura 5 mostra que as médias mensais dos totais diários de radiação global calculadas pelo método LabEEE melhor se ajustaram às médias do LABOLAR do que as médias de Kasten. Esta última, entretanto, apresentou diferenças significativas apenas nos meses de julho e agosto, de cerca de 1000Wh/m^2 e 700Wh/m^2, respectivamente. Em geral,

todas as fontes apresentam uma configuração semelhante, com máximos no verão e mínimos no inverno.

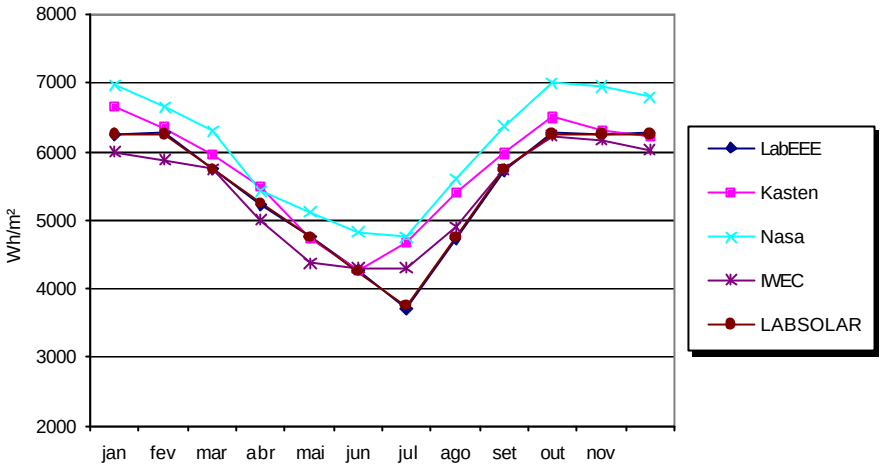


Figura 5. Médias mensais de totais diários de radiação global horizontal calculadas para a cidade do Recife

A figura 6 apresenta as médias de totais diários de radiação global horizontal para a cidade de Brasília, onde se percebe um bom ajuste entre as médias calculadas pelo método LabEEE e as médias do LABSOLAR (COLLE e PEREIRA, 1998) durante todo o ano, porém diferenças grandes entre as médias de Kasten e a do LABSOLAR (COLLE e PEREIRA, 1998). De fevereiro a abril, em julho e nos dois meses finais do ano as médias são semelhantes. Nos meses de maio até o outubro, com execeção de julho, a diferença entre as médias variou de cerca de 500Wh/m^2 (maio) a cerca de 1200Wh/m^2 (agosto e setembro). Novamente, estes dados se diferenciam muito dos dados dos arquivos IWEC e do NASA *Langley Research Center,* principalmente no período do verão, com diferenças extremas nos meses de janeiro e dezembro de até 2500Wh/m^2 em relação a LABSOLAR (COLLE e PEREIRA, 1998). Esta diferença dá-se pela configuração das curvas das médias de radiação global calculadas com os arquivos IWEC e obtidas do *NASA Langley Research Center* serem relativamente estáveis durante todo o ano, enquanto as demais curvas, LabEEE, Kasten e LABSOLAR, apresentam médias mais altas no período do verão e mais baixas no inverno.

Para a cidade de São Paulo, a figura 7 mostra novamente que as médias mensais dos totais diários de radiação global calculadas pelo método LabEEE coincidem com as médias de LABSOLAR, fornecidas por Colle e Pereira (1998). Kasten apresenta relativa semelhança com LABSOLAR (COLLE e PEREIRA, 1998), sendo que as maiores diferenças ocorrem nos meses de abril a junho, em setembro e em novembro. A diferença média é cerca de 500Wh/m^2, sendo a máxima de aproximadamente 1000Wh/m^2 no mês de novembro.

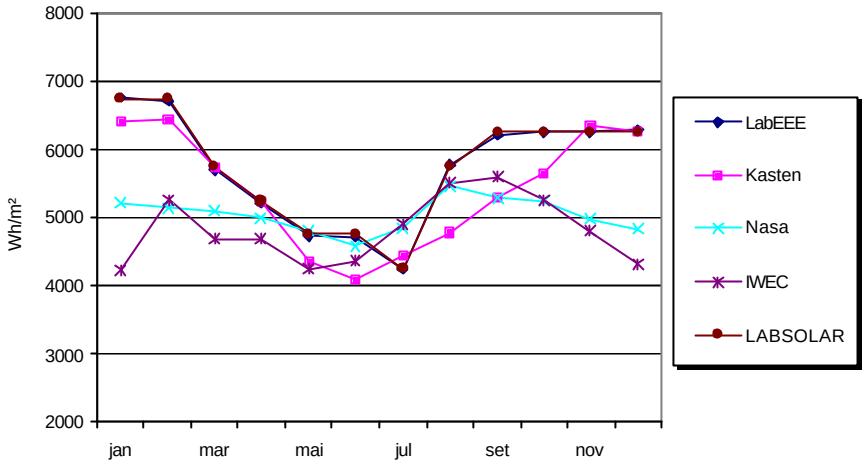


Figura 6. Médias mensais de totais diários de radiação global horizontal para Brasília

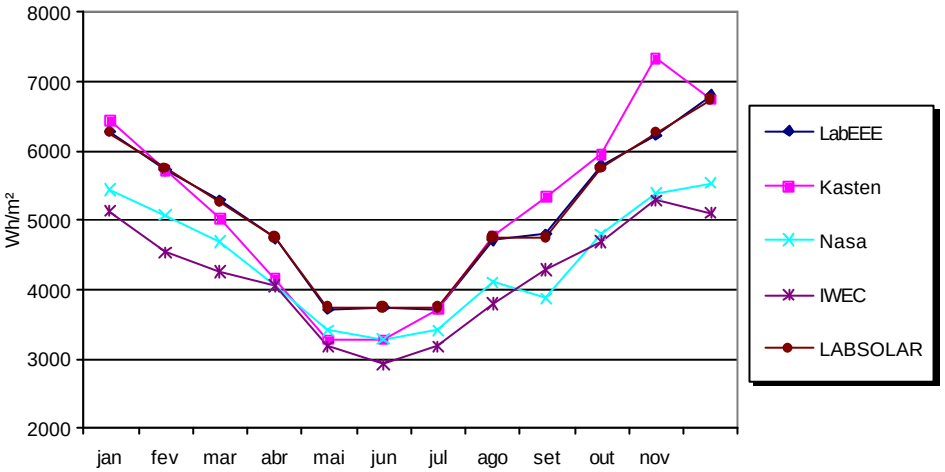


Figura 7. Médias mensais de totais diários de radiação global horizontal calculadas para a cidade de São Paulo

A cidade de Porto Alegre não possui arquivo IWEC, sendo então comparado com as médias do LABSOLAR somente. Na figura 8 observa-se como novamente foi possível a calibração do método LabEEE de forma a se conseguir médias mensais coincidentes com as de LABSOLAR. As médias de Kasten apresentam-se equivalentes às de LABSOLAR durante quase todos os meses do ano, diferindo significativamente apenas em agosto e novembro, este com a diferença máxima de pouco mais de1200W/m^2.

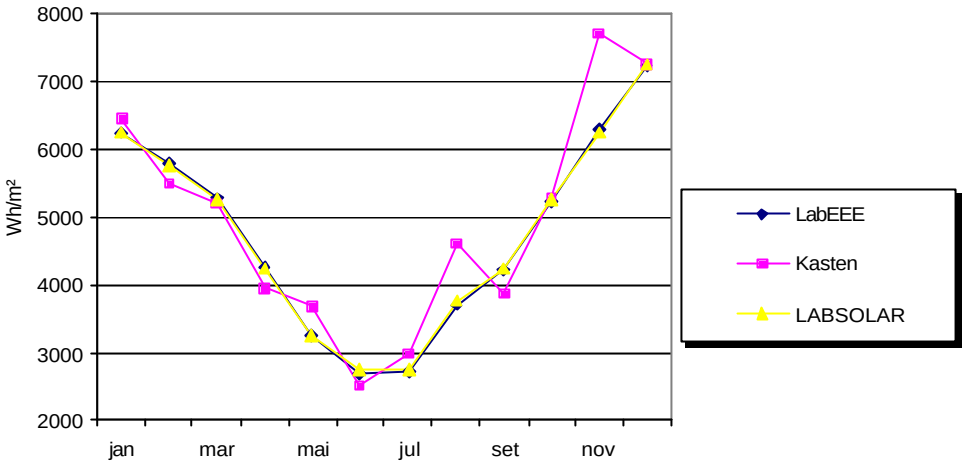


Figura 8. Médias mensais de totais diários de radiação global horizontal para Porto Alegre.

Outra forma de análise foi também efetuada ao estimar a radiação solar através dos métodos LabEEE e Kasten com os dados de nebulosidade e pressão oriundos do arquivo IWEC. Neste caso, os coeficientes não foram ajustados, tendo sido mantidos o que foi obtido no método anterior. A figura 9 apresenta as médias estimadas para a cidade do Recife. Como no caso do uso de nebulosidades diferentes, a configuração para Recife é semelhante, com médias mensais de totais diários de radiação global horizontal mais altas no verão e mais baixas no inverno.

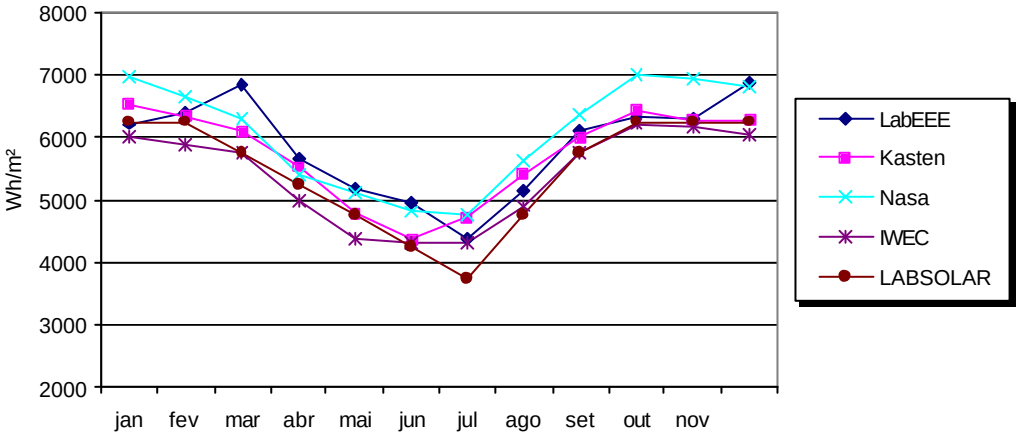


Figura 9. Médias mensais de radiação em Recife, com dados TMY2

Neste caso, as médias de LabEEE apresentam um desvio de LABSOLAR, principalmente nos meses de março a julho e também em dezembro, sendo a maior variação na ordem de 1000Wh/m^2, no mês de março. Kasten apresentou médias coincidentes com LABSOLAR nos meses de janeiro, fevereiro e de setembro a dezembro, com diferenças pequenas no demais meses, sendo a maior de 1000Wh/m^2 em julho. Em relação ao arquivo

IWEC do Recife, as diferenças usando o método LabEEE ou o método de Kasten são variáveis, sendo a concordância ora melhor com um método, ora melhor com outro.

4.1.4. Conclusão

O método Kasten, em relação aos dados de LABSOLAR de Colle e Pereira (1998), apresenta bons resultados para Belém e Recife e resultados regulares para Brasília e São Paulo. No caso de Porto Alegre, os resultados obtidos pelo método de Kasten são satisfatórios, com exceção dos meses de agosto e novembro. Não foi possível estabelecer um padrão para o comportamento da estimativa por Kasten visto que, em todos os casos, houve uma ocorrência mínima de 2 meses em que a radiação foi diferente das médias fornecidas por LABSOLAR (COLLE e PEREIRA, 1998).

As médias mensais dos totais diários estimados pelo método LabEEE foram perfeitamente ajustadas às médias mensais do LABSOLAR (COLLE e PEREIRA, 1998) para as cinco cidades avaliadas. A diferença entre estas médias foi de, no máximo, 50Wh/m^2.

Quando foram usados dados de nebulosidade e pressão dos arquivos climáticos IWEC, as médias estimadas pelo método Kasten se aproximaram mais às do LABSOLAR do que às do LabEEE nos meses de abril, junho e julho. No restante, ou as médias mensais dos totais diários coincidiram ou as estimadas pelo método LabEEE aproximaram-se mais das médias fornecidas pelo LABSOLAR (COLLE e PEREIRA, 1998).

Os resultados encontrados levaram à escolha do método LabEEE para estimativa da radiação global horizontal horária em todas as capitais brasileiras. Deve-se ressaltar que o método LabEEE foi desenvolvido com constantes mensais, o que torna mais precisa sua calibração, enquanto o método Kasten é baseado em constantes anuais.

A tabela 5 contém os valores da constante c de todos os meses do ano ajustados para as 9 cidades restantes em estudo. Vale lembrar que as constantes a e b foram mantidas iguais para todas as cidades estudadas, por não ter sido necessário o seu ajuste para a obtenção de bons resultados entre as médias mensais dos totais diários do LabEEE e as do LABSOLAR (COLLE e PEREIRA, 1998).

Tabela 5. Constante c para nove capitais brasileiras

	jan	fev	mar	abr	mai	jun	jul	ago	set	out	nov	dez
Curitiba	0,76	0,75	0,71	0,83	0,68	0,79	0,76	0,80	0,71	0,79	0,79	0,89
Florianópolis	0,76	0,75	0,67	0,71	0,69	0,69	0,70	0,68	0,68	0,70	0,68	0,75
Fortaleza	0,74	0,77	0,81	0,82	0,75	0,73	0,71	0,67	0,69	0,62	0,73	0,79
Maceió	0,73	0,70	0,79	0,79	0,79	0,86	0,76	0,72	0,76	0,76	0,78	0,87
Natal	0,85	0,78	0,79	0,85	0,77	0,85	0,81	0,70	0,71	0,72	0,76	0,88
Rio de Janeiro	0,73	0,79	0,61	0,70	0,61	0,75	0,59	0,76	0,56	0,78	0,70	0,77
Salvador	0,78	0,71	0,80	0,80	0,72	0,71	0,82	0,74	0,71	0,77	0,76	0,88
São Luis	0,71	0,82	0,78	0,84	0,83	0,81	0,80	0,75	0,74	0,70	0,76	0,90
Vitória	0,83	0,82	0,73	0,69	0,67	0,80	0,81	0,76	0,71	0,83	0,69	0,91

4.2. RADIAÇÃO SOLAR DIRETA NORMAL

A radiação solar direta normal incide sobre uma superfície receptora que se encontra alinhada em ângulo reto com a direção de incidência, formando um ângulo de incidência de 0^o com a normal à superfície. Esse dado é necessário à compilação de arquivos climáticos do tipo bin, utilizados pelo programa DOE 2.1-E. Da mesma forma que a radiação solar global horizontal, são raras as estações que mantêm medições de radiação direta de forma constante, restando a utilização de modelos analíticos para sua estimativa.

A radiação solar direta normal é estimada a partir de dados de radiação solar direta horizontal que, pode sua vez, é estimada a partir da radiação global horizontal. Em DUFFIE e BECKMAN (1991), a Radiação Direta Normal (I_{bn}) é expressa conforme a equação 7.

$$Ibn = \frac{Ib}{\cos(q)}, \qquad \text{(equação 7)}$$

onde Ib = Radiação Direta incidente na superfície horizontal [W/m^2]

q = altitude solar [graus ou radianos].

O cos(q) é calculado pela equação 8:

$$\cos(q) = (1 - \cos^2 d * sen^2 w)^{\frac{1}{2}} \qquad \text{(equação 8)}$$

onde d = declinação [graus ou radianos]

? = ângulo horário [graus ou radianos].

Para conferência e possível ajuste dos dados obtidos, foram utilizados como referência os valores máximos de radiação direta normal para dia de céu claro descritos no *ASHRAE Handbook of Fundamentals* (ASHRAE, 2001), segundo a equação 9.

$$Ibn_{\max} = \frac{A}{\exp\left(\frac{B}{\operatorname{sen} b}\right)} \qquad \text{(equação 9)}$$

onde A e B = relacionadas a constantes;

b = altitude solar [graus ou radianos]

A altitude solar pode ser encontrada com:

$$\operatorname{sen} b = \cos L * \cos d * \cos H + sinL * sin d \qquad \text{(equação 10)}$$

onde L = latitude [graus ou radianos];

d = declinação [graus ou radianos];

H = hora solar até o meio-dia (minutos)

Sendo H dado por:

$$H = 0{,}25[720 - (HL * 60 - 4(90 - Long))] \quad \text{(equação 11)}$$

onde HL = hora local [horas];

Long = Longitude [graus].

As constantes A e B da equação 9 foram obtidas em ASHRAE (2001) e usadas para limitar possíveis distorções nos cálculos, bastante comuns devido ao efeito que o co-seno causa na radiação quando o sol está próximo ao horizonte, maximizando-a. Quando o valor da radiação direta normal foi superior em até 200Wh/m^2 ao valor máximo estimado pela equação 9, esta foi corrigida equiparando-se às máximas estimadas.

O exemplo da variação de radiação em um dia típico, para a cidade de São Paulo, é apresentado na figura 10.

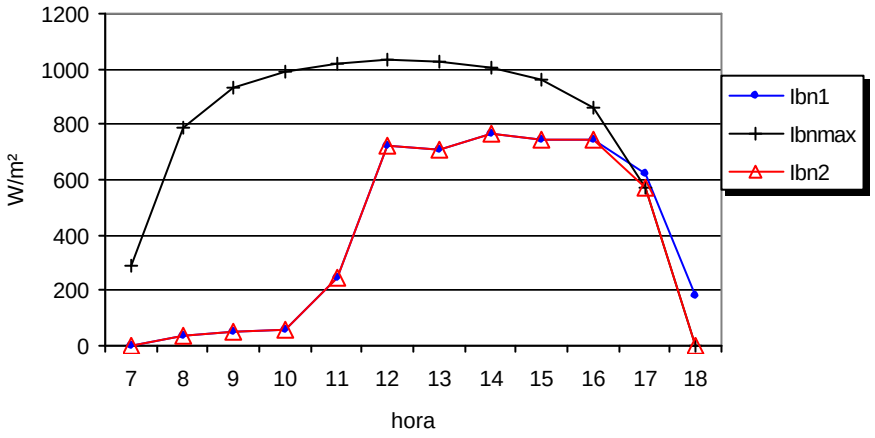


Figura 10. Correção da radiação direta normal no dia 25 de abril, na cidade de São Paulo.

Na figura 10, percebe-se que a radiação direta normal com nuvens (I_{bn1}) excedeu a radiação direta normal para céu claro (I_{bmax}) nas duas últimas horas de sol, às 17 e 18h. Foi então corrigida (I_{bn2}) para estas horas, igualando-se à radiação direta normal máxima, para céu claro. Este método foi aplicado, em sua maior parte, nas penúltimas horas de sol do dia, e com menor freqüência, nas segundas horas de sol do dia.

5 RESULTADOS

5.1 RADIAÇÃO SOLAR

A radiação global horizontal foi estimada hora a hora para todas as cidades envolvidas, bem como a radiação direta normal e, quando preciso, a radiação difusa horizontal. A figura 11 apresenta a nuvem de pontos que representam os dados de radiação global horizontal para a cidade de Florianópolis, no primeiro semestre, e a figura 12, a radiação para o segundo semestre do TRY de 1963. Cada dia do ano está representado por uma cor e/ou símbolo. Nos dois casos (figuras 11 e 12), os níveis de irradiação estão diretamente relacionados ao período do ano e à quantidade de nuvens na abóbada celeste. No primeiro semestre, figura 11, percebe-se que a radiação das 12h pode variar de 200Wh/m^2 a 1000Wh/m^2, aproximadamente. Na figura 12, esta varia de 170Wh/m^2 a pouco mais de 1000Wh/m^2. Ao observar um dia com pouca radiação, percebe-se que as horas de sol são menores que um dia em que a radiação solar é alta. No período do inverno, quando o dia é mais curto, a radiação solar deve atravessar uma camada atmosférica mais espessa, considerando a latitude de Florianópolis, refletindo então uma queda na intensidade da radiação solar que alcança a superfície terrestre. Está confirmado então que este fenômeno é bem representado pelas estimativas realizadas.

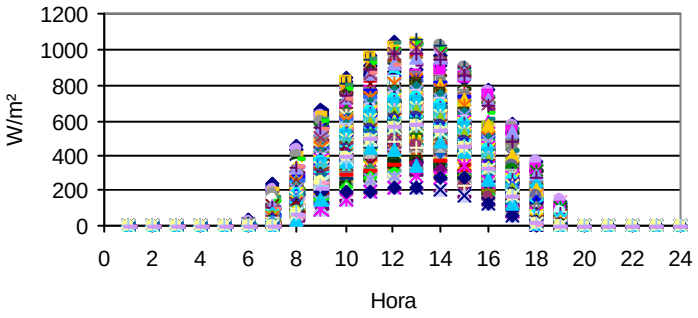


Figura 11. Radiação global horizontal de janeiro a junho para a cidade de Florianópolis, latitude 27°40'S.

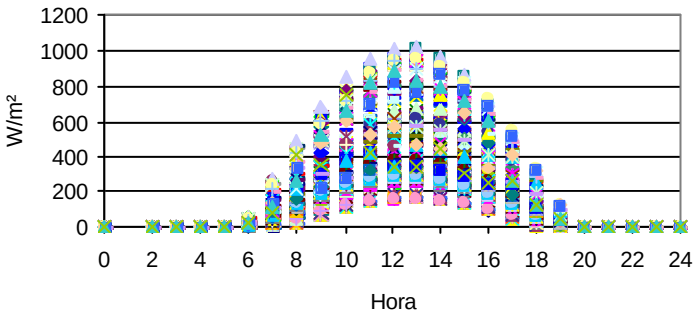


Figura 12. Radiação global horizontal de julho a dezembro para a cidade de Florianópolis, latitude 27°40'S.

Este fenômeno pode ser comparado à radiação solar de Belém, cidade de baixa latitude, 1°33'S, em que os solstícios de inverno e verão não são diferenciados. A figura 13 mostra a radiação global horizontal horária de janeiro a junho, estimados com a nebulosidade ocorrida no ano de 1954, enquanto a figura 14 mostra a radiação estimada de julho a dezembro. Nas duas figuras, percebe-se que as horas do nascer e do pôr do sol não se alteram, e os níveis mínimos da radiação global horizontal às 12h estão na ordem de 300Wh/m^2 no primeiro semestre e 350Wh/m^2 no segundo semestre. A redução da intensidade da radiação solar é então conseqüência exclusiva da cobertura de nuvens visto que a espessura da camada atmosférica que a radiação solar deve atravessar não se altera para esta latitude.

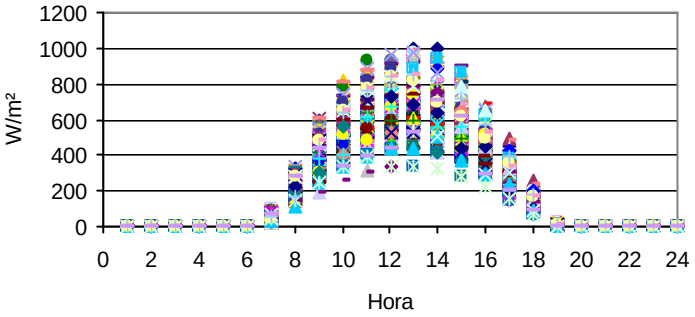


Figura 13. Radiação global horizontal de janeiro a junho para a cidade de Belém, latitude 1°33'.

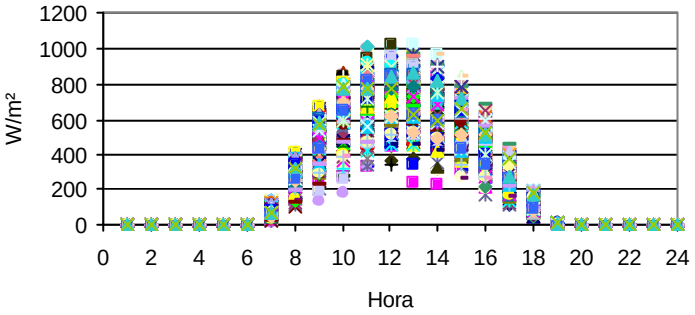


Figura 14. Radiação global horizontal de julho a dezembro para a cidade de Belém, latitude 1°33'.

As figuras 11 e 12 e as figuras 13 e 14 representam as situações extremas que podem ocorrer nas cidades estudas. O aspecto da nuvem de pontos que representa a radiação global horizontal horária para as demais cidades é intermediário às situações de Belém e Florianópolis, como são as suas latitudes.

5.2 FORMATOS DOS ARQUIVOS CLIMÁTICOS

Após corrigidos ou estimados os dados climáticos das 8760 horas de cada arquivo, estes foram compilados para três formatos: um arquivo texto, de extensão csv, que reúne todos os dados climáticos disponíveis e utilizados para a compilação, um arquivo de extensão bin,

formato compatível com o programa DOE-2.1E, e um arquivo de extensão epw, formato compatível com o programa EnergyPlus.

Os dois últimos formatos ainda geram arquivos estatísticos para análise dos dados, e acompanham os arquivos climáticos propriamente ditos, embora possam ser utilizados independentemente. Os arquivos estatísticos que acompanham os bin estão apresentados no anexo 2, lembrando que estes se encontram em unidades inglesas, e os arquivos estatísticos dos arquivos epw formam o anexo 3. O formato csv foi utilizado para extrair dados para a planilha resumo, apresentada no anexo 4.

Cada tipo de arquivo climático apresenta um formato distinto. Os arquivos com extensão bin têm os dados em unidades inglesas, e não são possíveis de serem abertos em editor de texto. Seu cabeçalho, antes da conversão de dados para o formato bin, segue a ordem mostrada na tabela 6, porém todos na mesma linha. Cada nova linha corresponde a uma nova hora. Deve-se ressaltar, entretanto, que o cabeçalho é usado como referência, mas não é incluído no arquivo climático em si. Os arquivos climáticos compilados no formato bin não apresentam dados nas colunas de neve, chuva (pluviosidade) e na coluna referente ao tipo de nuvens, tendo sido sombreados na tabela 6. A ausência destes dados não impede a realização da simulação pelo programa DOE-2.1E.

Tabela 6. Cabeçalho dos dados que compõe os arquivos climáticos do formato bin.

mês	dia	hora	tbu	tbs	pressão	cobertura de nuvens

neve	chuva	direção do vento	umidade específica	densidade do ar	entalpia

radiação global horizontal	radiação direta normal	tipo de nuvens	velocidade do ar

Já os arquivos no formato epw apresentam uma série de novos dados, cujo cabeçalho é mostrado na tabela 7. Neste caso, o cabeçalho faz parte do formato do arquivo, e portanto está apresentado na língua original do formato epw, em inglês. A tradução para o português foi inserida na segunda linha da tabela 7.

Assim como na tabela 6, os dados não existentes nos arquivos climáticos compilados estão sombreados na tabela 7. O programa EnergyPlus também não necessita de todas as colunas com dados preenchidos para realizar a simulação. O formato do arquivo já inclui dados que serão de fácil medição no futuro, mesmo que atualmente estejam indisponíveis. A fonte de dados não está preenchida por se tratar de um código específico do *Department of Energy* americano.

Tabela 7. Cabeçalho presente nos arquivos climáticos de formato epw.

Date	HH:MM	Datasource	Dry Bulb Temperature {C}	Dew Point Temperature {C}	Relative Humidity {%}	Atmospheric Pressure {Pa}
Data	Hora:min	Fonte de dados	Temperatura de bulbo seco	Temperatura de ponto de orvalho	Umidade relativa	Pressão atmosférica

Extraterrestrial Horizontal Radiation {Wh/m2}	Extraterrestrial Direct Normal Radiation {Wh/m2}	Horizontal Infrared Radiation Intensity from Sky {Wh/m2}
Radiação global extraterrestre horizontal	Radiação direta normal extraterrestre	Intensidade da radiação infravermelha horizontal vinda do céu

Global Horizontal Radiation {Wh/m2}	Direct Normal Radiation {Wh/m2}	Diffuse Horizontal Radiation {Wh/m2}
Radiação global horizontal	Radiação direta normal	Radiação difusa horizontal

Global Horizontal Illuminance {lux}	Direct Normal Illuminance {lux}	Diffuse Horizontal Illuminance {lux}
Iluminância global horizontal	Iluminância direta normal	Iluminância difusa horizontal

Zenith Luminance {Cd/m2}	Wind Direction {deg}	Wind Speed {m/s}	Total Sky Cover {.1}	Opaque Sky Cover {.1}
Luminância no zênite	Direção do vento	Velocidade do vento	Cobertura total de nuvens	Cobertura opaca de nuvens

Visibility {km}	Ceiling Height {m}	Present Weather Observation	Present Weather Codes	Precipitable Water {mm}	Aerosol Optical Depth {.001}	Snow Depth {cm}	Days Since Last Snow
Visibilidade	Altura da abóbada	Tempo presente	Código de tempo presente	Precipitação	Profundidade óptica de aerosóis	Qdade de neve	Dias sem nevar

Por fim, o formato para consulta de dados, com extensão csv, possui um cabeçalho como mostrado na tabela 8. Todos os dados estão completos e podem ser consultados para conhecer os dados correspondentes nos arquivos de outros formatos ou podem ser manipulados para outros fins.

Tabela 8. Cabeçalho presente no arquivo climático de formato csv.

Mês	Dia	Hora	TBS {C}	TBU {C}	T_d {C}	Pressão Atmosferica {kPa}

Umidade Relativa {%}	Densidade do ar	Entalpia	Velocidade do Vento {m/s}	Direção do Vento {graus}	Cobertura Total de Nuvens	Radiação Global Horizontal Extraterreste {Wh/m2}

Radiação Global Horizontal {Wh/m2}	Radiação Direta {Wh/m2}	Radiação Direta Normal {Wh/m2}	Radiação Difusa Horizontal {Wh/m2}

Foram gerados 3 formatos de arquivos climáticos: bin, epw e csv; para 14 cidades, totalizando 42 arquivos climáticos disponibilizados. Foram ainda gerados arquivos contendo informações sobre o conteúdo dos primeiros, informações estatísticas ou de resumo dos dados, totalizando outros 42 arquivos.

6 CONCLUSÃO

A etapa de processamento dos arquivos climáticos consistiu na revisão, tratamento e compilação de arquivos climáticos e na estimativa de dados de radiação solar. Alguns formatos tiveram seus dados atualizados, como o formato com extensão bin usado para simulação de desempenho térmico no programa DOE-2.1E; outros formatos foram criados, como o formato com extensão epw para simulação no programa EnergyPlus.

A estimativa de dados de radiação solar consistiu em selecionar dois métodos de cálculo de radiação global horizontal, chamados de método LabEEE e método Kasten, ajustar suas constantes e testar as médias mensais de seus totais diários para cinco cidades, comparando seus resultados a bibliografias existentes. Dos métodos avaliados, constatou-se que o método LabEEE fornecia médias mensais mais precisas quando comparadas ao Atlas de Irradiação Solar do Brasil, principal fonte de referência. Após obtidas as radiações globais horárias, a radiação direta normal foi estimada corrigindo suas distorções com dados limite da radiação direta normal para dias de céu claro.

No total, foram gerados arquivos climáticos para 14 cidades: Belém, Brasília, Recife, São Luís, Salvador, Fortaleza, Maceió, Natal, São Paulo, Vitória, Rio de Janeiro, Curitiba, Florianópolis, e Porto Alegre. Foram também gerados arquivos informativos, com dados estatísticos e com resumo. Os produtos gerados podem ser utilizados por dois programas computacionais para simulação do desempenho térmico de edificações, podem ser consultados em tabelas e gráficos resumindo as principais características ou podem ser manipulados para outros fins no formato texto. Ao todo, foram disponibilizados 84 arquivo do processamento de dados para criação de arquivos climáticos para simulação de desempenho de edificações.

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ANEXO 1

Arquivos Estatísticos do DOE-2.1E

BELÉM

BelemTRY1964_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Belem -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -1.38 LONGITUDE = -48.48 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	78.0	77.6	77.9	78.0	78.4	79.4	80.0	80.1	78.8	79.1	79.7	79.2	78.9
AVG. TEMP. (F) (WETBULB)	75.5	75.3	75.5	75.4	75.5	75.1	75.3	75.4	74.6	74.3	74.3	74.7	75.1
AVG. DAILY MAX. TEMP.	86.5	85.0	86.6	86.1	87.5	88.5	89.9	90.4	89.2	89.0	90.1	89.2	88.2
AVG. DAILY MIN. TEMP.	73.5	73.4	73.5	73.4	73.6	73.1	72.9	72.4	72.0	71.2	71.4	72.3	72.7
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	21.5	7.5	14.5	11.5	27.5	27.0	43.5	44.0	21.0	9.5	26.0	24.5	278.0
(BASE 75)	157.5	118.5	156.0	143.0	171.0	173.5	198.5	199.0	168.5	157.5	173.0	179.0	1995.0
(BASE 70)	311.5	258.5	311.0	293.0	326.0	323.5	353.5	354.0	318.5	312.5	323.0	334.0	3819.0
(BASE 65)	466.5	398.5	466.0	443.0	481.0	473.5	508.5	509.0	468.5	467.5	473.0	489.0	5644.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	37.3	25.0	32.8	32.1	43.0	66.2	81.6	90.0	63.6	70.6	77.2	67.4	686.9
(BASE 75)	102.9	83.9	99.2	100.0	115.0	142.5	168.0	173.0	133.8	152.2	161.3	147.5	1579.3
(BASE 70)	247.8	214.0	245.0	240.4	261.8	281.3	310.4	311.6	262.6	282.6	292.3	286.1	3235.9
(BASE 65)	402.8	354.0	400.0	390.4	416.8	431.3	465.4	466.6	412.6	437.6	441.9	441.1	5060.4

MAXIMUM TEMP.	95	89	89	90	91	91	92	93	92	91	94	92	95
MINIMUM TEMP.	71	71	71	72	71	70	71	71	70	69	68	71	68

NO. DAYS MAX. 90 AND ABOVE	6	0	0	1	4	6	19	24	11	12	21	9	113
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	0.7	0.8	0.7	0.7	0.6	0.8	1.0	1.2	1.2	1.1	1.2	1.1	0.9

AVG. WIND SPEED (DAY)	0.8	0.8	0.7	0.7	0.6	0.8	1.1	1.3	1.2	1.2	1.2	1.1	1.0
AVG. WIND SPEED (NIGHT)	7.0	6.9	9.3	0.6	4.0	0.4	8.2	7.6	0.9	2.6	0.2	3.2	2.8

AVG. TEMP. (DAY)	81.0	80.7	80.9	81.0	81.4	82.4	83.1	83.0	81.6	81.9	82.5	82.1	81.8
AVG. TEMP. (NIGHT)	395.2	1917.1	488.1	247.3	219.9	275.2	421.2	333.1	193.9	151.2	148.2	183.4	234.7

AVG. SKY COVER	6.4	6.8	6.7	6.7	6.4	4.9	3.6	3.4	4.0	3.2	3.2	4.6	5.0

AVG. SKY COVER (DAY)	6.7	7.1	7.0	7.1	6.7	5.2	3.7	3.6	4.2	3.3	3.3	4.8	5.2

AVG. REL. HUM. AT 4AM	97.1	97.2	98.0	97.9	97.4	96.8	95.8	95.9	96.0	95.4	94.6	94.9	96.4
10AM	85.5	87.8	86.4	86.6	83.6	80.4	79.0	78.8	77.2	74.1	71.7	76.0	80.5
4PM	81.0	82.1	84.1	79.7	77.0	66.2	62.7	63.1	67.7	67.0	66.5	68.3	72.1
10PM	94.5	93.9	95.6	94.7	94.8	90.9	88.0	88.8	91.7	86.3	84.5	88.7	91.0

Belem -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -1.38 LONGITUDE = -48.48 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	337.0	408.0	300.5	310.3	277.2	349.4	490.1	580.6	793.6	610.6	463.8	455.8	448.1
AVG. DAILY TOTAL HORIZNTL SOLAR	781.9	941.9	756.3	772.8	723.9	725.2	810.5	907.3	1099.1	984.8	884.9	840.1	851.4
MAX. DAILY DIRECT NORMAL SOLAR	915.0	1018.0	851.0	912.0	810.0	777.0	732.0	803.0	1042.0	929.0	735.0	834.0	1042.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1114.0	1328.0	1094.0	1127.0	1041.0	1009.0	965.0	1058.0	1250.0	1179.0	1062.0	1069.0	1328.0
MIN. DAILY DIRECT NORMAL SOLAR	169.0	160.0	124.0	129.0	72.0	32.0	35.0	205.0	180.0	105.0	213.0	118.0	32.0
MIN. DAILY TOTAL HORIZNTL SOLAR	645.0	652.0	619.0	643.0	550.0	435.0	402.0	648.0	701.0	627.0	683.0	596.0	402.0
MAX. HRLY DIRECT NORMAL SOLAR	238.0	248.0	226.0	246.0	220.0	209.0	207.0	222.0	269.0	239.0	181.0	211.0	269.0
MAX. HRLY TOTAL HORIZNTL SOLAR	295.0	311.0	296.0	305.0	280.0	271.0	270.0	290.0	324.0	303.0	269.0	270.0	324.0
AVG. MAX. HRLY DIRECT NORML SOLAR	96.9	118.5	99.3	100.3	90.6	107.2	149.4	174.4	215.5	173.1	130.9	144.7	133.5
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	212.2	226.3	214.8	215.6	199.9	196.2	228.1	247.6	273.8	249.3	219.4	220.0	225.2

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	364.1	449.1	411.0	539.2	613.8	659.1	716.0	667.0	573.9	431.6	388.2	366.5	515.2
E	364.3	444.2	351.8	365.2	349.1	331.1	349.7	380.4	431.6	410.8	388.2	366.5	377.2
S	664.1	695.5	429.3	377.8	349.1	331.0	349.5	382.4	488.3	621.1	700.5	733.8	509.1
W	1038.3	1328.0	1025.1	1065.6	979.3	960.1	1111.7	1289.0	1591.3	1398.8	1196.5	1112.8	1173.1

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	476.9	549.1	489.2	727.2	928.2	939.5	896.5	819.7	766.6	511.1	451.3	434.9	939.5
E	477.1	545.4	424.8	441.1	429.2	416.8	401.3	427.4	485.5	476.8	451.3	434.9	545.4
S	988.8	999.0	536.4	454.7	429.2	416.7	401.0	444.9	613.3	845.1	828.5	948.7	999.0
W	1586.5	2068.2	1639.3	1720.2	1560.3	1486.0	1405.1	1610.1	1950.6	1829.9	1592.1	1487.0	2068.2

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	149.5	174.2	177.4	246.6	297.8	301.5	297.6	275.2	248.7	167.1	142.6	141.1	301.5

E	149.5	170.8	150.9	157.0	145.8	141.1	139.1	149.6	167.9	159.3	142.6	141.1	170.8
S	322.2	308.4	195.3	163.1	145.8	141.1	139.1	157.1	205.8	257.6	259.7	296.7	322.2
W	577.6	673.3	602.5	632.2	555.7	528.1	522.9	591.3	690.7	632.4	524.0	514.3	690.7

Belem -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	90	80	72
2.5	89	79	72
5.0	87	79	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	75.1	75.2	75.2	75.4	75.3	75.4	75.7	74.9	74.6	74.6	75.2	75.1	75.1
1	74.8	75.0	74.7	75.0	75.2	75.0	75.1	74.5	74.1	74.2	74.4	74.7	74.7
2	74.6	74.6	74.5	74.5	74.8	74.6	74.5	74.1	73.6	73.3	73.5	74.0	74.2
3	74.4	74.2	74.3	74.1	74.5	74.1	74.0	73.5	73.3	72.7	73.1	73.6	73.8
4	74.2	74.0	74.2	73.9	74.3	73.8	73.7	73.1	72.7	72.1	72.6	73.3	73.5
5	73.9	73.9	73.9	73.8	74.2	73.5	73.4	72.8	72.4	71.6	72.0	72.9	73.2
6	73.9	73.8	73.7	73.6	73.9	73.2	73.0	72.4	72.1	71.2	71.5	72.6	72.9
7	74.4	74.1	74.2	74.3	74.5	74.2	74.1	73.3	73.2	72.9	73.1	73.5	73.8
8	76.6	76.3	76.6	76.2	77.2	77.6	77.7	77.3	77.4	77.9	78.4	78.1	77.3
9	79.4	78.7	79.3	78.9	80.5	81.3	81.4	81.3	81.4	81.7	82.7	82.1	80.7
10	81.7	80.5	81.4	81.5	82.7	84.3	84.2	84.6	83.9	84.3	85.2	84.3	83.2
11	83.5	82.2	83.8	83.2	84.1	85.5	86.5	87.0	86.0	86.4	87.0	86.3	85.1
12	84.1	83.0	84.3	84.0	84.7	86.1	87.5	88.3	87.3	87.6	88.8	87.4	86.1
13	84.2	83.4	84.7	83.6	85.7	87.2	88.4	89.5	88.3	88.3	89.1	88.5	86.8
14	83.1	82.7	82.8	83.8	84.6	87.1	88.8	89.7	88.6	87.9	88.9	88.0	86.4
15	82.5	81.7	81.1	82.6	83.7	86.2	89.0	89.3	86.6	86.5	86.7	86.3	85.2
16	81.3	80.4	80.8	81.7	81.9	85.1	86.7	88.0	83.8	85.3	86.4	83.6	83.8

17	79.9	79.5	79.5	80.3	79.9	83.8	84.6	85.4	81.4	83.4	84.2	81.8	82.0
18	78.5	78.2	78.6	78.7	78.8	81.8	82.5	83.6	79.7	81.4	81.9	80.4	80.4
19	77.5	77.4	77.6	77.7	77.7	79.3	80.5	80.6	77.3	78.8	79.9	78.6	78.6
20	76.7	76.9	76.9	77.2	76.9	77.5	78.6	78.6	76.4	77.9	78.5	77.6	77.5
21	76.3	76.2	76.2	76.4	76.2	76.7	77.6	77.3	75.9	77.2	77.7	76.8	76.7
22	75.8	75.9	75.8	76.1	75.9	76.1	76.6	76.3	75.3	76.2	76.8	76.3	76.1
23	75.4	75.5	75.6	75.8	75.5	75.6	76.1	75.7	74.8	75.3	75.9	75.7	75.6

GROUND TEMPERATURES	537.4	537.0	537.3	537.4	537.8	538.8	539.4	539.4	538.1	538.6	539.1	538.6	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

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Universidade Federal de Santa Catarina
Dep. de Engenharia Civil

BRASÍLIA

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Brasilia -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -15.77 LONGITUDE = -47.91 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	70.9	71.6	70.9	70.4	66.6	63.8	64.0	68.8	72.7	70.5	71.5	69.6	69.2
AVG. TEMP. (F) (WETBULB)	67.2	67.2	66.4	64.7	61.0	57.6	55.8	59.3	63.1	64.7	65.0	66.3	63.2
AVG. DAILY MAX. TEMP.	78.7	81.6	80.8	81.6	78.3	76.8	77.8	82.2	84.6	79.8	82.0	76.9	80.1
AVG. DAILY MIN. TEMP.	65.1	64.9	63.5	60.7	56.1	52.3	50.7	55.5	62.7	63.1	63.7	65.1	60.2
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	13.0	36.0	35.0	6.0	0.0	0.0	0.0	0.0	90.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	1.5
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COOLING DEG. DAYS (BASE 80)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 75)	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	18.5	1.0	1.5	0.0	23.0
(BASE 70)	65.0	90.5	73.5	39.0	18.0	0.0	0.0	20.0	116.0	59.5	86.0	45.5	613.0
(BASE 65)	214.0	230.5	221.0	184.5	80.5	22.0	11.0	124.5	260.0	200.0	236.0	186.0	1970.0
HEATING DEG. HRS./24 (BASE 65)	1.0	2.2	7.0	26.2	87.4	131.6	144.1	74.3	14.8	11.9	5.2	1.2	506.8
(BASE 60)	0.0	0.0	0.0	3.2	31.9	57.8	70.3	27.4	1.6	0.2	0.2	0.0	192.5

(BASE 55)	0.0	0.0	0.0	0.0	4.9	13.0	21.5	6.0	0.0	0.0	0.0	0.0	45.3
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.9	2.5	0.5	0.0	0.0	0.0	0.0	3.9

COOLING DEG. HRS./24 (BASE 80)	2.0	7.0	8.5	8.7	1.7	0.1	0.3	13.5	32.3	8.4	12.1	1.2	95.8
(BASE 75)	22.8	35.2	39.8	42.0	23.3	10.2	13.1	50.0	77.3	34.7	45.5	12.0	406.0
(BASE 70)	74.8	90.9	93.0	99.4	67.0	42.8	53.8	110.2	146.5	87.7	102.3	49.9	1018.2
(BASE 65)	183.3	187.8	189.3	187.5	136.5	97.0	114.0	191.4	247.0	181.5	199.0	142.8	2056.9

MAXIMUM TEMP.	83	85	88	85	85	81	82	88	91	87	88	84	91
MINIMUM TEMP.	63	63	60	55	50	46	43	47	56	59	57	63	43

NO. DAYS MAX. 90 AND ABOVE	0	0	0	0	0	0	0	0	3	0	0	0	3
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	1.2	1.0	1.2	0.7	1.1	1.1	0.8	1.0	1.0	1.2	0.8	1.2	1.0

AVG. WIND SPEED (DAY)	1.2	1.0	1.3	0.7	1.1	1.1	0.9	1.1	1.1	1.3	0.8	1.2	1.1
AVG. WIND SPEED (NIGHT)	2.5	2.1	12.5	14.4	-3.8	0.4	-1.1	-4.0	2.7	2.7	0.8	2.0	3.7

AVG. TEMP. (DAY)	73.4	74.3	73.6	72.2	66.6	64.0	64.2	69.0	75.4	72.9	73.7	72.0	71.0
AVG. TEMP. (NIGHT)	141.0	226.3	451.5	1954.5	60.6	58.8	58.4	46.7	219.0	121.4	108.2	112.2	182.5

AVG. SKY COVER	6.9	6.6	5.4	3.9	3.3	2.3	1.7	3.0	4.7	6.5	5.7	7.3	4.8

AVG. SKY COVER (DAY)	7.1	6.9	5.6	4.0	3.3	2.3	1.8	3.1	4.9	6.8	5.9	7.6	5.0

AVG. REL. HUM. AT 4AM	93.0	92.9	92.5	91.9	90.8	88.7	80.1	78.5	76.3	89.4	89.1	95.0	88.2
10AM	84.6	83.8	82.6	79.0	77.6	73.9	68.7	63.2	65.3	75.6	69.7	84.8	75.7
4PM	73.1	68.4	65.6	55.9	57.1	51.8	42.0	41.4	43.4	60.0	53.7	75.2	57.3
10PM	87.9	85.2	86.8	80.6	77.8	75.7	64.2	62.3	64.4	79.6	81.4	89.7	77.9

Brasilia -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -15.77 LONGITUDE = -47.91 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	853.2	875.1	634.1	597.1	445.4	482.2	387.1	712.4	840.6	657.7	699.3	615.3	648.1
AVG. DAILY TOTAL HORIZNTL SOLAR	1242.7	1216.2	927.2	804.5	710.2	717.9	630.4	868.5	978.4	984.5	1046.2	1175.7	940.2
MAX. DAILY DIRECT NORMAL SOLAR	1535.0	1584.0	1363.0	1124.0	844.0	715.0	595.0	1113.0	1395.0	1748.0	1530.0	1153.0	1748.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1614.0	1546.0	1367.0	1100.0	909.0	847.0	739.0	1075.0	1278.0	1652.0	1464.0	1406.0	1652.0
MIN. DAILY DIRECT NORMAL SOLAR	582.0	460.0	140.0	83.0	109.0	95.0	36.0	137.0	106.0	297.0	169.0	471.0	36.0
MIN. DAILY TOTAL HORIZNTL SOLAR	959.0	1021.0	591.0	485.0	510.0	448.0	304.0	509.0	549.0	768.0	735.0	1083.0	304.0
MAX. HRLY DIRECT NORMAL SOLAR	309.0	311.0	268.0	259.0	223.0	206.0	148.0	253.0	281.0	323.0	301.0	301.0	323.0
MAX. HRLY TOTAL HORIZNTL SOLAR	364.0	370.0	321.0	309.0	268.0	247.0	218.0	302.0	336.0	408.0	360.0	351.0	408.0
AVG. MAX. HRLY DIRECT NORML SOLAR	184.5	203.3	156.4	155.7	133.1	161.6	117.1	207.2	214.5	159.3	157.4	137.2	165.2
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	276.5	289.9	240.9	224.5	206.4	216.3	187.2	257.0	273.8	253.1	252.1	249.5	243.6

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	507.3	537.1	550.8	636.1	708.3	801.5	656.9	781.8	641.1	478.5	436.8	527.3	605.6
E	504.0	501.8	392.9	335.7	331.6	344.3	293.9	367.4	390.3	407.3	428.2	525.6	401.4
S	904.6	739.0	453.4	339.0	331.6	344.3	293.8	367.6	418.7	527.2	695.7	939.6	528.7
W	1724.6	1803.8	1368.1	1213.6	1086.0	1132.2	939.7	1388.3	1525.9	1393.9	1424.1	1601.4	1380.7

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	570.8	635.7	714.9	842.2	963.5	956.6	761.2	949.6	824.7	674.4	529.6	611.5	963.5
E	567.3	565.0	543.9	406.9	415.9	403.9	339.1	412.7	463.6	585.5	526.4	608.7	608.7
S	1070.7	965.6	708.6	414.8	415.8	403.8	339.0	412.6	520.2	812.1	925.4	1140.9	1140.9
W	2363.3	2425.7	2216.6	1789.3	1515.8	1385.3	1133.7	1746.7	2079.6	2564.0	2155.5	2030.5	2564.0

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	194.9	196.3	214.6	255.0	291.2	295.1	237.4	296.1	259.0	221.6	183.4	191.7	296.1

E	194.9	195.9	172.1	159.6	142.3	132.3	115.6	156.9	173.8	210.9	183.4	191.7	210.9
S	429.0	327.1	258.3	168.5	142.3	132.3	115.6	157.7	203.6	324.8	353.3	418.5	429.0
W	748.5	790.3	688.7	653.8	558.7	503.0	415.5	636.7	716.9	843.1	731.7	736.5	843.1

Brasilia -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	84	72	48
2.5	83	72	50
5.0	81	71	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	67.7	67.6	66.6	65.8	61.6	58.8	58.2	63.3	68.5	66.7	66.9	66.8	64.9
1	67.2	67.0	66.1	64.7	60.5	57.5	56.4	61.5	66.9	66.1	66.3	66.3	63.8
2	66.9	66.7	65.8	63.7	59.2	56.1	55.3	60.1	66.4	65.4	65.8	66.0	63.1
3	66.2	66.0	65.4	62.9	58.6	55.1	54.2	59.1	65.6	65.1	65.1	65.7	62.4
4	66.0	65.7	65.0	62.3	57.9	54.3	53.1	57.9	64.9	64.5	64.9	65.6	61.8
5	65.8	65.3	64.5	61.4	57.0	53.5	52.1	57.3	64.0	64.2	64.5	65.5	61.2
6	65.5	65.2	63.9	60.9	56.7	52.9	51.8	56.3	63.4	63.7	64.0	65.6	60.8
7	66.4	65.8	64.6	61.3	56.9	52.8	51.3	56.0	63.2	64.6	65.5	66.2	61.2
8	68.6	68.0	67.5	64.7	60.3	56.5	55.2	60.5	66.6	67.9	69.8	67.8	64.4
9	71.2	71.3	70.6	69.3	65.4	61.9	61.6	67.3	71.0	70.7	73.4	69.7	68.6
10	73.1	75.1	73.5	74.0	69.7	66.5	67.0	72.4	75.0	73.4	76.1	71.8	72.3
11	75.1	77.7	75.7	76.8	72.9	69.7	71.0	75.8	78.4	75.5	78.1	73.0	74.9
12	76.2	79.0	77.2	78.7	75.0	72.3	73.4	78.2	80.4	76.6	79.2	74.3	76.7
13	76.3	79.0	78.9	80.0	76.5	74.2	75.2	79.9	82.4	77.9	79.9	74.6	77.9
14	76.7	79.1	79.3	80.4	77.4	75.5	76.6	81.4	83.9	78.5	80.1	74.9	78.6
15	76.5	78.1	79.1	80.3	77.8	76.4	77.5	81.5	83.5	78.0	80.2	74.4	78.6
16	76.3	77.8	78.1	79.8	77.4	76.1	77.5	81.3	81.7	77.6	77.8	73.3	77.9

17	75.6	76.8	76.9	78.0	75.8	74.8	76.4	80.3	80.9	76.1	76.1	73.4	76.7
18	74.1	75.2	74.8	75.8	72.6	71.1	72.8	77.0	78.3	73.5	74.1	71.9	74.3
19	72.4	73.2	72.1	72.8	69.2	67.4	68.4	73.0	75.4	71.2	71.6	70.3	71.4
20	70.8	71.6	70.7	70.8	67.0	64.9	65.8	70.5	73.6	69.9	70.5	69.2	69.6
21	69.6	70.4	69.2	69.4	65.6	63.0	63.9	68.6	72.1	69.0	69.3	68.4	68.2
22	68.8	69.4	68.2	68.3	64.1	61.3	61.8	66.7	70.4	68.0	68.3	67.8	66.9
23	68.0	68.4	67.3	66.8	62.9	59.8	60.1	64.9	69.5	67.2	67.6	67.3	65.8

GROUND TEMPERATURES	530.3	531.0	530.3	529.8	526.0	523.2	523.4	528.2	532.1	529.9	530.9	529.0	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

CURITIBA

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Curitiba -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -25.25 LONGITUDE = -49.16 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	69.2	69.4	67.2	61.4	58.3	55.6	54.5	56.6	59.6	57.5	64.4	64.0	61.4
AVG. TEMP. (F) (WETBULB)	64.9	66.2	63.7	59.2	55.6	53.3	51.7	53.0	56.3	55.0	61.5	60.4	58.4
AVG. DAILY MAX. TEMP.	80.7	79.4	77.5	69.9	69.0	64.7	66.3	68.0	71.5	66.0	73.4	73.7	71.6
AVG. DAILY MIN. TEMP.	61.2	62.7	60.1	55.4	49.5	47.4	45.3	47.6	51.0	50.9	58.0	56.7	53.8
HEATING DEG. DAYS (BASE 65)	1.5	17.5	1.5	78.5	179.5	268.5	285.5	228.5	134.0	219.5	58.5	47.0	1520.0
(BASE 60)	0.0	1.5	0.0	6.5	60.0	135.0	152.0	119.0	42.0	97.5	15.0	5.0	633.5
(BASE 55)	0.0	0.0	0.0	0.0	16.0	52.5	70.5	51.5	5.0	26.5	0.0	0.0	222.0
(BASE 50)	0.0	0.0	0.0	0.0	2.5	14.0	37.0	10.0	0.0	5.0	0.0	0.0	68.5
COOLING DEG. DAYS (BASE 80)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 75)	1.5	9.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	12.0
(BASE 70)	54.5	77.5	27.5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	20.5	9.5	192.5
(BASE 65)	186.0	187.5	120.0	9.0	0.5	0.0	0.0	5.5	22.0	17.0	79.5	54.5	681.5
HEATING DEG. HRS./24 (BASE 65)	28.0	29.2	44.1	138.0	236.8	302.6	350.4	304.0	205.2	258.2	99.1	98.8	2094.3
(BASE 60)	2.1	5.3	5.0	41.8	124.9	178.1	226.7	186.2	100.8	136.7	29.2	30.2	1067.0

(BASE 55)	0.0	0.0	0.5	2.5	55.8	87.8	128.5	91.1	39.0	53.2	3.5	4.1	466.0
(BASE 50)	0.0	0.0	0.0	0.0	25.2	37.5	62.9	31.5	14.0	10.3	0.0	0.0	181.4

COOLING DEG. HRS./24 (BASE 80)	7.3	8.4	4.5	0.0	0.0	0.0	0.0	0.0	1.1	1.5	3.7	1.0	27.6
(BASE 75)	32.7	31.1	20.0	0.7	1.1	1.0	0.8	5.0	7.7	5.0	13.9	6.0	125.1
(BASE 70)	79.3	73.7	51.7	7.1	8.0	7.5	8.1	19.2	20.1	12.5	37.7	22.9	347.9
(BASE 65)	157.4	152.3	113.5	31.4	28.3	20.7	25.8	43.0	44.3	26.8	81.2	68.1	792.7

MAXIMUM TEMP.	88	88	87	78	79	77	79	80	83	85	87	86	88
MINIMUM TEMP.	56	55	49	51	31	32	28	41	35	40	52	50	28

NO. DAYS MAX. 90 AND ABOVE	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	1	2	2	0	0	0	0	0	5
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.1	1.9	1.7	1.8	1.6	2.0	1.5	1.8	2.0	2.2	2.4	2.7	2.0

AVG. WIND SPEED (DAY)	2.2	1.9	1.8	1.9	1.6	2.1	1.6	1.9	2.0	2.4	2.4	2.8	2.1
AVG. WIND SPEED (NIGHT)	4.0	3.5	8.6	-12.1	0.0	1.7	0.7	-1.0	4.2	4.6	3.2	4.6	6.1

AVG. TEMP. (DAY)	71.4	71.8	69.7	62.4	58.3	55.7	54.7	56.7	61.8	59.4	66.3	65.9	63.0
AVG. TEMP. (NIGHT)	103.8	135.3	223.4	-357.4	55.2	52.5	50.6	52.4	155.9	87.7	86.9	86.1	132.2

AVG. SKY COVER	6.0	6.2	5.3	5.6	4.6	4.8	4.3	5.1	5.4	6.4	6.8	5.4	5.5

AVG. SKY COVER (DAY)	6.3	6.6	5.5	5.7	4.6	4.7	4.3	5.1	5.7	6.7	7.2	5.7	5.7

AVG. REL. HUM. AT 4AM	96.6	97.7	97.9	98.9	98.5	97.6	97.8	96.6	97.5	97.4	96.7	96.2	97.4
10AM	80.8	85.7	89.4	92.6	92.6	92.9	93.7	89.2	87.1	85.0	84.8	77.7	87.6
4PM	60.4	70.4	62.3	71.2	67.7	72.2	63.9	61.4	63.5	73.9	73.4	64.7	67.0
10PM	91.2	95.2	94.2	96.4	94.2	93.4	92.8	90.5	92.7	95.2	94.3	92.9	93.6

Curitiba -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -25.25 LONGITUDE = -49.16 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	652.5	620.9	371.1	305.6	202.0	143.3	275.4	381.9	363.6	364.9	545.8	764.5	415.1
AVG. DAILY TOTAL HORIZNTL SOLAR	1104.8	1030.6	703.5	593.3	400.7	201.5	416.2	586.6	614.6	718.1	1052.2	1247.9	721.1
MAX. DAILY DIRECT NORMAL SOLAR	1576.0	1189.0	1116.0	866.0	631.0	325.0	698.0	866.0	1054.0	1521.0	1752.0	2027.0	2027.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1599.0	1420.0	1323.0	898.0	731.0	296.0	719.0	859.0	1026.0	1415.0	1749.0	1996.0	1996.0
MIN. DAILY DIRECT NORMAL SOLAR	103.0	98.0	33.0	89.0	14.0	11.0	2.0	50.0	19.0	32.0	132.0	153.0	2.0
MIN. DAILY TOTAL HORIZNTL SOLAR	779.0	703.0	407.0	436.0	131.0	124.0	89.0	358.0	364.0	462.0	697.0	862.0	89.0
MAX. HRLY DIRECT NORMAL SOLAR	271.0	265.0	232.0	233.0	154.0	151.0	184.0	214.0	209.0	282.0	301.0	334.0	334.0
MAX. HRLY TOTAL HORIZNTL SOLAR	335.0	321.0	292.0	276.0	213.0	156.0	222.0	267.0	272.0	342.0	352.0	393.0	393.0
AVG. MAX. HRLY DIRECT NORML SOLAR	162.4	163.9	105.7	98.7	64.9	68.4	106.9	119.9	95.2	101.3	130.9	195.8	117.7
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	248.8	253.1	193.1	176.9	134.7	107.3	144.9	187.3	177.1	193.2	230.6	265.3	192.4

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	507.5	537.8	482.1	525.7	412.4	242.8	474.8	576.1	472.6	423.9	513.7	561.1	477.5
E	478.5	457.8	329.5	286.9	199.3	85.1	206.6	279.6	283.2	331.5	473.9	541.8	329.0
S	754.9	624.2	367.7	288.7	199.3	85.1	206.6	279.7	297.7	402.8	714.6	909.5	426.8
W	1507.6	1517.5	1033.4	893.7	606.1	258.6	684.2	950.1	933.8	1016.3	1452.4	1704.3	1044.4

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	613.0	704.8	772.0	852.8	756.7	377.8	827.0	879.7	760.1	718.8	699.9	715.3	879.7
E	569.1	529.0	558.2	371.8	363.9	112.4	367.4	431.4	394.1	492.8	651.8	704.8	704.8
S	1027.6	802.5	687.3	371.8	363.9	112.4	367.4	431.4	426.6	697.2	1171.7	1388.7	1388.7
W	2329.4	2119.6	2182.9	1533.4	1241.2	414.3	1262.6	1497.4	1686.9	2167.0	2693.3	2927.9	2927.9

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	179.0	169.0	195.9	255.5	218.5	198.6	255.0	265.6	210.5	185.8	190.9	208.8	265.6

	E	179.0	166.1	159.3	147.4	115.8	77.9	120.0	142.4	143.6	175.2	190.9	208.8	208.8
	S	360.5	305.4	230.5	153.5	115.8	77.9	120.0	142.4	164.5	295.4	405.0	473.0	473.0
	W	662.0	645.5	633.5	593.4	431.3	255.0	460.9	558.7	567.1	707.6	725.5	797.0	797.0

Curitiba -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	85	73	35
2.5	83	72	37
5.0	81	71	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	64.8	65.4	63.2	58.2	54.6	52.6	50.4	52.5	55.3	54.0	60.5	59.9	57.6
1	64.4	65.0	62.8	58.1	54.1	52.0	50.0	52.2	54.6	53.5	60.2	59.2	57.1
2	63.9	64.8	62.3	57.8	53.8	51.7	49.7	51.6	54.3	53.4	60.2	59.0	56.8
3	63.4	64.3	62.1	57.7	53.1	51.3	49.1	51.3	54.0	53.1	59.9	58.5	56.4
4	62.8	64.1	61.7	57.4	52.6	50.9	48.5	50.5	53.5	52.9	59.5	58.1	56.0
5	62.2	63.9	61.4	57.0	52.1	50.2	47.8	50.0	53.2	52.7	59.1	57.5	55.5
6	61.6	63.6	61.0	56.8	51.3	49.7	47.1	49.5	52.5	52.6	59.2	57.8	55.2
7	63.5	64.6	61.7	57.1	51.1	49.4	46.7	49.5	52.9	53.6	60.8	59.8	55.8
8	66.1	66.6	63.8	58.5	52.5	50.5	47.7	50.6	54.8	55.2	62.8	62.4	57.6
9	68.7	69.1	66.0	60.3	55.2	53.2	50.2	53.1	57.8	57.6	65.2	65.0	60.0
10	72.1	71.7	69.1	62.7	58.9	56.5	54.0	56.9	61.7	59.5	67.0	67.5	63.1
11	74.9	74.3	71.4	64.9	62.4	59.7	58.4	60.6	64.1	61.5	68.8	69.4	65.8
12	76.5	75.9	73.3	66.5	64.8	61.7	61.4	63.2	66.2	62.7	69.3	70.7	67.6
13	78.5	76.7	74.8	68.0	66.9	63.0	63.3	65.4	68.1	64.4	70.9	71.6	69.3
14	79.5	76.9	76.1	69.0	67.7	63.7	64.4	66.3	69.4	64.5	71.3	72.0	70.0
15	78.7	76.9	76.5	68.7	68.0	63.7	64.8	66.5	69.2	64.2	71.3	72.3	70.0
16	77.0	76.4	76.2	67.8	67.5	63.0	64.2	66.0	68.6	63.7	70.9	70.9	69.3

17	74.4	75.0	73.8	66.4	65.8	61.4	62.9	64.4	66.7	62.1	69.4	69.2	67.6
18	72.9	72.9	71.2	64.1	62.5	58.8	60.3	61.6	64.2	60.5	67.4	66.8	65.2
19	69.2	69.8	67.0	61.2	59.4	56.3	56.2	58.1	60.5	57.7	64.6	64.1	62.0
20	67.4	68.1	65.6	60.1	57.4	55.1	54.5	56.3	58.9	56.6	63.1	62.4	60.4
21	66.5	66.9	64.8	59.2	56.3	54.3	53.3	54.7	57.7	55.4	61.9	61.1	59.3
22	65.8	66.5	64.2	58.8	55.8	53.3	52.3	54.0	56.8	54.8	61.7	60.7	58.7
23	65.3	66.0	63.7	58.3	55.1	52.5	51.5	53.0	56.2	54.5	61.0	60.4	58.1

GROUND TEMPERATURES	528.5	528.7	526.6	520.8	517.7	515.0	513.9	515.9	518.9	517.0	523.8	523.4	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

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Universidade Federal de Santa Catarina
Dep. de Engenharia Civil

FLORIANÓPOLIS

FlorianopolisTRY1963_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Florianopolis -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -27.40 LONGITUDE = -48.33 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	76.6	75.7	75.8	70.7	66.2	62.6	63.5	62.8	66.4	67.5	70.4	72.7	69.2
AVG. TEMP. (F) (WETBULB)	73.4	72.8	72.3	67.1	62.3	59.2	60.5	59.6	63.9	64.4	66.9	68.7	65.9
AVG. DAILY MAX. TEMP.	84.7	82.7	82.8	80.5	75.7	72.4	72.0	70.1	72.9	74.0	77.4	80.2	77.1
AVG. DAILY MIN. TEMP.	71.1	70.2	70.7	63.0	58.5	54.7	56.8	56.9	61.5	62.6	64.4	66.4	63.0
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	14.5	92.0	74.5	84.5	21.5	17.0	1.0	0.0	305.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	37.0	23.0	33.0	3.0	3.0	0.0	0.0	99.0
(BASE 55)	0.0	0.0	0.0	0.0	0.0	4.0	7.0	11.5	0.0	0.0	0.0	0.0	22.5
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	3.5
COOLING DEG. DAYS (BASE 80)	32.5	6.5	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	58.0
(BASE 75)	112.0	62.5	86.0	8.5	0.0	0.0	0.0	0.0	0.0	0.5	8.5	31.0	309.0
(BASE 70)	245.0	181.0	211.0	66.5	11.0	6.5	4.0	2.0	3.0	27.0	61.5	119.0	937.5
(BASE 65)	400.0	321.0	364.0	202.5	80.5	49.5	56.5	38.0	87.5	119.5	177.5	257.5	2154.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.3	0.3	15.0	64.5	127.2	106.8	112.1	37.8	33.5	12.3	6.1	516.0
(BASE 60)	0.0	0.0	0.0	1.0	20.0	58.4	37.2	47.0	7.3	6.1	1.5	0.2	178.9

(BASE 55)	0.0	0.0	0.0	0.0	2.8	23.5	13.4	19.5	0.0	0.1	0.0	0.0	59.4
(BASE 50)	0.0	0.0	0.0	0.0	0.0	6.1	4.2	8.5	0.0	0.0	0.0	0.0	18.8

COOLING DEG. HRS./24 (BASE 80)	37.7	18.4	25.6	5.2	0.6	0.6	0.8	0.0	0.2	0.9	3.5	10.3	103.9
(BASE 75)	96.8	63.5	81.8	30.5	7.8	3.1	6.3	0.7	3.2	7.9	20.7	41.5	363.7
(BASE 70)	211.8	164.4	191.7	88.8	36.1	17.0	24.2	10.5	22.5	32.6	68.6	122.1	990.4
(BASE 65)	360.6	299.4	335.5	185.8	100.4	54.5	61.3	43.6	78.4	109.6	174.3	246.0	2049.5

MAXIMUM TEMP.	97	94	96	85	85	85	83	79	82	83	87	91	97
MINIMUM TEMP.	65	62	64	55	50	39	41	36	54	54	55	57	36

NO. DAYS MAX. 90 AND ABOVE	8	1	4	0	0	0	0	0	0	0	0	1	14
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.0	1.5	1.8	1.4	1.5	1.5	1.6	1.8	1.7	2.0	2.0	2.0	1.7

AVG. WIND SPEED (DAY)	2.2	1.6	1.9	1.4	1.6	1.5	1.6	1.8	1.7	2.1	2.0	2.2	1.8
AVG. WIND SPEED (NIGHT)	3.7	2.5	10.7	0.3	0.4	1.2	0.9	-0.5	3.6	4.1	2.3	3.5	5.9

AVG. TEMP. (DAY)	79.2	78.5	78.7	70.9	66.3	62.8	63.7	62.9	68.6	69.8	72.6	75.0	70.9
AVG. TEMP. (NIGHT)	116.1	153.1	322.5	49.6	62.6	58.8	61.1	59.2	194.7	106.4	96.6	99.3	168.8

AVG. SKY COVER	5.8	5.7	5.9	3.2	3.0	3.3	4.2	5.5	6.4	6.3	6.1	5.5	5.1

AVG. SKY COVER (DAY)	6.1	6.0	6.2	3.3	3.0	3.3	4.2	5.5	6.6	6.5	6.4	5.7	5.3

AVG. REL. HUM. AT 4AM	92.5	94.0	93.2	95.7	91.9	94.0	94.5	92.5	96.0	92.6	91.9	90.7	93.3
10AM	81.8	83.3	82.4	80.9	82.3	83.8	87.2	81.8	89.6	81.0	81.1	78.4	82.8
4PM	79.7	81.0	74.1	68.9	65.1	66.1	69.6	70.9	79.5	78.6	75.7	74.7	73.6
10PM	90.3	89.4	89.8	90.7	88.4	90.0	90.3	88.7	91.5	90.4	88.9	86.3	89.6

Florianopolis -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -27.40 LONGITUDE = -48.33 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	754.0	680.2	352.8	521.0	272.7	133.5	246.9	252.3	198.8	295.2	370.3	466.5	377.0
AVG. DAILY TOTAL HORIZNTL SOLAR	1162.6	1064.4	690.3	695.2	415.9	177.8	381.7	461.9	486.9	601.9	891.0	985.5	665.8
MAX. DAILY DIRECT NORMAL SOLAR	1688.0	1598.0	1095.0	831.0	631.0	236.0	543.0	632.0	899.0	1245.0	1385.0	1680.0	1688.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1681.0	1534.0	1237.0	854.0	717.0	246.0	617.0	701.0	944.0	1248.0	1557.0	1699.0	1699.0
MIN. DAILY DIRECT NORMAL SOLAR	101.0	83.0	15.0	25.0	17.0	4.0	2.0	9.0	4.0	10.0	31.0	19.0	2.0
MIN. DAILY TOTAL HORIZNTL SOLAR	687.0	667.0	348.0	332.0	133.0	86.0	65.0	255.0	300.0	337.0	620.0	567.0	65.0
MAX. HRLY DIRECT NORMAL SOLAR	280.0	271.0	193.0	188.0	156.0	111.0	148.0	173.0	187.0	230.0	232.0	265.0	280.0
MAX. HRLY TOTAL HORIZNTL SOLAR	337.0	327.0	276.0	246.0	211.0	131.0	194.0	230.0	256.0	296.0	301.0	323.0	337.0
AVG. MAX. HRLY DIRECT NORML SOLAR	155.1	158.3	85.7	131.7	90.8	70.1	79.2	73.8	55.0	79.2	81.3	121.1	98.1
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	248.7	246.5	174.3	202.4	145.8	96.8	126.4	141.9	137.8	157.4	183.3	223.1	173.3

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	512.9	552.6	469.5	640.1	451.2	223.6	439.4	452.0	379.9	360.7	462.2	473.0	450.9
E	476.0	454.6	317.7	305.9	193.5	75.5	186.0	222.3	238.5	272.9	421.1	449.7	300.3
S	743.0	613.9	355.3	307.5	193.5	75.5	186.0	222.3	249.0	325.9	613.1	709.5	381.8
W	1552.2	1520.5	987.2	1103.3	631.6	233.6	602.8	702.4	698.5	816.4	1202.2	1298.3	942.5

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	611.4	742.0	773.6	788.3	762.6	316.3	734.1	730.7	713.6	648.3	667.3	622.7	788.3
E	576.8	537.2	501.6	350.4	318.5	95.5	284.0	310.0	421.9	438.0	592.6	596.6	596.6
S	1074.4	844.0	615.9	360.1	318.5	95.5	284.0	310.0	427.9	601.9	1022.5	1119.1	1119.1
W	2381.0	2314.9	1966.4	1426.1	1227.2	337.1	1061.9	1220.0	1517.0	1817.7	2303.8	2428.2	2428.2

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	176.5	171.9	165.1	222.4	219.8	166.6	227.0	219.2	196.2	169.1	162.5	171.1	227.0

E	176.5	171.9	149.9	132.3	114.6	59.4	105.4	122.3	134.6	152.7	162.5	171.1	176.5
S	388.1	326.5	214.1	142.0	114.6	59.4	105.4	122.3	151.8	253.7	335.7	382.4	388.1
W	675.2	681.9	560.6	507.1	429.7	207.0	387.8	472.2	521.4	601.3	606.2	645.7	681.9

Florianopolis -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	91	82	44
2.5	88	81	46
5.0	85	79	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	73.0	73.2	73.0	67.0	62.8	59.1	61.0	60.4	64.0	64.6	67.3	69.6	66.2
1	72.8	72.8	72.7	66.8	62.1	58.4	60.5	60.0	64.0	64.4	67.2	69.2	65.9
2	72.7	72.2	72.5	66.3	61.8	58.3	60.0	59.6	63.5	64.3	66.8	68.9	65.5
3	72.6	72.1	72.2	66.1	61.6	58.1	59.7	59.8	63.2	64.1	66.9	68.5	65.4
4	72.5	71.8	72.1	65.7	61.1	57.9	59.2	58.9	63.0	64.0	66.4	68.2	65.0
5	72.3	71.2	71.7	65.2	60.3	57.5	58.7	58.7	62.9	63.8	66.2	68.1	64.7
6	72.4	70.8	71.7	64.7	60.1	57.0	58.2	58.6	63.3	63.9	66.6	67.9	64.6
7	74.2	72.0	72.7	64.2	59.9	56.9	58.1	59.0	63.8	65.4	68.4	70.3	65.4
8	76.3	74.9	74.8	67.7	62.5	58.1	59.1	60.3	65.0	67.0	70.3	72.7	67.4
9	78.2	77.0	76.7	71.4	65.8	61.5	62.4	62.7	66.2	69.0	72.1	74.5	69.8
10	80.3	79.2	78.8	74.4	69.3	64.9	65.1	65.2	68.5	70.9	73.4	76.5	72.2
11	81.9	80.3	80.2	77.0	72.1	67.6	67.7	66.7	69.8	71.8	74.7	78.0	74.0
12	83.1	81.2	81.2	78.3	73.9	69.8	69.4	68.3	70.7	72.4	75.4	78.4	75.1
13	83.4	80.8	81.6	79.6	74.8	71.3	70.5	69.1	71.2	72.3	75.6	78.5	75.7
14	83.2	81.0	81.6	79.3	74.8	71.5	71.1	69.0	71.3	71.7	75.1	77.9	75.6
15	82.2	80.5	81.1	78.3	74.2	71.2	70.6	68.7	70.8	71.4	75.0	77.5	75.1
16	80.2	79.2	79.6	77.3	72.8	69.3	69.6	67.0	70.6	70.5	74.1	76.5	73.9

17	79.0	78.2	78.3	75.1	70.3	66.8	67.6	65.5	69.0	69.4	73.3	75.8	72.3
18	76.5	76.2	76.5	71.5	67.0	63.6	64.7	63.4	67.1	67.9	71.9	74.8	70.1
19	75.5	75.5	75.1	69.9	65.5	61.9	63.5	62.1	65.9	66.7	69.9	72.5	68.6
20	74.9	74.6	74.4	68.7	64.4	61.5	62.5	61.5	65.2	66.3	68.9	71.0	67.8
21	74.4	74.3	73.9	67.9	64.0	60.5	62.3	60.9	64.8	65.8	68.4	70.5	67.3
22	74.0	74.0	73.6	67.2	63.5	59.8	61.8	60.8	64.5	65.7	67.8	70.1	66.9
23	73.5	73.5	73.4	66.9	63.2	59.4	61.5	60.5	64.0	65.5	67.8	69.8	66.5

GROUND TEMPERATURES	536.0	535.1	535.2	530.1	525.5	522.0	522.9	522.2	525.6	527.0	529.8	532.1	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

FORTALEZA

FortalezaTRY1962_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Fortaleza -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -3.71 LONGITUDE = -38.53 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	80.8	81.1	79.7	78.9	79.0	78.5	78.6	78.9	79.4	80.4	80.5	81.6	79.8
AVG. TEMP. (F) (WETBULB)	74.9	75.7	75.3	75.3	75.0	73.5	73.4	72.4	73.6	73.4	73.9	75.4	74.3
AVG. DAILY MAX. TEMP.	86.8	87.1	86.0	85.7	86.0	85.5	85.7	86.2	85.9	86.6	86.4	87.6	86.3
AVG. DAILY MIN. TEMP.	74.5	75.8	74.4	73.5	73.2	72.2	71.7	71.9	73.9	75.5	75.7	76.7	74.1
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	26.5	42.0	27.0	10.5	6.0	0.5	1.5	2.5	10.0	34.0	32.5	67.0	260.0
(BASE 75)	176.0	180.5	161.0	139.5	143.5	116.0	115.5	126.0	147.5	187.5	180.5	222.0	1895.5
(BASE 70)	331.0	320.5	316.0	288.0	298.5	266.0	270.5	281.0	297.5	342.5	330.5	377.0	3719.0
(BASE 65)	486.0	460.5	471.0	438.0	453.5	416.0	425.5	436.0	447.5	497.5	480.5	532.0	5544.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	63.2	59.0	52.2	42.9	45.9	37.1	39.7	42.4	40.4	53.8	49.9	70.0	596.5
(BASE 75)	183.3	171.0	152.3	125.9	134.0	120.0	128.0	131.7	136.5	168.8	166.9	205.3	1823.8
(BASE 70)	334.5	310.1	301.6	266.8	279.6	254.4	266.8	275.0	283.1	322.5	315.9	360.0	3570.2
(BASE 65)	489.5	450.1	456.6	416.8	434.6	404.2	421.3	429.8	433.1	477.5	465.9	515.0	5394.4

MAXIMUM TEMP.	90	89	90	88	89	88	88	88	89	89	89	89	90
MINIMUM TEMP.	71	73	72	71	71	68	67	68	71	71	72	73	67

NO. DAYS MAX. 90 AND ABOVE	1	0	1	0	0	0	0	0	0	0	0	0	2
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	1.6	1.4	1.2	1.0	1.1	1.4	1.5	2.0	2.6	2.5	2.3	2.3	1.7

AVG. WIND SPEED (DAY)	1.7	1.5	1.3	1.0	1.2	1.4	1.5	2.0	2.7	2.6	2.3	2.4	1.8
AVG. WIND SPEED (NIGHT)	0.2	0.9	-0.1	0.4	-0.6	0.8	0.3	0.4	2.3	-2.6	1.4	-0.2	0.3

AVG. TEMP. (DAY)	80.9	81.2	79.9	79.0	79.2	78.6	78.7	79.0	79.5	80.4	80.6	81.7	79.9
AVG. TEMP. (NIGHT)	78.6	78.9	77.2	75.9	75.7	75.7	76.0	76.5	77.5	78.0	78.2	79.4	77.1

AVG. SKY COVER	3.8	4.6	5.6	5.3	4.3	3.4	2.9	2.3	2.4	2.4	4.0	4.0	3.8

AVG. SKY COVER (DAY)	3.9	4.7	5.7	5.4	4.4	3.4	2.9	2.3	2.4	2.4	4.0	4.0	3.8

AVG. REL. HUM. AT 4AM	87.8	87.9	91.6	96.7	96.5	93.4	91.8	87.8	88.7	83.9	82.5	83.4	89.3
10AM	70.9	76.5	79.6	83.3	78.1	73.9	71.4	65.9	70.2	64.7	67.0	71.0	72.7
4PM	65.8	68.2	71.2	74.1	68.8	65.1	65.6	60.6	65.7	62.1	62.8	65.6	66.3
10PM	80.5	80.4	85.8	90.0	90.6	86.0	85.0	82.9	82.1	79.4	80.5	80.3	83.6

Fortaleza -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -3.71 LONGITUDE = -38.53 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	561.5	529.8	636.4	555.5	590.1	704.0	681.5	795.2	942.6	712.6	659.8	625.3	666.8
AVG. DAILY TOTAL HORIZNTL SOLAR	1010.0	987.4	1040.9	993.3	990.9	998.6	956.5	1076.5	1214.1	1147.5	1121.1	1059.6	1049.9
MAX. DAILY DIRECT NORMAL SOLAR	1148.0	1324.0	1398.0	1147.0	1127.0	1111.0	1120.0	1070.0	1298.0	1027.0	1211.0	1263.0	1398.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1320.0	1390.0	1443.0	1308.0	1248.0	1210.0	1225.0	1241.0	1397.0	1318.0	1418.0	1412.0	1443.0
MIN. DAILY DIRECT NORMAL SOLAR	71.0	108.0	176.0	129.0	167.0	78.0	39.0	13.0	291.0	108.0	85.0	43.0	13.0
MIN. DAILY TOTAL HORIZNTL SOLAR	646.0	706.0	788.0	724.0	749.0	573.0	402.0	449.0	821.0	593.0	694.0	603.0	402.0
MAX. HRLY DIRECT NORMAL SOLAR	260.0	270.0	299.0	293.0	243.0	220.0	219.0	210.0	227.0	183.0	264.0	275.0	299.0
MAX. HRLY TOTAL HORIZNTL SOLAR	316.0	326.0	354.0	344.0	291.0	272.0	276.0	282.0	296.0	273.0	314.0	323.0	354.0
AVG. MAX. HRLY DIRECT NORML SOLAR	158.5	152.0	159.0	157.6	148.2	172.4	168.3	172.1	211.6	166.0	192.3	181.4	169.9
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	250.2	248.5	251.8	247.2	232.2	238.2	231.0	253.1	284.3	261.1	266.7	257.9	251.8

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	446.9	444.7	531.1	701.9	856.0	950.5	877.6	820.8	675.9	526.2	507.1	467.6	651.6
E	447.6	436.9	444.2	444.8	434.2	418.4	399.3	437.9	497.0	495.1	507.8	468.2	452.6
S	845.6	690.9	546.6	457.0	433.9	418.3	399.1	439.2	557.1	718.1	914.7	936.2	612.7
W	1349.2	1330.5	1426.2	1395.3	1363.4	1375.7	1337.0	1539.4	1815.0	1650.8	1609.1	1444.0	1469.9

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	520.3	513.3	735.7	913.7	1116.8	1180.8	1119.2	964.2	816.9	598.0	584.4	558.6	1180.8
E	521.2	510.6	542.7	535.7	504.9	475.4	465.2	501.1	541.8	545.7	585.1	559.8	585.1
S	1085.1	993.2	764.1	573.0	504.5	475.4	465.2	513.0	648.7	885.9	1194.7	1243.7	1243.7
W	1839.7	1961.5	2172.8	2037.3	1828.7	1734.6	1768.1	1810.0	2069.4	1890.6	2142.3	1980.1	2172.8

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	163.4	168.1	217.3	295.6	317.9	315.2	307.0	269.8	228.3	166.9	169.3	171.7	317.9

E	163.4	168.1	183.3	181.6	156.1	146.1	146.3	150.1	156.6	147.7	169.3	171.7	183.3
S	353.3	302.7	263.2	197.2	156.1	146.1	146.3	156.5	199.0	236.1	345.7	374.8	374.8
W	639.7	678.2	755.8	747.7	612.9	553.8	562.1	583.5	622.3	555.3	673.8	667.4	755.8

Fortaleza -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	88	79	70
2.5	88	78	71
5.0	87	78	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	78.5	78.9	77.0	75.8	75.6	75.9	75.9	76.5	77.5	77.9	78.2	79.3	77.2
1	78.0	78.8	76.7	75.6	75.4	75.2	75.5	76.3	76.9	77.6	77.9	78.9	76.9
2	77.5	78.1	76.4	75.3	75.0	74.6	75.0	75.9	76.4	77.3	77.7	78.7	76.5
3	76.7	77.5	76.0	74.6	74.4	74.1	74.4	75.2	75.8	76.8	77.4	78.3	75.9
4	76.4	77.0	75.5	74.3	74.3	73.4	73.5	74.5	75.1	76.6	76.9	77.7	75.4
5	75.5	76.4	75.4	74.1	74.0	73.0	72.5	73.1	74.7	75.9	76.3	77.3	74.8
6	75.0	76.2	75.1	74.3	73.4	72.4	72.1	72.4	74.4	76.3	76.5	77.3	74.6
7	77.4	77.3	76.3	75.8	75.9	74.4	73.9	74.2	76.1	78.5	79.0	79.6	76.5
8	81.1	80.7	79.3	78.5	78.7	77.4	77.9	77.6	79.5	81.0	81.3	81.6	79.5
9	83.5	82.2	81.1	80.2	81.4	79.9	80.5	80.4	81.2	83.0	83.1	84.0	81.7
10	84.5	83.2	82.5	82.1	83.6	81.8	82.9	82.9	83.1	85.0	84.2	85.5	83.5
11	85.4	84.7	84.4	83.5	84.3	83.6	84.6	85.0	84.4	86.0	84.8	86.5	84.8
12	85.9	85.8	85.0	84.4	85.0	84.4	84.6	85.3	85.0	86.3	85.5	86.8	85.3
13	85.8	86.3	84.8	84.7	85.1	84.7	85.1	85.5	85.3	86.0	85.9	87.2	85.5
14	85.7	86.5	84.7	84.6	85.1	84.8	84.8	85.1	85.0	85.5	85.3	86.7	85.3
15	85.3	86.0	84.2	83.9	84.6	84.0	84.1	84.0	83.9	84.3	84.5	85.9	84.5
16	84.3	84.6	83.1	83.0	83.1	82.9	82.7	82.5	82.5	83.0	83.1	84.5	83.3

17	82.7	83.2	82.0	81.2	81.6	81.4	81.0	81.0	80.9	81.3	81.6	82.5	81.7
18	81.4	81.8	80.6	79.7	79.9	79.6	78.9	79.1	79.3	79.5	79.9	81.1	80.0
19	80.3	81.3	79.8	78.8	78.4	78.4	78.1	78.0	78.4	78.9	79.2	80.5	79.2
20	79.8	80.6	79.2	78.1	78.0	77.8	77.6	77.5	77.9	78.5	78.9	80.1	78.7
21	79.7	80.1	78.6	77.5	76.9	77.2	77.2	77.3	77.9	78.3	78.7	79.8	78.3
22	79.5	79.5	78.2	76.9	76.5	76.5	77.0	76.9	77.7	78.0	78.5	79.6	77.9
23	79.2	79.1	77.7	76.6	76.2	76.0	76.5	76.7	77.7	78.1	78.3	79.5	77.6

GROUND TEMPERATURES	540.2	540.5	539.1	538.3	538.4	537.9	538.0	538.2	538.9	539.8	539.8	541.0	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

MACEIÓ

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Maceio -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -9.39 LONGITUDE = -35.44 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	78.6	78.7	78.0	76.6	75.2	73.2	72.1	72.2	73.2	75.7	76.8	77.8	75.7
AVG. TEMP. (F) (WETBULB)	72.3	72.9	73.2	72.6	72.0	70.9	68.9	68.5	69.2	70.6	71.3	72.3	71.2
AVG. DAILY MAX. TEMP.	88.9	88.4	86.3	84.7	82.4	78.8	79.4	79.8	81.0	84.5	86.2	86.8	83.9
AVG. DAILY MIN. TEMP.	70.4	71.1	71.3	70.3	69.7	68.9	66.2	65.8	66.6	68.1	69.4	70.8	69.0
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	17.5	8.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5	33.5
(BASE 75)	143.0	132.5	117.0	74.5	40.0	6.0	0.0	0.5	6.5	41.0	83.0	118.0	762.0
(BASE 70)	298.0	272.5	272.0	224.5	188.0	116.0	87.0	88.0	114.5	195.5	233.0	273.0	2362.0
(BASE 65)	453.0	412.5	427.0	374.5	343.0	266.0	242.0	243.0	264.5	350.5	383.0	428.0	4187.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.7	1.7	0.0	0.0	0.0	4.8
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	69.5	58.8	45.9	28.4	15.3	1.9	1.8	2.3	7.3	26.5	39.5	48.2	345.3
(BASE 75)	145.8	128.3	119.6	88.4	62.7	25.5	27.4	34.9	46.8	86.6	103.8	118.8	988.4
(BASE 70)	269.4	244.5	249.6	198.3	163.5	105.3	94.0	101.0	119.3	185.0	209.2	241.2	2180.4
(BASE 65)	423.0	384.2	404.3	347.2	315.8	247.2	221.2	225.4	247.5	330.3	355.4	395.7	3897.3

MAXIMUM TEMP.	95	92	92	88	87	84	84	84	84	87	91	91	95
MINIMUM TEMP.	67	68	68	68	66	64	63	61	60	65	66	68	60

NO. DAYS MAX. 90 AND ABOVE	12	9	2	0	0	0	0	0	0	0	1	3	27
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	1.7	1.3	1.1	0.9	1.0	1.3	1.0	1.1	1.2	1.4	1.5	1.5	1.3

AVG. WIND SPEED (DAY)	1.8	1.4	1.2	1.0	1.1	1.4	1.1	1.2	1.3	1.4	1.6	1.5	1.3
AVG. WIND SPEED (NIGHT)	-0.2	0.1	-0.2	0.1	-0.1	0.5	0.1	0.0	0.1	-1.7	0.1	-1.3	-0.1

AVG. TEMP. (DAY)	78.9	79.0	78.3	76.8	75.4	73.4	72.4	72.5	73.4	75.8	76.9	77.9	75.9
AVG. TEMP. (NIGHT)	73.1	73.8	73.8	72.4	71.7	71.1	68.3	68.5	69.1	70.7	71.8	73.0	71.2

AVG. SKY COVER	2.0	3.0	4.0	4.2	5.1	6.2	4.3	4.3	3.7	3.0	3.1	3.7	3.9

AVG. SKY COVER (DAY)	2.1	3.1	4.1	4.3	5.2	6.3	4.4	4.4	3.8	3.0	3.1	3.7	3.9

AVG. REL. HUM. AT 4AM	92.2	92.8	94.8	96.1	95.9	95.4	96.1	96.0	96.0	94.4	93.8	94.4	94.8
10AM	65.2	68.4	71.9	76.9	80.1	83.9	82.2	76.2	73.3	66.7	67.1	67.5	73.3
4PM	58.4	61.3	65.4	67.8	73.5	82.1	73.3	69.1	69.6	63.3	61.6	62.2	67.3
10PM	83.9	85.3	89.0	92.1	93.5	93.6	92.5	91.4	90.9	89.7	87.2	88.2	89.8

Maceio -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -9.39 LONGITUDE = -35.44 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	985.3	753.6	823.0	562.9	492.5	366.6	429.5	467.1	729.5	880.3	932.6	857.0	689.9
AVG. DAILY TOTAL HORIZNTL SOLAR	1362.6	1184.9	1119.8	984.5	902.5	802.9	768.2	895.3	1064.4	1228.5	1333.3	1222.2	1071.8
MAX. DAILY DIRECT NORMAL SOLAR	1629.0	1278.0	1425.0	1187.0	985.0	990.0	893.0	1090.0	1454.0	1550.0	1512.0	1716.0	1716.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1749.0	1559.0	1427.0	1308.0	1187.0	1082.0	1093.0	1233.0	1449.0	1617.0	1605.0	1760.0	1760.0
MIN. DAILY DIRECT NORMAL SOLAR	84.0	46.0	151.0	87.0	209.0	155.0	14.0	28.0	62.0	50.0	263.0	106.0	14.0
MIN. DAILY TOTAL HORIZNTL SOLAR	819.0	688.0	750.0	648.0	718.0	657.0	399.0	522.0	639.0	634.0	820.0	770.0	399.0
MAX. HRLY DIRECT NORMAL SOLAR	268.0	245.0	283.0	252.0	215.0	240.0	220.0	233.0	274.0	288.0	293.0	313.0	313.0
MAX. HRLY TOTAL HORIZNTL SOLAR	318.0	308.0	346.0	323.0	294.0	279.0	274.0	287.0	321.0	334.0	341.0	365.0	365.0
AVG. MAX. HRLY DIRECT NORML SOLAR	212.4	182.7	189.2	146.7	121.0	98.2	126.5	124.3	169.4	220.6	227.4	194.6	167.7
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	273.0	257.5	274.5	240.4	209.2	196.7	195.5	221.5	249.4	281.9	299.3	274.3	247.7

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	554.4	535.2	602.6	756.8	818.2	791.0	750.2	739.1	675.5	591.8	561.8	498.7	656.8
E	557.9	517.1	464.7	449.0	407.1	379.9	354.8	411.7	463.2	532.2	560.6	500.9	466.2
S	1068.1	787.4	533.0	453.8	406.5	379.4	353.9	410.9	502.3	714.9	982.1	986.0	630.8
W	1837.6	1640.3	1531.1	1367.5	1204.3	1040.1	1034.5	1192.3	1489.5	1738.3	1799.8	1593.3	1454.5

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	636.2	670.3	842.4	991.3	1045.2	1037.3	1051.7	965.2	1016.4	846.4	790.0	814.5	1051.7
E	640.4	617.9	673.7	693.9	579.3	528.4	563.3	672.9	730.4	798.9	791.7	817.8	817.8
S	1388.2	1106.4	779.8	717.3	578.6	527.4	562.0	676.4	799.9	1094.8	1277.8	1424.5	1424.5
W	2465.9	2276.1	1968.8	1723.3	1587.0	1386.9	1444.2	1758.0	2012.3	2214.3	2227.0	2305.2	2465.9

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	167.2	170.1	211.9	248.8	277.3	305.5	265.2	254.2	240.9	206.4	184.0	191.2	305.5

E	167.2	162.7	177.2	177.1	158.0	152.2	150.3	156.0	176.2	181.0	184.0	191.2	191.2
S	359.8	301.5	255.3	193.8	158.0	152.2	150.3	160.1	207.0	286.9	348.0	399.4	399.4
W	650.6	625.1	692.6	608.9	546.8	516.3	472.8	598.1	663.7	721.3	690.6	723.7	723.7

Maceio -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	91	77	64
2.5	89	77	65
5.0	88	76	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	73.1	73.9	73.8	72.3	71.8	71.0	68.4	68.4	69.0	70.7	71.6	73.0	71.4
1	72.6	73.1	73.3	72.0	71.4	70.9	68.1	68.0	68.6	70.3	71.0	72.5	71.0
2	72.1	72.7	72.9	71.6	71.0	70.6	68.0	67.5	68.3	69.9	70.5	72.1	70.6
3	71.5	72.2	72.5	71.3	70.9	70.3	67.6	67.0	67.7	69.4	70.2	71.7	70.2
4	70.9	71.8	72.0	71.0	70.4	69.9	67.5	66.6	67.3	68.9	69.9	71.4	69.8
5	70.4	71.3	71.8	70.6	70.3	69.5	67.1	66.3	67.1	68.5	69.5	71.2	69.5
6	72.0	72.0	72.0	70.6	70.2	69.4	67.2	66.6	67.6	70.3	72.2	72.4	70.2
7	75.5	75.4	74.5	73.3	72.5	71.0	69.3	68.9	70.7	74.2	75.8	76.2	73.1
8	80.3	80.0	79.2	77.2	76.1	73.4	72.2	72.7	74.9	78.5	79.7	79.7	77.0
9	82.7	82.4	82.1	80.3	78.6	75.9	74.8	76.2	77.9	80.4	81.1	81.9	79.5
10	85.1	84.7	83.5	81.9	79.8	76.6	76.5	77.5	79.4	82.4	83.5	84.0	81.2
11	87.0	86.2	84.6	83.0	80.9	77.2	78.1	79.1	80.2	83.4	84.7	85.3	82.5
12	88.0	87.3	84.9	83.9	81.4	77.5	78.5	79.2	80.2	83.6	85.4	85.9	83.0
13	88.4	87.8	85.5	83.8	81.2	77.5	78.5	79.0	80.1	83.5	85.2	85.7	83.0
14	88.0	87.2	84.9	83.7	80.8	77.4	77.9	78.4	79.5	83.0	85.1	85.3	82.6
15	86.7	85.9	84.2	82.8	80.4	76.6	77.4	77.9	78.7	82.1	83.6	84.0	81.7
16	84.7	84.5	83.0	81.1	79.0	76.0	76.1	76.8	77.5	80.6	81.6	82.4	80.3

17	82.3	82.2	81.0	79.3	77.1	74.2	74.5	74.7	75.6	78.2	79.4	80.4	78.2
18	79.4	79.8	79.0	77.1	75.3	73.0	72.6	72.5	73.5	75.5	76.7	78.0	76.0
19	77.1	77.2	77.4	75.7	74.2	72.5	71.4	71.1	71.8	74.0	75.0	76.2	74.5
20	76.2	76.5	76.1	74.8	73.7	72.3	70.7	70.4	71.1	73.1	74.1	75.3	73.7
21	75.2	75.7	75.5	74.1	73.0	72.1	69.9	69.9	70.5	72.3	73.5	74.6	73.0
22	74.4	75.1	75.0	73.6	72.5	71.6	69.4	69.4	70.0	71.7	72.9	73.9	72.4
23	73.8	74.4	74.3	73.0	72.1	71.4	68.6	69.1	69.6	71.2	72.2	73.3	71.9

GROUND TEMPERATURES	538.0	538.1	537.4	536.0	534.6	532.6	531.5	531.6	532.6	535.0	536.3	537.2
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

NATAL

NatalTRY1954_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Natal -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -5.47 LONGITUDE = -35.12 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	80.2	80.8	80.6	78.7	77.6	76.4	75.1	75.4	76.6	78.7	79.1	80.0	78.2
AVG. TEMP. (F) (WETBULB)	74.5	75.0	75.4	74.6	73.7	72.9	71.2	71.7	71.9	72.3	72.6	73.3	73.2
AVG. DAILY MAX. TEMP.	86.5	88.1	87.8	86.1	84.7	82.8	82.6	83.4	84.3	86.0	85.8	86.7	85.4
AVG. DAILY MIN. TEMP.	75.3	74.6	74.2	72.9	72.3	71.4	69.5	68.9	70.2	72.8	73.6	74.6	72.5
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	32.5	39.0	37.5	7.5	2.0	0.0	0.0	0.0	0.5	5.0	8.5	26.0	158.5
(BASE 75)	182.5	178.0	187.0	134.5	109.0	63.5	37.0	37.5	66.5	136.5	140.0	175.0	1447.0
(BASE 70)	337.5	318.0	341.5	284.5	264.0	212.5	188.0	191.0	216.5	291.5	290.0	330.0	3265.0
(BASE 65)	492.5	458.0	496.5	434.5	419.0	362.5	343.0	346.0	366.5	446.5	440.0	485.0	5090.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	52.1	63.2	69.7	43.2	32.2	17.5	14.8	17.8	24.8	42.7	42.8	56.8	477.6
(BASE 75)	162.8	166.1	178.9	122.0	102.4	71.0	64.7	72.0	86.1	124.9	129.3	157.8	1438.2
(BASE 70)	315.8	303.6	329.8	260.0	236.3	190.8	161.7	175.2	199.0	269.6	272.9	309.7	3024.2
(BASE 65)	470.8	443.6	484.8	410.0	391.3	340.8	312.8	323.1	346.9	424.6	422.8	464.7	4835.9

MAXIMUM TEMP.	90	90	91	89	88	86	86	85	86	89	89	88	91
MINIMUM TEMP.	72	71	72	71	71	70	66	66	67	69	68	71	66

NO. DAYS MAX. 90 AND ABOVE	1	2	3	0	0	0	0	0	0	0	0	0	6
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.1	1.8	1.8	1.9	2.3	2.1	2.5	2.1	2.5	2.3	2.5	2.2	2.2

AVG. WIND SPEED (DAY)	2.1	1.8	1.8	2.0	2.4	2.1	2.6	2.2	2.5	2.4	2.5	2.3	2.2
AVG. WIND SPEED (NIGHT)	1.3	0.8	0.9	1.4	1.4	1.6	1.6	1.2	1.6	0.1	0.3	0.8	1.2

AVG. TEMP. (DAY)	80.3	81.0	80.8	78.8	77.8	76.6	75.4	75.7	77.0	80.4	80.8	81.4	78.8
AVG. TEMP. (NIGHT)	77.7	78.3	78.1	75.9	74.4	73.5	71.5	72.0	68.8	25.0	12.8	43.7	68.2

AVG. SKY COVER	5.5	4.9	5.1	5.6	5.5	5.6	4.7	4.4	4.3	4.4	4.5	4.2	4.9

AVG. SKY COVER (DAY)	5.6	4.9	5.1	5.7	5.5	5.6	4.8	4.5	4.4	4.5	4.6	4.3	5.0

AVG. REL. HUM. AT 4AM	87.2	89.0	92.2	95.2	95.0	94.6	94.2	94.1	92.2	84.3	83.8	83.9	90.5
10AM	72.7	71.4	74.4	80.0	79.1	81.5	79.6	79.4	74.6	65.1	66.7	64.5	74.1
4PM	67.8	64.4	67.7	71.8	72.6	73.8	70.1	72.3	67.7	63.7	62.6	62.6	68.1
10PM	81.6	81.2	82.9	87.8	89.1	90.4	90.1	89.2	86.7	80.3	80.2	81.6	85.1

Natal -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -5.47 LONGITUDE = -35.12 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	687.7	675.2	673.5	497.4	452.5	478.2	474.1	359.9	493.4	600.9	723.6	677.5	565.5
AVG. DAILY TOTAL HORIZNTL SOLAR	1113.3	1077.0	1049.5	963.1	908.3	879.6	840.0	821.4	962.3	1084.1	1189.3	1128.1	1000.7
MAX. DAILY DIRECT NORMAL SOLAR	1298.0	1274.0	1454.0	1127.0	917.0	1281.0	1251.0	794.0	1249.0	1415.0	1324.0	1279.0	1454.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1467.0	1404.0	1416.0	1298.0	1135.0	1342.0	1305.0	1119.0	1325.0	1516.0	1492.0	1455.0	1516.0
MIN. DAILY DIRECT NORMAL SOLAR	252.0	122.0	138.0	179.0	173.0	148.0	35.0	34.0	27.0	61.0	95.0	133.0	27.0
MIN. DAILY TOTAL HORIZNTL SOLAR	865.0	730.0	745.0	772.0	722.0	678.0	500.0	515.0	540.0	655.0	749.0	788.0	500.0
MAX. HRLY DIRECT NORMAL SOLAR	307.0	284.0	283.0	287.0	234.0	261.0	251.0	226.0	224.0	262.0	279.0	301.0	307.0
MAX. HRLY TOTAL HORIZNTL SOLAR	363.0	338.0	336.0	337.0	279.0	306.0	296.0	288.0	289.0	315.0	325.0	360.0	363.0
AVG. MAX. HRLY DIRECT NORML SOLAR	177.8	194.1	173.1	136.8	109.4	123.5	131.4	106.9	149.1	164.1	200.6	188.2	154.3
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	267.4	280.3	258.8	228.5	207.2	205.7	208.2	205.5	243.7	254.4	275.8	260.8	241.1

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	457.7	458.1	539.0	685.4	782.7	832.2	769.5	646.5	591.3	513.6	520.1	473.4	606.4
E	460.3	448.2	442.6	426.1	410.6	391.7	370.2	384.3	438.8	477.5	520.6	474.8	437.0
S	877.3	710.0	522.7	433.3	409.8	390.9	369.1	383.7	484.4	666.3	934.1	938.3	592.7
W	1414.0	1422.3	1401.1	1261.7	1186.0	1137.7	1090.9	1071.0	1311.3	1480.2	1650.9	1425.4	1320.0

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	556.7	546.5	695.9	1040.0	1059.5	1331.0	1279.7	870.6	818.2	633.0	582.4	549.0	1331.0
E	558.5	508.4	512.5	524.1	466.1	493.7	473.4	486.7	501.6	552.3	583.5	550.8	583.5
S	1249.2	923.6	665.9	522.5	464.6	492.5	472.2	490.4	589.8	883.6	1188.1	1251.3	1251.3
W	2059.3	1905.0	1948.7	1952.1	1579.4	1891.6	1821.4	1652.2	1850.2	2202.9	2083.1	2017.8	2202.9

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	184.2	177.2	205.6	317.0	316.3	362.3	346.1	262.5	223.9	182.0	170.9	169.5	362.3

E	184.2	169.9	170.2	176.7	147.5	161.1	155.1	150.3	151.4	165.9	170.9	169.5	184.2
S	396.0	317.3	239.5	176.7	147.5	161.1	155.1	155.1	189.6	275.4	356.3	370.9	396.0
W	721.1	690.2	704.6	714.1	569.5	619.4	596.8	596.8	600.0	675.6	686.3	661.9	721.1

Natal -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	89	78	67
2.5	88	78	68
5.0	87	77	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	77.6	78.0	77.9	75.7	74.2	73.4	71.4	71.6	72.6	75.3	75.8	76.7	75.0
1	77.3	77.4	77.1	75.2	73.6	73.0	70.8	71.1	72.1	74.9	75.6	76.5	74.5
2	76.8	76.8	76.3	74.5	73.4	72.6	70.4	70.6	71.6	74.5	75.3	76.0	74.0
3	76.5	76.1	75.5	73.8	73.0	72.3	70.2	70.0	71.3	74.2	75.1	75.7	73.6
4	76.3	75.6	75.0	73.5	72.7	72.0	70.0	69.7	70.9	73.7	74.7	75.5	73.3
5	75.8	74.9	74.6	73.2	72.6	71.6	69.8	69.4	70.6	73.2	74.1	74.9	72.9
6	75.9	74.8	74.5	73.5	72.9	71.9	70.0	69.2	70.8	74.2	74.9	75.5	73.2
7	78.4	77.4	77.7	75.5	75.3	74.2	72.2	71.8	73.9	77.3	77.8	78.6	75.8
8	81.0	81.3	81.6	79.5	78.2	76.2	75.1	76.0	77.6	81.1	81.1	82.0	79.2
9	82.7	83.7	83.6	81.4	80.3	78.4	77.5	78.6	79.7	82.9	82.6	83.8	81.3
10	83.9	85.6	85.1	83.1	82.0	80.1	79.4	80.3	81.4	84.2	83.9	84.9	82.8
11	84.7	86.9	86.4	84.6	83.1	81.3	80.7	81.3	83.0	84.9	84.9	85.6	83.9
12	85.7	87.4	87.0	85.2	83.7	81.5	81.8	82.6	83.5	85.1	84.7	86.0	84.5
13	85.8	87.5	86.7	84.8	83.6	81.8	81.5	82.6	83.9	85.0	85.2	86.0	84.5
14	85.0	86.9	86.1	84.4	83.5	81.8	81.5	82.6	83.0	84.4	84.7	85.6	84.1
15	84.3	86.0	85.5	83.2	82.6	81.2	81.0	81.4	82.2	83.5	83.8	84.7	83.3
16	83.2	84.3	84.5	82.4	81.1	80.4	79.7	79.7	80.6	81.7	82.2	83.6	82.0

17	81.7	82.4	82.8	80.6	79.4	78.6	77.7	78.0	78.7	79.7	80.1	81.5	80.1
18	79.9	80.8	80.9	79.1	78.1	76.9	76.1	76.0	76.9	77.6	78.1	79.4	78.3
19	78.9	80.0	80.1	78.1	77.2	75.9	74.5	74.8	75.8	76.9	77.4	78.2	77.3
20	78.6	79.6	79.7	77.4	76.5	75.0	73.7	74.1	75.2	76.5	77.0	77.7	76.7
21	78.4	79.3	79.3	77.0	75.8	74.6	73.1	73.5	74.6	76.4	76.7	77.2	76.3
22	78.1	79.0	78.9	76.5	75.4	74.1	72.4	72.9	74.1	76.0	76.4	77.1	75.9
23	77.9	78.6	78.5	76.0	74.6	73.7	71.6	72.3	73.4	75.6	76.1	77.0	75.4

GROUND TEMPERATURES	539.6	540.2	540.0	538.1	537.0	535.8	534.5	534.8	536.0	538.1	538.5	539.4	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

PORTO ALEGRE

PortoAlegreTRY1954_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

PoA -TRY 19 MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -30.03 LONGITUDE = -51.22 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	76.3	75.8	74.2	67.7	58.0	58.8	56.7	61.3	62.5	65.0	70.3	73.8	66.6
AVG. TEMP. (F) (WETBULB)	71.1	71.2	69.4	63.9	54.7	56.7	54.3	57.8	59.7	61.0	64.2	66.5	62.5
AVG. DAILY MAX. TEMP.	86.9	85.0	83.9	76.9	69.9	66.3	64.6	72.4	70.2	73.9	81.4	86.0	76.4
AVG. DAILY MIN. TEMP.	67.4	68.7	66.4	59.5	48.0	52.7	50.4	51.9	55.9	57.2	60.4	61.9	58.3
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	14.5	205.5	168.0	239.0	145.5	79.5	57.5	6.5	1.5	917.5
(BASE 60)	0.0	0.0	0.0	4.5	103.0	58.5	120.5	58.0	18.5	10.5	0.0	0.0	373.5
(BASE 55)	0.0	0.0	0.0	0.0	36.5	14.0	35.5	11.5	0.0	0.0	0.0	0.0	97.5
(BASE 50)	0.0	0.0	0.0	0.0	5.5	1.5	2.5	0.0	0.0	0.0	0.0	0.0	9.5
COOLING DEG. DAYS (BASE 80)	30.0	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	44.5
(BASE 75)	106.5	61.5	53.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	52.5	280.5
(BASE 70)	230.0	191.5	161.5	33.5	1.0	0.0	0.0	13.5	1.5	16.0	62.0	148.5	859.0
(BASE 65)	376.5	331.5	315.0	110.5	17.5	2.5	6.5	57.0	21.0	75.0	182.5	278.5	1774.0
HEATING DEG. HRS./24 (BASE 65)	7.3	1.2	4.2	52.6	260.6	203.4	277.6	189.1	120.1	87.2	32.0	23.7	1259.0
(BASE 60)	1.3	0.0	0.2	16.5	159.0	92.7	149.5	93.4	43.2	33.3	7.7	7.8	604.5

(BASE 55)	0.0	0.0	0.0	2.6	88.0	31.0	58.6	36.9	6.6	9.1	1.0	1.6	235.4
(BASE 50)	0.0	0.0	0.0	0.4	44.7	8.9	18.7	11.7	0.5	1.4	0.0	0.1	86.3

COOLING DEG. HRS./24 (BASE 80)	63.0	31.5	31.8	4.2	0.6	0.0	0.1	8.5	0.1	2.5	16.8	55.9	214.8
(BASE 75)	125.1	79.8	78.0	17.0	4.5	0.5	1.9	20.9	3.0	11.6	47.9	104.0	494.2
(BASE 70)	223.4	173.5	161.4	56.5	16.7	5.2	8.0	41.2	15.6	34.2	104.3	181.9	1021.9
(BASE 65)	358.6	304.8	289.5	134.4	42.5	16.8	19.3	73.1	45.2	87.0	191.2	296.4	1859.0

MAXIMUM TEMP.	98	95	92	90	85	79	82	88	81	87	92	98	98
MINIMUM TEMP.	55	61	58	46	34	37	40	38	48	45	52	49	34

NO. DAYS MAX. 90 AND ABOVE	16	5	7	1	0	0	0	0	0	0	1	14	44
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	1.7	1.6	1.8	1.7	1.3	1.7	1.6	1.8	2.0	2.0	2.2	2.0	1.8

AVG. WIND SPEED (DAY)	1.8	1.6	1.8	1.8	1.3	1.8	1.6	1.9	2.0	2.0	2.2	2.0	1.8
AVG. WIND SPEED (NIGHT)	2.1	1.7	3.6	10.6	0.1	1.5	1.5	-2.3	2.9	3.0	1.8	2.4	2.9

AVG. TEMP. (DAY)	77.2	77.0	75.5	69.0	59.2	59.1	57.1	62.5	63.6	65.8	70.9	74.4	67.9
AVG. TEMP. (NIGHT)	86.6	97.1	120.1	452.7	7.8	51.3	47.7	-18.0	96.2	76.0	76.3	79.4	104.1

AVG. SKY COVER	4.2	4.4	3.6	4.0	3.2	6.0	4.8	2.9	5.8	4.4	2.5	2.9	4.1

AVG. SKY COVER (DAY)	4.3	4.5	3.7	4.2	3.3	6.1	4.8	3.0	5.9	4.4	2.6	2.9	4.1

AVG. REL. HUM. AT 4AM	94.9	94.3	94.1	93.9	96.3	95.9	94.9	92.7	94.5	93.8	93.3	88.2	93.9
10AM	78.6	81.7	81.3	82.4	88.4	93.8	92.8	85.5	86.8	79.1	73.6	67.7	82.6
4PM	63.6	67.9	64.0	65.0	61.9	74.8	72.1	67.9	75.5	63.8	54.3	51.2	65.1
10PM	84.2	86.2	85.5	89.4	90.2	92.6	90.1	90.0	89.3	85.3	80.3	76.9	86.7

PoA -TRY 19 MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -30.03 LONGITUDE = -51.22 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	746.2	723.0	649.6	465.4	127.5	73.1	90.4	375.9	370.2	693.5	792.5	1044.5	511.9
AVG. DAILY TOTAL HORIZNTL SOLAR	1123.2	1046.0	810.3	616.8	194.7	156.2	144.1	504.4	651.5	876.9	1157.7	1338.0	716.4
MAX. DAILY DIRECT NORMAL SOLAR	1517.0	1595.0	1409.0	1000.0	315.0	303.0	302.0	699.0	1215.0	1423.0	1194.0	1894.0	1894.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1572.0	1533.0	1343.0	946.0	299.0	279.0	265.0	770.0	1110.0	1320.0	1483.0	1842.0	1842.0
MIN. DAILY DIRECT NORMAL SOLAR	49.0	84.0	43.0	32.0	14.0	10.0	6.0	4.0	66.0	23.0	13.0	44.0	4.0
MIN. DAILY TOTAL HORIZNTL SOLAR	665.0	677.0	406.0	170.0	120.0	124.0	84.0	89.0	436.0	427.0	436.0	685.0	84.0
MAX. HRLY DIRECT NORMAL SOLAR	247.0	268.0	237.0	227.0	134.0	147.0	144.0	168.0	247.0	271.0	191.0	299.0	299.0
MAX. HRLY TOTAL HORIZNTL SOLAR	313.0	323.0	294.0	271.0	151.0	152.0	145.0	223.0	296.0	325.0	283.0	351.0	351.0
AVG. MAX. HRLY DIRECT NORML SOLAR	166.4	154.2	154.5	129.2	60.9	36.3	46.7	103.5	98.6	158.8	157.0	185.3	120.8
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	240.3	229.8	221.3	183.9	100.8	85.3	79.3	156.8	180.4	220.9	239.3	268.0	183.6

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	514.2	556.7	575.0	574.9	224.8	186.3	172.1	508.5	518.7	525.9	546.3	575.3	455.7
E	462.9	441.6	340.0	276.7	85.9	75.5	64.2	232.0	303.8	359.3	475.1	535.4	303.5
S	721.1	599.5	376.9	278.8	85.9	75.5	64.2	232.1	319.9	440.5	732.4	926.7	403.4
W	1529.6	1517.8	1260.4	1000.3	264.0	202.6	189.5	831.1	987.2	1305.0	1617.7	1889.0	1046.7

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	626.9	767.5	802.8	880.5	343.2	381.6	340.5	720.5	859.2	759.8	701.9	716.7	880.5
E	568.1	573.7	526.4	389.5	106.8	134.0	94.1	331.0	433.1	630.5	643.7	658.4	658.4
S	1021.6	897.2	677.0	395.2	106.8	134.0	94.1	332.5	473.9	813.4	1031.6	1236.7	1236.7
W	2263.9	2370.9	2281.5	1699.0	429.3	436.1	390.0	1328.7	1931.6	2079.7	2157.2	2764.5	2764.5

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	165.3	171.7	186.9	242.7	168.9	203.8	184.0	208.8	227.9	178.2	151.7	186.8	242.7

E	165.3	171.7	160.9	145.2	65.3	76.0	62.2	120.4	156.5	167.0	151.7	186.8	186.8
S	363.5	334.2	244.8	151.0	65.3	76.0	62.2	120.8	182.5	291.9	317.5	429.3	429.3
W	621.8	675.2	640.5	588.5	253.4	273.6	246.3	465.5	642.4	674.2	535.3	714.3	714.3

PoA -TRY 19 MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	95	80	42
2.5	92	78	45
5.0	90	77	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	71.7	72.2	70.5	64.3	52.8	56.4	54.1	57.7	60.0	61.2	64.9	68.2	62.8
1	71.0	71.7	69.9	63.9	52.2	56.2	53.6	57.0	59.7	60.6	64.1	66.8	62.2
2	70.3	71.0	69.3	63.4	51.3	55.8	53.4	56.4	59.2	59.8	63.0	66.3	61.5
3	69.8	70.2	68.3	62.8	50.7	55.6	53.0	55.7	58.5	59.3	62.0	65.1	60.8
4	69.4	70.0	67.9	62.2	50.4	55.3	52.8	55.1	57.8	58.8	61.6	64.5	60.4
5	69.0	69.8	67.4	61.6	50.2	54.8	52.3	54.5	57.7	58.6	61.3	64.2	60.1
6	69.0	69.3	67.0	60.9	50.2	54.9	52.0	53.7	57.5	58.2	61.1	63.8	59.7
7	70.9	70.1	67.2	60.8	50.7	55.0	52.2	53.5	58.0	60.0	64.8	67.5	60.8
8	73.8	73.1	69.7	63.0	51.6	55.3	52.4	55.2	59.3	62.4	68.4	71.5	62.9
9	76.5	75.8	73.5	66.5	54.9	56.5	53.9	58.7	61.4	65.3	71.5	74.2	65.7
10	78.6	78.1	76.6	70.2	58.7	58.4	56.3	62.4	63.7	67.9	74.7	77.3	68.5
11	80.7	79.8	79.2	72.3	62.1	60.5	58.3	65.5	65.4	69.9	76.9	79.4	70.8
12	82.6	81.8	81.1	74.1	64.5	62.8	60.3	67.9	67.2	71.5	78.6	81.2	72.7
13	83.9	83.1	81.9	75.3	66.7	63.8	61.6	69.7	68.5	72.7	80.0	82.7	74.1
14	84.6	83.0	82.8	76.0	68.4	64.6	62.5	70.5	68.8	73.1	80.5	83.7	74.8
15	84.2	82.8	82.2	75.7	69.5	65.1	63.8	71.0	68.4	72.4	79.8	84.4	74.9
16	84.1	82.4	81.7	75.3	69.4	64.6	63.5	70.5	68.0	71.3	79.2	84.2	74.5

17	83.4	81.4	80.5	74.4	67.4	63.2	62.0	69.2	66.9	70.0	77.6	83.0	73.2
18	82.2	80.5	78.7	71.7	63.9	61.3	60.1	66.1	65.2	68.5	75.1	81.1	71.2
19	79.8	78.0	76.0	68.5	60.6	59.8	58.2	62.6	63.7	66.3	72.4	77.5	68.6
20	76.6	75.9	74.1	67.3	58.5	59.0	57.0	60.9	62.7	64.5	69.7	74.5	66.7
21	74.5	74.0	72.5	65.9	56.7	58.0	56.3	59.4	61.3	63.3	67.8	71.4	65.0
22	73.3	73.4	71.9	65.1	55.4	57.1	55.6	58.8	60.9	62.5	66.7	70.1	64.2
23	72.2	72.8	71.1	64.2	54.4	56.7	55.1	58.2	60.3	61.7	65.9	68.7	63.4

GROUND TEMPERATURES	530.5	530.6	528.8	523.3	514.1	516.1	513.7	517.1	519.0	520.4	523.6	525.9	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

RECIFE

RecifeTRY1962_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Recife -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -8.03 LONGITUDE = -34.52 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	80.0	80.5	80.0	78.9	78.3	76.4	75.3	75.8	77.1	78.8	79.3	79.8	78.3
AVG. TEMP. (F) (WETBULB)	74.1	74.6	75.2	74.5	74.0	72.7	71.7	71.2	71.9	72.7	73.6	74.2	73.4
AVG. DAILY MAX. TEMP.	83.4	84.0	83.6	83.0	82.2	80.3	79.5	79.9	80.6	82.3	82.9	83.4	82.1
AVG. DAILY MIN. TEMP.	76.0	76.7	75.7	74.1	73.6	72.5	70.8	71.1	73.7	75.6	76.3	76.7	74.4
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	6.5	17.5	14.0	2.5	1.0	0.0	0.0	0.0	0.0	0.0	4.5	14.5	60.5
(BASE 75)	145.5	150.0	145.0	105.5	90.5	46.5	14.5	27.0	67.0	122.0	137.0	156.5	1207.0
(BASE 70)	300.5	290.0	300.0	255.5	245.5	192.0	159.0	170.0	214.5	277.0	287.0	311.5	3002.5
(BASE 65)	455.5	430.0	455.0	405.5	400.5	342.0	314.0	325.0	364.5	432.0	437.0	466.5	4827.5
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	30.8	33.4	35.4	21.7	15.6	3.6	0.3	1.1	3.5	15.1	19.1	25.2	204.8
(BASE 75)	156.2	153.2	158.0	121.0	111.7	63.0	46.5	55.1	74.5	120.0	130.1	148.7	1337.8
(BASE 70)	310.5	292.9	310.5	265.9	257.3	190.9	164.4	183.1	214.3	273.3	279.9	302.9	3046.0
(BASE 65)	465.5	432.9	465.5	415.9	412.3	340.7	318.7	336.3	363.9	428.3	429.9	457.9	4867.8

MAXIMUM TEMP.	84	86	85	85	84	83	81	82	83	83	89	86	89
MINIMUM TEMP.	72	74	72	71	71	68	68	67	68	71	74	73	67

NO. DAYS MAX. 90 AND ABOVE	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.1	2.0	2.2	2.2	2.2	2.7	2.6	2.8	2.6	2.6	2.5	2.8	2.4

AVG. WIND SPEED (DAY)	2.1	2.0	2.2	2.2	2.2	2.7	2.6	2.8	2.6	2.7	2.5	2.9	2.5
AVG. WIND SPEED (NIGHT)	1.5	1.8	1.7	1.7	1.8	2.6	2.4	2.4	2.1	1.0	2.4	1.6	2.0

AVG. TEMP. (DAY)	80.1	80.5	80.1	79.0	78.4	76.5	75.4	76.0	77.2	78.9	79.4	79.8	78.4
AVG. TEMP. (NIGHT)	78.5	79.3	78.9	77.6	77.0	74.7	73.6	74.3	75.7	77.2	77.7	78.3	76.6

AVG. SKY COVER	3.4	4.4	5.5	5.2	5.0	5.5	4.9	4.5	4.1	3.4	3.8	4.7	4.5

AVG. SKY COVER (DAY)	3.4	4.4	5.5	5.3	5.1	5.5	5.0	4.5	4.1	3.4	3.9	4.7	4.6

AVG. REL. HUM. AT 4AM	81.6	81.1	86.9	89.4	90.2	90.4	91.0	86.4	82.3	80.4	80.8	81.8	85.2
10AM	70.7	74.1	77.2	77.5	77.9	80.7	82.1	76.1	74.7	70.7	72.4	73.6	75.6
4PM	70.5	70.4	75.9	75.0	76.0	78.4	78.6	75.0	75.2	69.7	71.0	72.8	74.1
10PM	77.7	77.5	81.3	82.7	82.7	87.7	85.3	81.2	79.8	78.7	79.6	80.0	81.2

Recife -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -8.03 LONGITUDE = -34.52 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	849.8	908.0	709.5	607.7	505.3	408.7	345.0	514.0	785.5	903.6	775.7	801.6	674.6
AVG. DAILY TOTAL HORIZNTL SOLAR	1320.2	1332.8	1065.3	991.6	918.2	806.2	703.8	866.6	1106.2	1243.7	1198.4	1193.7	1060.4
MAX. DAILY DIRECT NORMAL SOLAR	1339.0	1662.0	1463.0	1255.0	1065.0	975.0	808.0	1067.0	1281.0	1236.0	1355.0	1641.0	1662.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1600.0	1737.0	1444.0	1340.0	1209.0	1131.0	1054.0	1219.0	1406.0	1422.0	1505.0	1670.0	1737.0
MIN. DAILY DIRECT NORMAL SOLAR	73.0	109.0	122.0	84.0	138.0	70.0	6.0	14.0	28.0	273.0	130.0	70.0	6.0
MIN. DAILY TOTAL HORIZNTL SOLAR	737.0	825.0	732.0	651.0	676.0	565.0	281.0	426.0	554.0	780.0	796.0	696.0	281.0
MAX. HRLY DIRECT NORMAL SOLAR	218.0	268.0	278.0	273.0	234.0	228.0	183.0	212.0	245.0	220.0	246.0	300.0	300.0
MAX. HRLY TOTAL HORIZNTL SOLAR	293.0	320.0	332.0	322.0	284.0	273.0	248.0	277.0	304.0	292.0	306.0	350.0	350.0
AVG. MAX. HRLY DIRECT NORML SOLAR	182.7	198.1	163.5	147.8	121.9	115.0	106.7	143.2	176.8	193.8	191.3	200.5	161.5
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	269.2	279.4	249.2	233.9	212.2	194.2	184.1	215.0	256.0	271.6	274.0	274.1	242.5

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	558.2	573.5	546.3	717.3	812.2	772.0	650.5	686.3	640.5	534.8	486.7	474.0	621.1
E	561.1	558.8	427.7	420.6	405.7	361.7	319.5	373.1	444.7	490.2	486.6	476.2	443.0
S	1059.2	884.2	493.3	425.5	404.9	360.9	318.8	372.2	483.8	682.9	857.2	947.8	606.1
W	1801.8	1882.4	1381.5	1328.9	1212.4	1019.6	908.4	1157.2	1512.6	1702.5	1561.6	1515.3	1412.2

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	629.3	678.0	796.4	1004.6	1128.9	1152.0	998.6	992.4	787.9	614.0	556.8	563.9	1152.0
E	633.6	648.2	496.3	501.0	478.9	444.9	425.4	464.4	507.9	542.3	556.9	565.9	648.2
S	1276.7	1210.3	641.0	513.1	477.6	443.9	424.2	465.8	584.6	872.9	1098.8	1277.0	1277.0
W	2217.8	2573.8	2041.0	1962.8	1718.7	1620.5	1461.5	1718.6	2023.2	1974.4	2075.2	2198.5	2573.8

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	154.0	175.0	222.8	262.1	280.3	316.9	276.3	264.8	213.4	173.1	159.8	180.2	316.9

	E	154.0	169.8	167.4	166.7	149.7	142.5	129.9	144.6	159.0	153.7	159.8	180.2	180.2
	S	319.0	320.1	238.5	177.5	149.7	142.5	129.9	145.9	193.3	259.1	318.7	390.9	390.9
	W	584.0	691.4	692.3	686.3	591.7	545.5	477.9	566.8	645.3	601.0	631.9	707.3	707.3

Recife -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	85	78	69
2.5	84	77	70
5.0	84	77	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	78.5	79.5	78.9	77.7	77.3	74.8	73.4	74.2	75.6	77.1	77.7	78.4	76.9
1	78.1	78.9	78.4	76.9	76.5	74.6	73.3	73.9	75.3	77.0	77.4	78.2	76.5
2	77.8	78.6	77.6	76.3	76.0	74.2	72.9	73.6	75.1	76.8	77.2	78.0	76.2
3	77.5	78.1	77.2	75.8	75.2	74.0	72.4	73.1	74.7	76.5	77.2	77.7	75.8
4	77.0	78.0	76.9	75.0	74.9	73.9	72.1	72.8	74.4	76.2	76.7	77.5	75.4
5	76.6	77.3	76.5	74.7	74.4	73.6	71.4	72.7	74.5	75.9	76.7	77.2	75.1
6	76.7	77.1	76.6	74.7	74.5	73.6	71.3	72.6	74.8	76.6	77.6	77.5	75.3
7	78.8	79.1	78.2	76.7	76.1	75.2	72.5	74.0	76.5	78.4	79.1	79.5	77.0
8	80.6	80.5	80.2	78.8	78.3	76.9	74.8	76.0	78.0	80.3	80.3	80.4	78.7
9	82.1	81.7	81.6	80.7	80.0	78.1	76.8	77.8	78.8	81.0	81.2	81.4	80.1
10	82.5	82.4	82.5	81.6	80.8	78.8	77.6	78.6	79.5	81.5	81.2	81.9	80.8
11	82.7	83.1	82.8	81.9	81.4	79.1	78.5	78.9	80.0	81.8	81.8	82.3	81.2
12	83.0	83.5	82.9	81.6	81.5	79.0	78.9	78.9	79.9	81.6	82.3	82.6	81.3
13	83.2	83.5	82.9	82.1	81.4	79.2	79.0	79.3	79.7	81.6	82.3	82.7	81.4
14	82.8	83.1	82.6	81.9	81.2	79.0	79.0	79.3	79.5	81.5	82.3	82.5	81.2
15	82.7	83.1	82.5	81.7	80.9	79.0	78.0	78.5	79.1	81.2	81.6	81.8	80.8
16	82.1	82.3	82.0	81.2	80.2	78.5	77.7	78.1	78.5	80.4	80.7	81.1	80.2

17	81.3	81.6	81.1	80.3	79.6	77.2	76.5	76.7	77.8	79.3	79.9	80.5	79.3
18	80.2	80.7	80.3	79.7	79.0	76.7	75.9	76.0	77.0	78.4	79.0	79.7	78.5
19	79.5	80.2	80.1	79.3	78.7	76.1	75.6	75.5	76.7	78.1	78.7	79.3	78.1
20	79.4	79.9	79.7	79.0	78.5	75.9	75.4	75.2	76.8	77.9	78.4	79.1	77.9
21	79.3	79.9	79.8	78.7	78.2	75.3	74.9	75.3	76.4	77.6	78.3	78.7	77.7
22	79.1	79.7	79.7	78.6	77.8	75.1	74.5	74.8	76.4	77.6	78.2	78.5	77.5
23	78.7	79.5	79.4	78.1	77.1	74.9	74.2	74.8	76.1	77.3	77.9	78.4	77.2

GROUND TEMPERATURES	533.5	534.0	534.6	534.0	533.4	532.1	531.0	530.6	531.3	532.1	533.0	533.6	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

RIO DE JANEIRO

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Rio - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -22.54 LONGITUDE = -43.12 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	81.0	78.4	80.4	75.3	71.3	69.0	68.9	69.9	73.3	73.5	76.3	76.3	74.5
AVG. TEMP. (F) (WETBULB)	75.6	73.5	74.5	70.9	67.6	65.2	65.8	66.3	69.1	70.8	72.3	71.3	70.2
AVG. DAILY MAX. TEMP.	88.6	84.9	86.8	81.1	78.4	76.2	76.5	77.6	80.2	79.2	82.8	82.1	81.2
AVG. DAILY MIN. TEMP.	75.1	73.6	75.1	70.2	64.5	62.6	62.2	63.2	67.9	69.2	71.1	71.0	68.8
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	1.5	8.5	0.0	0.0	0.0	0.0	10.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COOLING DEG. DAYS (BASE 80)	80.0	22.0	49.5	0.5	0.0	0.0	1.5	0.0	0.0	4.5	24.0	24.5	206.5
(BASE 75)	213.0	123.5	185.5	40.0	12.0	0.0	10.0	6.0	23.0	33.0	88.5	92.0	826.5
(BASE 70)	368.0	259.0	340.0	170.5	63.0	23.0	26.5	57.0	125.0	133.5	210.5	207.0	1983.0
(BASE 65)	523.0	399.0	495.0	320.5	200.0	132.5	135.0	176.0	271.5	284.5	358.5	358.5	3654.0
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	6.8	15.2	18.3	17.5	0.6	0.0	0.2	0.2	58.9
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.9	0.8	1.0	0.0	0.0	0.0	0.0	2.8

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	89.9	39.4	64.5	6.9	5.0	1.2	3.2	5.2	11.1	9.9	27.4	36.2	299.9
(BASE 75)	193.2	109.8	171.9	52.2	25.0	9.2	13.2	22.8	39.5	37.2	83.8	95.2	853.0
(BASE 70)	342.5	236.1	323.5	164.2	90.3	45.1	51.7	72.5	114.3	118.7	193.7	204.2	1956.8
(BASE 65)	497.5	376.0	478.5	309.6	203.0	134.6	140.0	168.6	249.1	262.4	337.9	351.2	3508.5

MAXIMUM TEMP.	100	95	95	89	90	84	92	95	89	93	99	101	101
MINIMUM TEMP.	73	69	72	66	60	57	58	55	62	66	63	62	55

NO. DAYS MAX. 90 AND ABOVE	14	5	7	0	1	0	2	1	0	3	5	5	43
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	1.6	1.8	1.7	1.7	1.2	1.3	1.4	1.5	1.7	1.8	1.8	2.3	1.6

AVG. WIND SPEED (DAY)	1.7	1.8	1.8	1.7	1.2	1.3	1.4	1.5	1.7	1.9	1.9	2.4	1.7
AVG. WIND SPEED (NIGHT)	5.5	47.5	-0.8	1.2	0.6	1.3	1.0	0.7	-0.4	6.9	2.5	5.2	-4.1

AVG. TEMP. (DAY)	84.1	79.9	80.5	75.4	71.4	69.1	69.1	70.0	74.1	76.3	79.0	79.1	75.8
AVG. TEMP. (NIGHT)	194.5	2461.9	78.2	73.4	69.2	67.0	67.2	67.6	-10.8	170.4	129.9	132.6	-44.8

AVG. SKY COVER	3.7	4.6	2.7	3.6	1.8	3.2	2.3	3.0	2.2	5.5	4.9	4.6	3.5

AVG. SKY COVER (DAY)	3.9	4.7	2.7	3.6	1.8	3.3	2.3	3.0	2.2	5.8	5.2	4.8	3.6

AVG. REL. HUM. AT 4AM	89.5	88.9	86.7	89.5	92.5	91.9	93.1	91.6	90.4	93.7	91.1	87.7	90.6
10AM	76.6	79.5	76.8	80.8	83.2	83.4	86.4	83.4	81.8	86.3	80.1	75.8	81.2
4PM	67.5	67.8	64.4	70.0	72.2	70.5	77.1	73.4	71.0	82.2	75.9	70.5	71.9
10PM	83.0	83.5	77.7	82.5	84.7	83.8	85.4	84.1	82.6	91.1	86.2	81.1	83.8

Rio - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -22.54 LONGITUDE = -43.12 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	898.7	926.5	550.3	477.3	334.2	408.2	280.0	564.1	354.0	653.8	679.0	833.1	578.2
AVG. DAILY TOTAL HORIZNTL SOLAR	1236.3	1203.1	937.0	708.3	569.4	553.4	482.2	691.9	693.4	1030.5	1132.9	1200.5	868.2
MAX. DAILY DIRECT NORMAL SOLAR	1535.0	1676.0	857.0	1081.0	479.0	665.0	374.0	1004.0	650.0	1779.0	1482.0	1698.0	1779.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1575.0	1584.0	1145.0	1173.0	685.0	709.0	591.0	955.0	1089.0	1720.0	1602.0	1724.0	1724.0
MIN. DAILY DIRECT NORMAL SOLAR	76.0	143.0	40.0	15.0	11.0	23.0	0.0	31.0	4.0	39.0	42.0	25.0	0.0
MIN. DAILY TOTAL HORIZNTL SOLAR	702.0	759.0	422.0	342.0	280.0	291.0	87.0	343.0	174.0	590.0	665.0	595.0	87.0
MAX. HRLY DIRECT NORMAL SOLAR	264.0	291.0	155.0	199.0	116.0	175.0	100.0	227.0	109.0	295.0	243.0	288.0	295.0
MAX. HRLY TOTAL HORIZNTL SOLAR	325.0	345.0	259.0	263.0	199.0	214.0	180.0	272.0	224.0	341.0	311.0	339.0	345.0
AVG. MAX. HRLY DIRECT NORML SOLAR	180.4	196.8	118.7	142.0	89.9	122.1	79.5	149.7	81.8	141.2	146.5	189.3	136.1
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	267.3	276.5	222.9	208.6	166.8	173.4	154.1	208.2	183.6	220.6	235.2	259.6	214.4

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	498.2	566.8	602.8	611.8	590.3	651.1	528.2	662.4	500.3	569.1	513.8	491.5	565.5
E	479.2	475.2	414.2	307.8	262.5	251.9	226.9	284.6	308.7	453.3	483.1	482.8	368.7
S	782.8	650.8	462.7	310.8	262.5	251.9	226.9	284.6	324.9	576.9	739.5	832.1	474.8
W	1630.4	1693.6	1353.9	1042.3	817.2	838.1	695.9	1033.6	947.5	1497.0	1533.9	1588.8	1220.3

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	566.8	735.8	758.8	914.6	675.6	862.8	618.8	844.1	695.7	876.0	644.6	605.1	914.6
E	555.4	536.5	470.2	488.6	297.4	303.2	265.7	346.1	475.1	628.2	601.8	599.0	628.2
S	1021.0	799.2	570.6	511.0	297.4	303.2	265.7	346.1	537.8	946.5	1031.9	1130.2	1130.2
W	2119.6	2317.7	1654.0	1904.3	1006.8	1140.9	848.5	1478.2	1574.3	2641.8	2275.8	2403.4	2641.8

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	167.0	185.8	165.5	228.1	197.1	262.2	190.6	257.5	160.8	192.8	162.9	177.0	262.2

E	167.0	178.1	137.9	144.2	105.6	114.0	95.5	138.6	122.9	183.1	162.9	177.0	183.1
S	357.0	320.7	195.5	159.4	105.6	114.0	95.5	138.6	155.1	330.2	338.1	390.0	390.0
W	652.2	723.2	500.6	563.9	366.9	424.6	319.5	562.8	421.4	739.8	622.8	688.7	739.8

Rio - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	95	82	59
2.5	92	80	60
5.0	90	79	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	77.9	76.0	78.5	73.6	69.4	67.0	67.4	67.9	71.1	71.5	73.8	74.0	72.3
1	77.5	75.6	78.0	73.1	69.0	66.5	66.5	67.1	70.3	71.2	73.4	73.8	71.8
2	77.2	75.4	77.4	72.7	68.3	65.8	65.7	66.5	69.8	70.8	73.0	73.4	71.3
3	76.4	75.0	76.5	72.0	67.0	65.2	64.7	65.7	69.3	70.5	72.7	72.8	70.6
4	76.0	74.5	76.1	71.5	66.5	64.5	64.1	65.1	68.9	70.1	72.7	72.2	70.1
5	75.6	74.2	75.8	71.1	65.9	64.0	63.6	64.5	68.6	70.0	72.4	71.8	69.8
6	76.0	73.9	75.4	70.6	65.2	63.4	63.0	64.0	68.2	69.9	72.8	72.3	69.5
7	77.3	74.7	76.3	71.1	65.1	63.5	62.5	64.2	69.2	70.8	74.1	73.7	70.2
8	79.6	76.9	78.8	72.7	67.7	64.8	64.3	66.1	70.8	72.2	76.1	75.9	72.1
9	82.3	78.9	80.7	75.5	70.6	67.1	67.1	68.8	72.8	73.9	77.9	78.2	74.5
10	84.2	80.3	82.0	76.8	73.0	69.8	69.1	71.1	75.0	75.5	79.1	79.2	76.2
11	85.9	81.7	83.6	78.5	75.0	71.9	71.9	72.8	76.6	76.3	80.3	79.8	77.8
12	86.4	82.6	84.2	79.4	76.3	73.6	73.8	74.3	77.8	76.9	80.2	80.6	78.8
13	87.3	83.5	85.0	80.1	76.5	74.4	74.6	75.6	78.1	77.3	80.4	80.5	79.4
14	86.7	83.7	85.2	79.7	77.3	75.2	75.0	75.9	78.7	77.5	80.2	80.5	79.6
15	86.5	83.6	85.5	79.7	77.0	74.9	74.9	75.6	78.6	77.1	79.8	80.0	79.4
16	85.7	82.5	84.6	79.1	76.2	74.1	74.3	74.9	77.7	76.6	78.5	79.3	78.6

17	84.2	81.5	83.8	78.0	75.2	72.6	73.1	74.1	76.7	75.6	78.4	78.6	77.6
18	83.0	80.2	82.6	77.0	73.9	71.5	71.7	72.7	75.0	74.9	77.6	77.8	76.5
19	81.7	78.9	81.8	76.4	73.1	70.8	70.9	71.7	74.3	74.2	76.6	76.8	75.6
20	80.5	77.9	80.7	75.7	72.3	70.1	70.2	70.8	73.6	73.3	75.8	75.9	74.7
21	79.5	77.2	79.9	74.9	71.4	69.1	69.4	70.0	73.1	72.6	75.3	75.4	74.0
22	79.2	76.9	79.5	74.4	70.5	68.3	68.6	69.2	72.5	72.5	74.8	74.8	73.4
23	78.6	76.6	78.7	74.1	69.8	67.6	67.7	68.2	72.0	72.1	74.2	74.4	72.8

GROUND TEMPERATURES	535.0	532.9	533.9	530.2	527.0	524.6	525.2	525.7	528.5	530.2	531.7	530.6	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

SALVADOR

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Salvador - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -12.90 LONGITUDE = -38.33 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	79.8	80.0	80.2	79.2	77.4	76.0	73.8	74.1	75.6	77.5	78.6	78.6	77.5
AVG. TEMP. (F) (WETBULB)	74.2	73.9	74.6	74.1	72.2	71.2	68.6	68.2	69.4	71.3	71.7	72.9	71.8
AVG. DAILY MAX. TEMP.	86.8	86.7	86.7	84.7	83.2	81.7	79.9	80.2	82.3	83.5	84.8	84.4	83.7
AVG. DAILY MIN. TEMP.	72.4	71.6	72.8	72.9	70.5	70.6	67.7	67.7	67.3	72.2	71.3	71.5	70.7
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	15.5	7.5	15.0	6.0	0.5	0.0	0.0	0.0	0.0	0.0	1.5	3.0	49.0
(BASE 75)	143.0	117.0	148.0	114.0	61.0	44.5	12.0	7.0	30.0	88.0	91.0	91.5	947.0
(BASE 70)	298.0	257.0	303.0	263.5	211.5	184.5	118.0	123.0	145.0	242.0	241.0	246.0	2632.5
(BASE 65)	453.0	397.0	458.0	413.5	366.5	334.5	272.0	278.0	295.0	397.0	391.0	401.0	4456.5
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.1	4.1	3.7	2.8	0.0	0.0	0.0	10.8
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	58.1	54.7	59.5	37.8	22.2	8.1	1.6	1.5	12.3	21.4	37.8	34.3	349.2
(BASE 75)	160.0	151.7	171.3	137.0	100.5	60.2	36.5	40.5	66.3	90.5	123.1	124.9	1262.4
(BASE 70)	305.8	281.7	318.1	277.7	233.8	183.2	136.2	142.2	182.2	232.9	259.5	268.6	2821.9
(BASE 65)	460.0	420.6	472.3	426.9	383.9	329.1	275.7	285.6	320.5	386.4	407.5	422.8	4591.2

MAXIMUM TEMP.	90	90	92	87	86	84	83	82	85	85	86	87	92
MINIMUM TEMP.	65	66	66	67	64	63	60	58	60	65	66	66	58

NO. DAYS MAX. 90 AND ABOVE	1	2	1	0	0	0	0	0	0	0	0	0	4
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.5	2.0	2.2	1.6	1.7	2.0	1.9	2.1	2.3	2.8	2.7	2.4	2.2

AVG. WIND SPEED (DAY)	2.6	2.0	2.2	1.6	1.7	2.0	2.0	2.1	2.3	2.9	2.8	2.5	2.2
AVG. WIND SPEED (NIGHT)	0.5	2.2	1.4	1.5	1.0	2.0	1.4	1.5	1.9	-12.3	15.9	-275.3	0.8

AVG. TEMP. (DAY)	79.9	80.1	80.3	79.3	77.5	76.1	74.0	74.3	75.7	78.3	81.7	80.2	78.1
AVG. TEMP. (NIGHT)	77.3	78.1	78.2	77.4	75.2	73.6	70.8	71.6	72.9	-57.8	496.3	******	62.2

AVG. SKY COVER	4.4	3.0	4.8	4.3	4.7	4.8	4.7	4.5	3.2	4.4	3.6	5.3	4.3

AVG. SKY COVER (DAY)	4.4	3.0	4.8	4.4	4.7	4.8	4.8	4.5	3.2	4.5	3.8	5.4	4.4

AVG. REL. HUM. AT 4AM	89.5	86.7	87.3	86.3	87.2	86.4	84.5	80.9	85.3	83.0	82.9	85.7	85.5
10AM	67.9	68.6	69.9	73.6	72.9	74.0	71.3	70.0	66.1	68.0	64.9	70.1	69.8
4PM	68.7	67.5	68.9	72.3	71.1	72.8	70.0	67.4	64.8	68.0	64.1	67.8	68.6
10PM	82.6	79.5	80.6	81.4	82.0	84.8	80.5	79.0	78.0	78.2	76.5	82.3	80.5

Salvador - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -12.90 LONGITUDE = -38.33 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	671.0	772.5	718.3	616.8	382.2	390.5	474.2	545.3	726.0	917.5	960.0	682.5	653.6
AVG. DAILY TOTAL HORIZNTL SOLAR	1096.3	1119.5	1063.4	973.3	807.2	721.6	787.9	876.0	1067.7	1225.4	1313.8	1151.7	1016.1
MAX. DAILY DIRECT NORMAL SOLAR	1474.0	1218.0	1547.0	1375.0	1059.0	862.0	1077.0	1246.0	1378.0	1706.0	1612.0	1729.0	1729.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1542.0	1337.0	1488.0	1377.0	1166.0	1024.0	1149.0	1276.0	1428.0	1690.0	1657.0	1795.0	1795.0
MIN. DAILY DIRECT NORMAL SOLAR	108.0	143.0	150.0	97.0	90.0	19.0	35.0	33.0	92.0	34.0	102.0	125.0	19.0
MIN. DAILY TOTAL HORIZNTL SOLAR	747.0	712.0	738.0	635.0	583.0	406.0	469.0	482.0	598.0	593.0	787.0	790.0	406.0
MAX. HRLY DIRECT NORMAL SOLAR	271.0	227.0	288.0	273.0	208.0	185.0	231.0	246.0	244.0	295.0	288.0	326.0	326.0
MAX. HRLY TOTAL HORIZNTL SOLAR	326.0	303.0	341.0	320.0	261.0	236.0	274.0	294.0	302.0	341.0	335.0	380.0	380.0
AVG. MAX. HRLY DIRECT NORML SOLAR	170.7	178.9	186.6	166.4	115.3	107.7	145.0	157.7	187.8	224.1	224.9	170.1	169.5
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	253.8	262.2	256.0	234.5	198.2	176.9	201.3	228.2	259.4	284.9	285.7	260.9	241.7

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	447.8	473.9	600.8	754.7	750.8	737.5	788.0	746.1	688.8	574.0	537.6	488.4	633.1
E	446.5	445.5	447.1	425.7	382.2	332.9	355.7	390.9	461.8	503.5	531.9	489.4	434.3
S	778.1	640.5	508.2	431.1	382.0	332.8	355.6	391.4	499.2	681.8	925.0	894.1	568.0
W	1362.0	1479.0	1480.6	1392.7	1117.4	986.2	1098.2	1267.4	1586.6	1772.4	1821.2	1487.9	1403.2

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	530.2	559.9	777.7	1085.9	1118.8	1116.4	1166.4	1116.0	872.2	758.0	628.5	624.0	1166.4
E	530.2	499.7	527.6	511.8	471.5	431.7	456.1	484.5	544.4	600.9	615.9	625.5	625.5
S	1121.0	846.2	630.4	527.5	471.2	431.7	455.9	488.6	619.1	951.6	1172.9	1346.7	1346.7
W	2037.5	1850.1	2222.6	2115.1	1789.6	1549.5	1768.1	1959.3	2159.1	2515.3	2380.7	2502.9	2515.3

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	166.7	166.0	208.5	293.6	274.2	282.5	325.9	284.3	217.1	197.2	176.8	197.7	325.9

E	166.7	155.5	177.5	169.9	141.9	129.1	147.5	157.1	161.5	180.8	176.8	197.7	197.7
S	360.8	285.5	238.7	183.8	141.9	129.1	147.5	163.4	207.2	316.8	369.3	426.6	426.6
W	645.1	607.7	734.6	698.5	547.1	476.3	575.7	635.1	652.4	741.0	711.0	773.8	773.8

Salvador - TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	88	78	62
2.5	87	78	63
5.0	87	77	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0	77.2	78.1	78.4	77.4	75.4	73.7	70.9	71.5	72.9	74.8	75.7	76.6	75.2
1	76.7	77.5	77.6	76.5	74.7	73.3	70.2	71.2	72.4	74.6	75.0	76.4	74.6
2	76.0	76.5	76.7	76.0	74.2	73.3	70.0	70.9	71.7	74.2	74.5	75.8	74.1
3	75.0	75.0	76.0	75.6	73.4	72.7	70.0	70.5	70.4	73.5	73.5	75.2	73.4
4	74.0	74.4	75.1	74.8	72.5	72.4	69.0	69.9	69.6	73.2	72.6	73.9	72.6
5	73.1	72.8	74.2	74.2	71.9	72.1	68.7	69.3	68.6	73.1	71.4	72.5	71.8
6	73.1	72.2	73.7	73.6	71.6	72.5	69.4	69.4	68.6	73.7	73.1	72.9	72.0
7	77.3	75.7	76.7	76.5	74.5	74.6	71.1	71.0	72.9	77.5	78.7	77.6	75.3
8	81.5	81.2	81.8	80.6	78.7	77.1	74.7	75.0	77.2	79.6	81.5	80.5	79.1
9	83.6	83.3	84.1	82.2	80.4	78.7	77.1	77.2	79.7	80.9	82.4	81.5	80.9
10	84.7	84.1	85.4	83.2	81.6	79.8	77.9	78.4	80.8	81.5	83.5	82.8	82.0
11	85.9	85.5	85.2	83.5	82.1	80.0	78.2	79.3	81.5	82.1	84.0	83.4	82.5
12	85.9	85.6	85.7	83.6	82.5	80.6	78.9	79.4	81.7	82.2	84.3	83.6	82.8
13	85.8	86.1	85.6	83.8	82.4	80.7	78.8	79.8	81.6	82.8	84.3	83.4	82.9
14	85.7	85.4	85.0	83.1	81.8	80.3	78.3	79.0	81.4	82.2	83.9	83.3	82.4
15	84.2	84.8	84.5	82.9	81.1	79.7	77.8	78.0	80.4	81.1	83.1	82.4	81.6
16	83.3	84.1	83.1	82.4	80.4	78.4	77.0	77.2	79.3	80.0	81.9	81.5	80.7

17	82.3	82.9	81.6	81.0	78.9	76.9	75.5	75.0	77.0	78.1	80.6	80.4	79.2
18	80.2	80.9	80.1	79.4	77.5	75.1	74.3	73.6	75.4	76.1	78.1	78.5	77.4
19	78.8	79.5	79.3	78.7	77.1	74.8	73.7	73.2	74.8	75.7	77.4	77.7	76.7
20	78.4	79.1	79.2	78.3	76.8	74.4	73.0	72.6	74.3	75.7	76.9	77.1	76.3
21	78.1	78.8	79.1	78.1	76.3	74.3	72.5	72.5	74.2	75.7	76.8	76.9	76.1
22	77.7	78.6	78.9	78.0	75.8	73.9	72.1	72.3	74.1	75.4	76.6	76.7	75.8
23	77.6	78.5	78.6	78.0	75.6	73.8	71.3	71.9	73.5	75.2	76.3	76.5	75.6

GROUND TEMPERATURES	533.7	533.3	534.0	533.5	531.6	530.5	527.9	527.6	528.8	530.7	531.1	532.2	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

SÃO LUÍS

Statistics for sao luisCSV
Location -- Sao Luis -TRY
     {S 2° 34'} {W 44° 13'} {GMT -3.0 Hours}
Elevation --   53m above sea level
Standard Pressure at Elevation -- 100690Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	21.3	21.8

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	33.6	33.2	33.1	25.9	25.5	25.2						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	33.3	33.9	33.1	33.0	33.7	33.0	32.6	33.0	33.5	33.7	34.2	35.0
Day:Hour	13:14	28:15	12:14	18:14	12:16	14:15	28:15	18:15	27:14	1:15	7:14	7:15
Minimum	23.5	22.3	20.3	22.0	22.7	21.0	21.0	22.0	22.2	22.4	21.7	22.4
Day:Hour	10:06	12:06	9:07	14:20	31:06	6:05	5:08	20:07	20:05	6:05	16:21	11:03
Daily Avg	27.5	26.6	26.2	26.3	26.4	26.5	26.5	26.7	26.9	27.2	27.2	27.0

  - Maximum Dry Bulb temperature of 35.0°C on Dec 7
  - Minimum Dry Bulb temperature of 20.3°C on Mar 9

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.3	24.9	24.4	24.6	24.5	24.3	24.4	24.4	24.3	24.7	25.0	25.0
1:01- 2:00	24.9	24.7	24.2	24.3	24.4	24.1	24.3	24.1	24.1	24.5	24.8	24.8
2:01- 3:00	24.5	24.4	24.0	24.1	24.2	23.9	24.0	23.9	24.0	24.2	24.7	24.6
3:01- 4:00	24.3	24.2	23.9	23.9	24.1	23.7	23.8	23.6	23.8	24.1	24.5	24.4
4:01- 5:00	24.2	24.0	23.7	23.7	23.9	23.5	23.7	23.4	23.7	23.9	24.4	24.3
5:01- 6:00	24.1	23.8	23.5	23.6	23.7	23.4	23.5	23.4	23.6	23.7	24.2	24.2
6:01- 7:00	24.5	24.2	23.7	23.9	23.8	23.5	23.8	23.5	24.0	23.8	24.2	24.4
7:01- 8:00	25.5	24.9	24.6	24.7	24.9	24.6	24.6	24.6	25.5	25.5	24.5	25.6
8:01- 9:00	27.2	26.3	26.3	26.4	26.6	26.5	26.7	27.0	27.4	27.8	25.8	27.4
9:01-10:00	28.5	27.4	27.6	27.6	28.1	27.9	28.0	28.1	28.6	29.1	27.8	28.6
10:01-11:00	29.6	28.2	28.8	29.0	29.0	29.0	28.9	29.2	29.7	30.0	28.8	29.5
11:01-12:00	30.4	29.3	29.5	29.7	29.8	29.8	29.8	30.1	30.5	30.8	30.1	30.3
12:01-13:00	31.3	30.0	30.0	29.9	30.1	30.6	30.4	30.8	31.3	31.4	30.8	30.6
13:01-14:00	31.8	30.3	30.1	30.1	30.2	30.7	30.3	31.3	31.6	31.7	31.4	30.8
14:01-15:00	31.8	29.8	29.8	29.4	29.6	30.5	30.6	31.4	31.7	31.8	31.6	30.7
15:01-16:00	31.5	29.2	29.0	28.3	29.0	29.8	29.6	30.7	31.2	31.2	31.5	30.3
16:01-17:00	30.8	29.1	28.1	27.8	28.1	29.0	29.3	29.8	30.2	30.1	30.9	29.5
17:01-18:00	29.5	28.3	26.9	27.2	27.1	27.6	28.2	28.3	28.8	28.8	29.8	28.4
18:01-19:00	28.0	27.1	26.0	26.4	26.3	26.5	26.6	26.9	27.0	27.1	28.5	27.1
19:01-20:00	27.1	26.4	25.6	26.0	25.8	25.8	25.8	26.2	26.1	26.2	26.9	26.4
20:01-21:00	26.5	26.0	25.2	25.6	25.4	25.4	25.4	25.4	25.4	25.7	26.1	26.0
21:01-22:00	26.1	25.7	24.9	25.3	25.0	25.1	25.1	25.1	25.1	25.3	25.7	25.7
22:01-23:00	25.8	25.5	24.7	25.0	24.8	24.9	24.8	24.9	24.7	25.1	25.4	25.5
23:01-24:00	25.5	25.2	24.5	24.8	24.6	24.7	24.6	24.6	24.5	24.9	25.2	25.2
Max Hour	15	14	14	14	14	14	15	15	15	15	15	14
Min Hour	6	6	6	6	6	6	6	6	6	6	7	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	25.8	26.3	26.8	26.5	25.9	26.0	25.0	24.7	24.2	24.2	24.0	24.7
Day:Hour	10:09	4:14	12:15	2:15	6:18	17:15	3:19	2:15	28:08	22:13	29:21	10:12
Minimum	20.7	19.5	19.4	20.7	21.0	20.7	19.9	20.4	19.3	19.9	20.1	20.0
Day:Hour	13:12	25:20	9:07	15:10	6:05	6:05	26:16	10:16	29:11	17:12	21:13	7:18

Daily Avg	22.6	22.8	23.0	23.4	23.5	23.1	23.0	22.8	22.3	22.1	22.3	22.8

- Maximum Dew Point temperature of 26.8°C on Mar 12
- Minimum Dew Point temperature of 19.3°C on Sep 29

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	40	40	41	40	41	38	37	39	38	38	38	39
Day:Hour	17:15	28:15	12:15	21:15	12:16	4:16	1:15	1:16	14:15	8:15	6:15	5:13
Average HI	34	34	34	34	34	34	34	34	34	34	34	34
Avg Del HI	4	4	5	5	5	4	4	4	4	4	4	4
# Hours HI	366	252	258	244	273	276	293	312	315	329	315	318

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	23	12	13	6	6	10	11	19	18	23	23	14
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	541	465	503	489	507	494	511	517	508	532	516	528
CDD base 18C	293	241	255	249	259	254	263	269	268	284	276	280

CDH base 20C	5545	4452	4623	4539	4733	4645	4832	4980	5002	5320	5180	5241
CDH base 23C	3313	2440	2441	2388	2503	2497	2607	2759	2846	3090	3035	3012
CDH base 27C	1053	641	643	569	625	727	727	848	938	1030	976	854

- 6112 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 3192 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	92	91	94	95	96	96	95	95	94	90	90	92
10am	73	79	80	80	80	79	77	75	70	66	74	74
3pm	60	71	72	74	74	67	64	61	57	58	58	65
10pm	83	85	91	91	93	93	92	90	88	85	84	86
Maximum	97	99	99	100	100	100	100	99	97	97	99	98
Day:Hour	3:07	13:08	4:22	14:18	4:08	6:05	5:08	6:05	1:07	1:02	17:03	9:05
Minimum	52	52	54	55	56	53	48	49	49	48	46	45
Day:Hour	2:15	3:14	19:14	17:15	12:15	14:15	29:16	10:16	29:12	3:15	7:14	7:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.8	2.9	2.9	3.0	3.0	2.8	2.7	2.7	2.6	2.6	2.6	2.8

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	3148	3871	3117	3164	3327	3647	3884	4661	4484	4669	4311	3785
Direct Max	6491	7964	6108	6262	6069	5946	7692	6479	7422	7438	8006	7836
Day	1	28	31	17	8	13	30	18	30	28	6	8
Diffuse Avg	2927	2961	3136	2977	2641	2294	2234	2368	2623	2641	2677	2746

- Maximum Direct Solar of 8006 Wh/m² on Nov 6

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
52	57	54	57	66	51	74	65	68	59	55	55

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	15.0	11.0	9.0	9.0	9.0	10.0	10.0	13.0	13.0	10.0	13.0
Day:Hour	1:10	22:24	25:15	19:10	9:23	25:10	11:11	10:11	29:12	1:10	1:11	10:24
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:02	1:01	1:04	1:01	1:01	1:01	1:01	1:01	1:01	2:21	1:20	1:01
Daily Avg	3.5	2.6	2.8	2.2	2.4	1.9	3.1	3.6	4.8	4.4	3.7	3.3

- Maximum Wind Speed of 15.0 m/s on Feb 22
- Minimum Wind Speed of   0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Jul 30:Aug 5, Average Temp= 26.75°C, Deviation=| 0.008|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Nov 5:Nov 11, Maximum Temp= 35.00°C, Deviation=| 7.200|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Mar 5:Mar 11, Minimum Temp= 20.30°C, Deviation=| 4.483|°C

SÃO PAULO

SaoPauloTRY1954_05.sta

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

SaoPaulo -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -23.30 LONGITUDE = -46.37 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	72.5	71.8	70.1	65.3	62.2	62.2	60.9	63.0	64.7	64.2	66.0	68.0	65.9
AVG. TEMP. (F) (WETBULB)	67.3	68.0	66.7	61.8	59.6	58.8	56.5	56.4	59.8	60.7	61.7	63.0	61.7
AVG. DAILY MAX. TEMP.	83.7	81.1	80.4	74.0	70.2	71.5	71.9	74.6	76.6	74.1	77.0	77.2	76.0
AVG. DAILY MIN. TEMP.	65.4	65.9	64.4	59.6	56.9	56.0	53.9	54.2	57.8	58.3	59.3	61.0	59.4
HEATING DEG. DAYS (BASE 65)	1.5	0.0	2.0	38.0	81.0	58.5	78.5	67.0	38.0	60.5	8.5	13.5	447.0
(BASE 60)	0.0	0.0	0.0	0.5	20.0	4.5	11.5	22.0	6.0	9.5	0.0	0.0	74.0
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	1.5
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
COOLING DEG. DAYS (BASE 80)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(BASE 75)	32.0	26.0	8.5	0.0	0.0	0.0	0.0	0.0	2.0	0.0	1.0	8.5	78.0
(BASE 70)	152.0	106.5	97.0	17.5	2.0	0.0	0.0	3.0	32.5	20.5	21.0	43.0	495.0
(BASE 65)	297.5	238.0	230.0	92.5	36.0	20.0	12.5	49.5	104.0	97.5	103.0	140.5	1421.0
HEATING DEG. HRS./24 (BASE 65)	5.6	1.3	10.8	68.1	129.8	129.3	176.9	148.4	101.6	104.1	58.5	45.3	979.6
(BASE 60)	0.0	0.0	0.0	17.2	41.5	36.8	73.3	60.5	24.4	25.5	5.5	5.5	290.4

(BASE 55)	0.0	0.0	0.0	0.7	3.8	4.5	13.2	14.4	3.3	1.0	0.0	0.1	40.8
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.3	0.4	0.8	0.1	0.0	0.0	0.0	1.6

COOLING DEG. HRS./24 (BASE 80)	23.0	14.1	10.2	1.0	0.0	0.0	0.0	0.5	9.5	5.5	6.4	7.6	77.8
(BASE 75)	60.5	37.5	34.7	10.5	2.5	0.5	2.1	13.9	24.5	18.8	16.7	26.3	248.6
(BASE 70)	123.3	87.7	77.1	32.4	14.3	13.7	18.0	43.4	50.6	43.2	42.4	66.2	612.4
(BASE 65)	237.4	192.8	170.2	78.3	41.8	44.8	49.6	87.5	91.7	80.5	89.0	139.2	1303.0

MAXIMUM TEMP.	91	91	88	84	81	77	81	82	90	88	91	89	91
MINIMUM TEMP.	60	62	59	53	49	48	48	46	49	50	55	54	46

NO. DAYS MAX. 90 AND ABOVE	2	2	0	0	0	0	0	0	1	0	2	0	7
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.1	2.2	2.1	2.4	2.5	1.9	2.2	2.3	2.6	2.8	2.7	2.7	2.4

AVG. WIND SPEED (DAY)	2.2	2.3	2.2	2.4	2.5	1.9	2.3	2.4	2.6	2.9	2.7	2.7	2.4
AVG. WIND SPEED (NIGHT)	3.1	3.8	279.8	-0.4	0.8	1.3	1.8	0.2	7.8	4.4	2.9	3.3	10.0

AVG. TEMP. (DAY)	73.6	73.1	71.5	66.7	63.3	62.3	61.1	64.1	65.9	65.3	66.9	69.0	67.0
AVG. TEMP. (NIGHT)	97.1	137.0	7179.5	-18.8	29.6	59.4	57.7	28.4	216.3	86.3	78.8	82.2	225.1

AVG. SKY COVER	5.8	5.9	5.8	5.3	6.7	5.4	4.7	3.8	4.8	6.5	5.2	5.2	5.4

AVG. SKY COVER (DAY)	5.9	6.1	6.0	5.4	6.9	5.4	4.7	3.9	5.0	6.7	5.4	5.3	5.6

AVG. REL. HUM. AT 4AM	93.3	94.6	95.9	95.0	96.0	95.7	92.8	88.4	90.1	94.8	93.5	89.3	93.3
10AM	77.8	81.9	84.5	84.4	88.8	89.3	84.8	75.9	78.9	81.8	75.0	74.5	81.5
4PM	62.2	70.4	67.8	63.5	72.7	63.8	55.8	46.3	63.0	72.2	69.9	66.0	64.4
10PM	86.1	89.6	91.6	91.1	94.0	89.9	86.1	75.3	88.4	90.3	90.3	86.0	88.2

SaoPaulo -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -23.30 LONGITUDE = -46.37 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	745.2	604.5	566.3	457.3	294.0	350.0	314.6	540.8	487.8	596.7	790.8	909.6	554.8
AVG. DAILY TOTAL HORIZNTL SOLAR	1174.2	1044.7	916.2	690.3	557.8	538.3	485.6	678.8	709.0	943.0	1224.3	1321.5	856.2
MAX. DAILY DIRECT NORMAL SOLAR	1638.0	1651.0	1323.0	1112.0	738.0	728.0	753.0	889.0	1096.0	1523.0	1537.0	2063.0	2063.0
MAX. DAILY TOTAL HORIZNTL SOLAR	1597.0	1524.0	1414.0	1037.0	770.0	762.0	766.0	902.0	1066.0	1434.0	1621.0	2040.0	2040.0
MIN. DAILY DIRECT NORMAL SOLAR	114.0	162.0	88.0	88.0	113.0	54.0	15.0	36.0	28.0	91.0	50.0	173.0	15.0
MIN. DAILY TOTAL HORIZNTL SOLAR	777.0	791.0	504.0	450.0	427.0	342.0	256.0	342.0	388.0	575.0	697.0	888.0	256.0
MAX. HRLY DIRECT NORMAL SOLAR	287.0	278.0	268.0	247.0	204.0	199.0	204.0	223.0	227.0	301.0	256.0	337.0	337.0
MAX. HRLY TOTAL HORIZNTL SOLAR	341.0	330.0	320.0	295.0	245.0	239.0	244.0	266.0	285.0	361.0	316.0	395.0	395.0
AVG. MAX. HRLY DIRECT NORML SOLAR	173.7	156.8	151.9	152.2	95.4	124.5	110.7	156.8	131.8	157.6	185.3	181.2	148.1
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	262.4	241.1	237.5	212.4	171.4	181.3	168.9	211.9	208.8	248.4	264.6	268.3	223.0

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	511.3	539.6	600.7	597.2	577.4	630.8	548.6	660.8	541.5	520.2	571.9	543.9	570.4
E	489.5	458.5	410.8	306.8	272.8	265.4	234.3	293.4	310.7	409.5	539.0	533.3	376.6
S	784.6	606.5	462.0	308.7	272.8	265.4	234.3	293.4	324.5	511.6	857.8	913.7	485.8
W	1603.9	1474.5	1390.7	1041.0	838.7	859.6	762.6	1074.4	1073.6	1370.8	1809.5	1757.6	1253.6

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	613.1	784.5	790.9	829.8	908.0	954.1	905.3	856.2	788.9	775.7	672.2	734.3	954.1
E	592.3	560.7	551.2	387.9	362.8	347.4	325.7	358.8	394.7	647.8	628.2	720.3	720.3
S	1076.4	757.9	671.4	389.9	362.8	347.4	325.7	358.8	427.5	972.6	1117.9	1389.5	1389.5
W	2316.1	2447.6	2295.7	1654.8	1352.7	1303.7	1275.3	1485.1	1674.6	2323.1	2432.7	2958.6	2958.6

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	177.7	187.2	209.0	269.8	278.3	292.2	281.8	261.4	218.8	200.8	169.8	210.0	292.2

E	177.7	176.3	171.6	153.3	131.9	129.5	129.3	138.7	146.8	183.6	169.8	210.0	210.0
S	371.0	294.9	251.4	155.4	131.9	129.5	129.3	138.7	169.8	311.0	350.1	463.3	463.3
W	701.5	718.7	701.6	622.9	509.5	487.2	499.9	558.0	594.7	754.8	660.9	809.9	809.9

SaoPaulo -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	88	75	50
2.5	86	73	51
5.0	84	72	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	68.5	68.6	67.0	62.2	59.7	59.1	57.6	59.4	61.0	60.9	61.8	64.5	62.5
1	67.9	68.3	66.6	61.9	59.5	58.8	56.8	58.6	60.8	60.4	61.6	64.1	62.1
2	67.3	68.0	66.0	61.4	59.3	58.4	56.4	57.6	60.3	60.2	61.1	63.6	61.6
3	66.8	67.5	65.7	61.1	58.8	58.0	55.9	56.8	60.1	59.8	60.7	63.2	61.2
4	66.7	67.4	65.3	60.6	58.7	57.6	55.5	56.0	59.9	59.6	60.4	62.7	60.8
5	66.4	66.9	65.2	60.5	58.4	57.1	55.1	55.5	59.3	59.5	59.9	62.1	60.5
6	66.2	66.5	64.9	60.3	58.4	56.9	55.0	55.2	59.0	59.6	60.0	62.2	60.3
7	67.4	66.9	65.2	60.6	58.5	56.7	55.0	55.3	59.3	60.5	62.2	63.7	60.9
8	69.9	69.0	66.6	62.0	59.2	57.3	55.6	56.9	61.0	62.3	64.2	66.5	62.5
9	72.7	72.0	69.4	64.5	61.2	59.6	57.9	60.3	63.5	64.6	67.2	69.0	65.1
10	76.4	75.1	72.4	67.2	63.2	62.5	60.8	64.5	66.8	67.3	70.2	71.7	68.1
11	78.8	77.0	75.3	69.1	65.3	65.5	63.7	68.1	69.7	69.6	73.2	73.6	70.7
12	80.5	78.5	77.5	71.2	67.4	67.8	66.4	70.6	72.5	71.1	75.3	74.5	72.7
13	82.0	79.1	79.1	72.4	68.7	69.5	68.7	72.8	74.5	71.9	76.1	75.5	74.2
14	81.8	78.6	78.5	73.2	69.0	70.2	70.7	73.5	74.7	71.8	75.2	75.2	74.3
15	80.3	78.5	78.1	73.3	68.6	70.7	70.6	73.5	73.1	70.4	72.4	74.3	73.6
16	77.8	76.9	75.7	71.9	66.9	69.7	69.8	72.5	70.1	68.8	70.2	73.5	72.0

17	75.7	75.3	73.1	68.9	64.9	67.5	67.9	69.9	68.1	67.0	68.7	71.6	69.9
18	73.5	73.2	70.6	66.5	63.0	64.6	64.4	66.6	65.9	65.0	66.5	70.0	67.5
19	72.3	71.5	69.2	65.1	61.8	62.5	61.8	64.2	64.1	63.5	64.8	68.0	65.7
20	71.0	70.7	68.6	64.2	60.9	61.7	60.4	62.5	63.0	62.8	64.1	66.7	64.7
21	70.4	70.1	68.3	63.7	60.5	61.0	59.3	61.6	62.4	62.2	63.4	66.0	64.0
22	69.9	69.6	67.7	63.3	60.2	60.2	58.5	60.6	61.8	61.5	62.8	65.5	63.4
23	69.2	69.2	67.2	62.8	59.8	59.7	57.8	60.2	61.4	61.5	62.4	64.9	63.0

GROUND TEMPERATURES	526.7	527.4	526.1	521.2	519.0	518.2	515.9	515.8	519.1	520.2	521.1	522.4	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

VITÓRIA

DOE-2.1E-W74 WEATHER UTILITY PROGRA

INPUT VERIFICATION

RUN TYPE STAT

Vitoria -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -20.19 LONGITUDE = -40.20 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. TEMP. (F) (DRYBULB)	78.2	78.7	77.9	75.9	72.4	68.0	68.2	70.5	71.6	72.6	75.5	76.3	73.8
AVG. TEMP. (F) (WETBULB)	74.4	74.3	74.1	71.6	68.7	65.0	65.2	66.6	68.0	69.0	70.8	72.7	70.0
AVG. DAILY MAX. TEMP.	85.7	86.7	86.6	84.9	80.7	76.0	76.5	80.4	79.1	80.0	83.2	83.6	81.9
AVG. DAILY MIN. TEMP.	72.5	73.4	71.3	68.6	65.8	61.8	61.0	62.7	65.9	66.8	69.9	71.0	67.5
HEATING DEG. DAYS (BASE 65)	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.5	1.0	0.0	0.0	7.0
(BASE 60)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
COOLING DEG. DAYS (BASE 80)	20.5	35.5	15.0	3.0	0.5	0.0	0.0	0.0	0.0	1.0	9.5	10.0	95.0
(BASE 75)	128.0	144.0	123.5	58.5	19.5	0.0	0.0	8.0	18.5	34.5	82.5	90.0	707.0
(BASE 70)	281.5	281.0	277.0	201.5	109.0	8.5	17.5	62.5	98.5	119.0	200.5	227.0	1883.5
(BASE 65)	436.5	421.0	432.0	351.5	255.5	116.5	122.0	203.0	226.5	261.0	345.5	381.5	3552.5
HEATING DEG. HRS./24 (BASE 65)	0.0	0.0	0.0	0.2	5.2	25.4	30.0	17.1	8.2	4.4	0.2	0.0	90.8
(BASE 60)	0.0	0.0	0.0	0.0	0.0	1.2	5.0	0.9	0.0	0.0	0.0	0.0	7.0

(BASE 55)	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.8
(BASE 50)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

COOLING DEG. HRS./24 (BASE 80)	40.8	45.3	44.3	27.2	14.0	0.5	1.7	9.0	8.5	13.3	27.2	27.8	259.7
(BASE 75)	117.8	116.3	116.3	82.4	45.6	6.5	13.7	33.1	33.6	43.3	74.9	84.7	768.0
(BASE 70)	253.6	244.8	246.0	183.2	118.2	38.3	49.8	85.5	92.8	118.7	175.2	201.9	1808.0
(BASE 65)	408.2	384.8	400.3	325.8	235.8	115.8	130.6	186.3	205.1	240.3	314.2	351.8	3299.0

MAXIMUM TEMP.	96	93	92	93	90	84	84	91	90	90	91	93	96
MINIMUM TEMP.	68	70	67	63	62	58	52	58	60	60	63	66	52

NO. DAYS MAX. 90 AND ABOVE	5	9	7	6	2	0	0	1	1	2	5	3	41
NO. DAYS MAX. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

NO. DAYS MIN. 32 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0
NO. DAYS MIN. 0 AND BELOW	0	0	0	0	0	0	0	0	0	0	0	0	0

AVG. WIND SPEED (MPH)	2.7	3.1	2.0	2.3	2.3	2.0	2.2	2.6	2.7	2.8	3.5	3.0	2.6

AVG. WIND SPEED (DAY)	2.7	3.2	2.1	2.3	2.4	2.1	2.3	2.7	2.7	2.9	3.6	3.1	2.7
AVG. WIND SPEED (NIGHT)	20.4	2.0	0.4	1.4	1.5	1.4	1.2	1.2	1.7	14.1	6.0	7.8	-0.5

AVG. TEMP. (DAY)	80.2	78.8	78.0	76.0	72.7	68.3	68.5	70.7	71.6	75.0	78.2	79.2	74.9
AVG. TEMP. (NIGHT)	459.4	75.4	74.4	72.1	68.7	64.8	64.9	66.4	68.5	284.6	162.7	177.1	34.9

AVG. SKY COVER	5.5	5.8	3.9	3.2	3.7	4.7	4.4	3.7	5.4	6.1	4.4	6.2	4.7

AVG. SKY COVER (DAY)	5.7	5.8	3.9	3.2	3.7	4.7	4.4	3.7	5.4	6.3	4.6	6.4	4.8

AVG. REL. HUM. AT 4AM	94.3	92.1	94.6	92.7	92.2	92.6	91.9	91.9	92.6	93.4	89.8	92.7	92.6
10AM	78.4	76.3	76.7	73.1	77.8	83.0	81.0	77.8	79.4	79.6	72.7	79.6	78.0
4PM	74.4	71.5	73.9	71.2	71.3	75.6	78.0	71.5	75.1	74.0	72.7	77.2	73.9
10PM	89.4	88.9	90.0	88.9	88.8	90.8	89.7	88.2	89.3	88.4	87.2	89.1	89.1

Vitoria -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

LATITUDE = -20.19 LONGITUDE = -40.20 TIME ZONE = 3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
AVG. DAILY DIRECT NORMAL SOLAR	925.0	642.2	760.3	553.7	305.3	330.3	321.1	626.0	399.0	508.5	737.0	631.7	561.6
AVG. DAILY TOTAL HORIZNTL SOLAR	1351.6	1074.7	1051.3	836.4	561.6	537.0	520.7	847.1	790.9	1010.4	1157.4	1165.2	908.2
MAX. DAILY DIRECT NORMAL SOLAR	2099.0	1683.0	1237.0	1001.0	613.0	767.0	820.0	1265.0	1312.0	1800.0	1440.0	1932.0	2099.0
MAX. DAILY TOTAL HORIZNTL SOLAR	2105.0	1626.0	1275.0	1139.0	761.0	796.0	831.0	1261.0	1380.0	1721.0	1574.0	1915.0	2105.0
MIN. DAILY DIRECT NORMAL SOLAR	229.0	201.0	62.0	36.0	34.0	49.0	21.0	42.0	23.0	85.0	37.0	187.0	21.0
MIN. DAILY TOTAL HORIZNTL SOLAR	879.0	813.0	635.0	405.0	357.0	356.0	298.0	395.0	467.0	704.0	647.0	893.0	298.0
MAX. HRLY DIRECT NORMAL SOLAR	322.0	305.0	240.0	191.0	153.0	201.0	211.0	241.0	229.0	305.0	241.0	336.0	336.0
MAX. HRLY TOTAL HORIZNTL SOLAR	369.0	362.0	300.0	259.0	223.0	241.0	252.0	284.0	292.0	353.0	308.0	392.0	392.0
AVG. MAX. HRLY DIRECT NORML SOLAR	191.1	165.5	175.2	137.2	87.4	108.6	109.0	152.1	114.5	136.2	158.3	143.4	139.8
AVG. MAX. HRLY TOTAL HRZNTL SOLAR	281.5	256.5	252.8	219.0	164.9	167.4	169.7	215.0	193.0	225.7	244.6	250.8	219.9

AVG. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	569.8	517.5	677.5	695.8	564.8	597.7	560.2	774.4	564.5	569.8	503.7	508.0	592.6
E	556.0	450.1	439.8	365.1	255.0	243.3	233.4	365.1	371.2	461.9	481.8	499.7	393.4
S	937.8	601.9	487.4	370.0	255.0	243.3	233.4	365.7	396.2	571.4	743.9	824.8	502.5
W	1820.9	1417.7	1512.9	1223.1	756.4	738.3	713.4	1276.0	1129.2	1396.0	1544.1	1461.1	1248.7

MAX. DAILY TOTAL VERTICAL SOLAR

AZIMUTH													
N	766.5	617.2	919.3	971.4	774.7	943.4	928.2	1113.4	941.8	933.3	609.3	652.7	1113.4
E	758.9	543.0	491.9	464.6	305.5	326.4	315.5	492.8	542.8	631.6	587.4	643.5	758.9
S	1486.1	863.7	573.5	481.7	305.4	326.4	315.5	498.6	622.2	809.7	1008.7	1245.3	1486.1
W	3084.6	2255.4	1976.5	1788.3	1069.2	1206.5	1234.4	2050.3	2147.3	2700.5	2194.6	2614.6	3084.6

MAX. HRLY TOTAL VERTICAL SOLAR

AZIMUTH													
N	195.0	185.3	207.3	224.2	232.2	290.2	292.0	270.7	214.8	209.7	161.6	203.3	292.0

E	195.0	183.5	157.1	140.7	115.4	125.4	128.6	154.6	154.4	189.6	161.6	203.3	203.3
S	432.5	342.2	209.5	149.6	115.4	125.4	128.6	160.3	198.1	296.4	334.2	437.2	437.2
W	764.9	748.1	637.1	544.1	424.1	474.5	495.5	625.6	615.1	782.4	628.5	797.2	797.2

Vitoria -TRY MONTHLY WEATHER DATA SUMMARY DOE-2.1E-W7

DESIGN TEMPERATURES ---------- SUMMER ---------- WINTER

PER CENT	T(DRY)	T(WET)	T(DRY)
1.0	90	81	58
2.5	89	80	59
5.0	88	79	

MONTHLY AVERAGE TEMPERATURES AS A FUNCTION OF HOUR OF THE DAY

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
	----	----	----	----	----	----	----	----	----	----	----	----	----
0	74.9	75.6	74.2	72.2	68.7	64.7	64.9	66.5	68.4	70.0	72.0	73.3	70.4
1	74.4	75.3	73.8	71.8	68.5	64.3	64.4	65.9	68.0	69.1	71.6	73.0	70.0
2	74.0	74.9	73.4	71.1	68.1	63.7	63.9	65.7	67.7	68.6	71.2	72.6	69.5
3	73.6	74.5	72.9	70.4	67.5	63.2	63.3	65.0	67.4	68.2	71.0	72.2	69.1
4	73.4	74.4	72.3	69.8	67.1	63.0	62.9	64.3	67.2	67.8	70.6	71.9	68.7
5	73.1	74.0	71.8	69.4	66.7	62.5	62.3	63.7	66.9	67.5	70.3	71.7	68.3
6	73.5	74.0	71.3	68.9	66.4	62.4	62.0	63.2	66.7	68.1	71.3	72.4	68.3
7	76.2	76.1	73.7	71.0	67.3	63.4	63.4	64.8	69.0	70.8	74.5	75.0	70.4
8	78.8	78.7	77.8	75.1	71.0	66.4	66.2	68.9	72.0	73.8	77.0	77.1	73.6
9	81.0	80.8	81.4	79.1	75.0	69.3	69.6	72.5	74.2	75.7	79.0	78.7	76.3
10	82.6	82.7	83.2	81.8	77.3	71.7	73.1	76.3	76.1	77.0	80.6	79.8	78.5
11	83.0	84.6	85.0	82.9	78.4	73.6	74.4	78.3	77.6	78.0	81.6	81.1	79.8
12	83.9	85.7	85.4	83.7	79.2	74.2	75.5	78.9	77.8	78.1	82.3	81.5	80.5
13	84.5	86.0	85.7	84.1	80.1	74.7	75.5	79.2	77.9	78.2	82.0	82.5	80.8
14	84.2	84.9	85.0	82.9	79.9	75.0	75.2	79.0	77.0	77.7	81.2	81.6	80.3
15	83.3	84.0	83.7	81.7	79.0	74.1	74.4	77.7	76.3	77.0	79.6	81.0	79.3
16	81.7	82.6	82.0	80.4	77.7	73.0	73.1	75.6	75.0	76.0	77.8	79.5	77.8

17	80.3	80.9	80.3	78.6	75.6	71.4	71.5	73.6	73.4	74.3	76.4	78.0	76.2
18	78.7	79.0	78.5	76.7	73.3	69.3	69.5	71.3	71.5	73.0	75.1	76.8	74.4
19	77.3	77.3	77.1	75.2	71.9	67.9	67.8	69.5	70.2	71.7	73.9	75.6	72.9
20	76.6	76.5	76.2	74.4	70.6	67.2	67.1	68.6	69.8	71.1	73.5	74.8	72.2
21	76.1	76.0	75.6	73.6	70.3	66.3	66.5	67.9	69.5	70.5	73.0	74.4	71.6
22	75.7	75.9	74.9	73.0	69.6	65.9	66.0	67.5	69.1	70.3	72.9	74.1	71.2
23	75.2	75.6	74.7	72.7	69.3	65.2	65.3	67.2	68.8	69.8	72.4	73.7	70.8

GROUND TEMPERATURES	533.8	533.7	533.5	531.0	528.1	524.4	524.6	525.9	527.4	528.3	530.2	532.1	
CLEARNESS NUMBERS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

ANEXO 2

Arquivos Estatísticos do EnergyPlus

BELÉM

Statistics for belemCSV
Location -- Belem -TRY
     {S 1° 22'} {W 48° 28'} {GMT -3.0 Hours}
Elevation --   16m above sea level
Standard Pressure at Elevation -- 101133Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	20.7	21.1

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	33.3	33.1	32.8	26.7	26.3	25.9

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	32.5	32.4	33.2	33.8	33.3	34.9	33.4	33.4	33.7	33.3	34.2	33.4
Day:Hour	7:16	8:15	9:16	8:16	7:16	1:17	1:15	1:16	8:16	8:14	18:14	29:16
Minimum	21.3	20.5	21.6	21.6	20.0	21.3	21.4	20.9	20.8	20.7	20.3	21.5
Day:Hour	11:07	11:07	10:07	11:05	11:07	27:07	7:07	11:07	11:07	23:07	18:07	25:05
Daily Avg	25.5	25.6	25.9	25.8	26.0	26.3	26.5	26.3	26.0	26.1	26.3	26.1

- Maximum Dry Bulb temperature of 34.9°C on Jun 1
- Minimum Dry Bulb temperature of 20.0°C on May 11

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	23.9	23.8	24.2	24.0	24.2	24.1	24.1	23.7	23.6	23.7	24.2	24.0
1:01- 2:00	23.7	23.7	24.0	23.8	24.0	23.9	23.9	23.5	23.4	23.5	23.9	23.8
2:01- 3:00	23.6	23.4	23.8	23.6	23.8	23.7	23.6	23.3	23.1	23.1	23.5	23.5
3:01- 4:00	23.4	23.2	23.6	23.5	23.6	23.4	23.3	23.1	22.9	22.8	23.2	23.3
4:01- 5:00	23.3	23.0	23.4	23.3	23.5	23.2	23.1	22.9	22.7	22.5	22.9	23.0
5:01- 6:00	23.2	22.8	23.2	23.1	23.3	23.0	22.9	22.7	22.5	22.2	22.6	22.8
6:01- 7:00	23.1	22.7	23.0	23.0	23.2	22.8	22.7	22.4	22.3	22.0	22.4	22.6
7:01- 8:00	23.4	23.2	23.5	23.5	23.6	23.4	23.3	23.0	23.0	22.8	23.1	23.1
8:01- 9:00	24.9	24.8	25.1	24.8	25.2	25.4	25.2	25.2	25.3	25.3	25.5	25.4
9:01-10:00	26.3	26.5	26.6	26.5	27.2	27.4	27.4	27.3	27.3	27.4	27.5	27.5
10:01-11:00	27.6	27.5	27.9	28.0	28.5	28.9	28.8	28.8	28.7	28.7	28.9	28.9
11:01-12:00	28.8	28.6	29.2	28.8	29.3	29.6	30.0	30.2	29.7	30.0	30.0	29.9
12:01-13:00	29.3	29.0	29.6	29.4	29.8	30.1	30.7	30.7	30.3	30.5	30.9	30.5
13:01-14:00	28.9	29.5	29.7	29.5	30.2	30.7	31.1	31.2	30.9	30.8	31.2	31.0
14:01-15:00	28.5	29.2	29.3	29.7	29.3	30.4	31.1	31.3	30.9	30.8	31.0	30.8
15:01-16:00	28.1	28.4	28.3	28.9	29.2	29.9	30.9	31.0	30.2	30.1	29.5	29.9
16:01-17:00	27.2	27.6	28.0	28.0	28.3	29.3	30.3	30.4	28.9	29.4	29.2	28.3
17:01-18:00	26.6	26.6	27.3	27.1	27.0	28.4	29.4	28.8	27.8	28.2	28.3	27.5
18:01-19:00	25.9	26.0	26.6	26.3	26.4	27.4	28.1	27.8	26.8	27.3	27.3	26.5
19:01-20:00	25.3	25.4	25.9	25.7	25.7	26.1	26.8	26.2	25.7	26.1	26.2	25.4
20:01-21:00	24.9	25.1	25.3	25.2	25.2	25.3	25.8	25.1	25.1	25.5	25.5	25.0
21:01-22:00	24.5	24.7	24.9	24.8	24.7	24.9	25.2	24.6	24.7	25.1	25.2	24.7
22:01-23:00	24.3	24.4	24.7	24.5	24.5	24.6	24.7	24.2	24.4	24.6	24.8	24.4
23:01-24:00	24.1	24.1	24.5	24.3	24.3	24.3	24.3	24.0	24.0	24.1	24.4	24.1
Max Hour	13	14	14	15	14	14	15	15	15	14	14	14
Min Hour	7	7	7	7	7	7	7	7	7	7	7	7

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum	26.2	27.4	26.7	26.5	25.2	25.2	27.5	26.4	25.5	25.7	25.0	26.6
Day:Hour	26:15	8:17	18:17	1:12	1:15	17:15	28:14	17:12	2:14	4:12	8:13	8:12
Minimum	20.3	20.0	19.4	19.5	19.0	18.5	17.0	17.7	19.9	19.7	19.6	20.7
Day:Hour	11:13	11:06	6:14	11:14	11:07	12:13	11:17	12:09	11:04	7:17	17:07	11:07
Daily Avg	23.2	23.1	23.3	23.0	23.1	22.7	22.9	22.6	22.6	22.2	22.5	22.7

- Maximum Dew Point temperature of 27.5°C on Jul 28
- Minimum Dew Point temperature of 17.0°C on Jul 11

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	41	42	41	43	40	40	42	41	40	41	40	42
Day:Hour	8:14	8:15	8:15	8:16	24:17	1:17	28:14	15:14	8:15	8:14	18:14	8:14
Average HI	34	34	34	34	34	34	35	35	34	34	34	34
Avg Del HI	5	5	5	4	4	4	5	5	4	4	4	4
# Hours HI	199	196	224	216	235	272	304	282	261	284	264	259

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	4	4	3	4	7	7	15	19	12	12	18	8
Max <= 0												
Min <= 0												

Min <=-18

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	482	436	493	474	496	488	513	505	480	500	489	499
CDD base 18C	234	212	245	234	248	248	265	257	240	252	249	251
CDH base 20C	4120	3733	4388	4177	4466	4504	4863	4692	4325	4548	4528	4524
CDH base 23C	1923	1759	2180	2039	2252	2376	2665	2529	2249	2427	2430	2348
CDH base 27C	433	422	526	495	605	757	915	927	722	799	787	742

- 5853 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2933 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	97	97	97	96	97	96	95	96	96	95	95	96
10am	85	84	84	84	82	79	79	79	79	76	77	79
3pm	79	75	76	72	73	66	67	63	64	63	65	66
10pm	95	93	94	94	93	91	89	91	92	87	89	90
Maximum	100	100	100	100	100	100	100	100	100	100	100	100
Day:Hour	1:04	1:06	13:02	23:01	16:07	3:04	4:07	3:05	14:07	3:04	4:06	1:06
Minimum	52	56	51	49	49	48	43	43	49	47	50	51
Day:Hour	11:13	11:12	6:15	11:14	11:15	12:13	12:14	12:15	11:15	7:15	25:13	29:16

- Monthly Indicators for Precipitation/Moisture (kPa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	3.0	3.0	3.0	2.9	2.9	2.8	2.9	2.8	2.8	2.7	2.8	2.8

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	2903	3396	3299	2979	3022	3282	3748	4174	5025	4271	3175	2877
Direct Max	7316	8303	8492	7381	6174	7019	8327	7294	7693	6685	6091	6391
Day	9	9	9	13	9	1	9	9	19	22	9	3
Diffuse Avg	2996	2937	2929	2962	2820	2558	2510	2629	2555	2570	2813	2783

- Maximum Direct Solar of 8492 Wh/m² on Mar 9

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
62	60	70	67	61	67	71	73	57	60	72	70

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	8.0	10.0	8.0	8.0	10.0	7.0	8.0	7.0	10.0	8.0	8.0	8.0
Day:Hour	15:14	18:16	13:17	18:12	23:16	26:12	2:15	14:16	16:18	18:12	21:13	29:18
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:02	1:01
Daily Avg	1.4	1.4	1.4	1.4	1.2	1.5	1.8	1.9	1.8	1.8	1.8	1.7

- Maximum Wind Speed of 10.0 m/s on Feb 18
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.0 m	22.8	23.9	24.2	23.9	22.2	20.4	16.7	17.5	17.2	17.8	19.2	21.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Jul 23:Jul 29, Average Temp= 26.04°C, Deviation=| 0.004|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Aug 6:Aug 12, Maximum Temp= 34.90°C, Deviation=| 7.674|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Feb 19:Feb 25, Minimum Temp= 20.00°C, Deviation=| 5.132|°C

BRASÍLIA

Statistics for brasiliaCSV
Location -- Brasilia -TRY
     {S 15° 52'} {W 47° 55'} {GMT -3.0 Hours}
Elevation -- 1060m above sea level
Standard Pressure at Elevation -- 89222Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	8.1	9.0

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	31.7	31.2	30.5	21.6	20.8	20.5						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	28.2	29.6	31.0	29.7	29.2	27.4	27.8	31.1	33.0	30.8	31.3	29.0
Day:Hour	19:16	14:15	6:15	17:15	2:16	23:16	30:17	30:14	22:16	19:14	17:17	4:14
Minimum	17.0	17.0	15.3	13.0	9.9	7.5	6.1	8.3	13.2	14.8	13.7	17.2
Day:Hour	18:07	1:07	29:07	8:07	31:08	18:06	24:08	2:08	19:06	28:07	14:06	16:05
Daily Avg	21.6	22.0	21.6	21.3	19.2	17.7	17.8	20.4	22.6	21.4	21.9	20.9

  - Maximum Dry Bulb temperature of 33.0°C on Sep 22
  - Minimum Dry Bulb temperature of   6.1°C on Jul 24

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	19.8	19.7	19.2	18.8	16.4	14.9	14.5	17.4	20.2	19.2	19.4	19.4
1:01- 2:00	19.6	19.5	19.0	18.2	15.8	14.2	13.5	16.4	19.4	18.9	19.1	19.1
2:01- 3:00	19.4	19.2	18.8	17.6	15.1	13.4	13.0	15.6	19.1	18.5	18.8	18.9
3:01- 4:00	19.1	18.9	18.6	17.2	14.8	12.8	12.3	15.0	18.6	18.4	18.4	18.7
4:01- 5:00	18.9	18.7	18.3	16.8	14.4	12.4	11.7	14.4	18.2	18.1	18.3	18.6
5:01- 6:00	18.8	18.5	18.0	16.3	13.9	12.0	11.2	14.0	17.7	17.9	18.0	18.7
6:01- 7:00	18.6	18.4	17.8	16.1	13.7	11.6	11.0	13.5	17.4	17.6	17.8	18.7
7:01- 8:00	19.1	18.7	18.1	16.3	13.8	11.6	10.7	13.3	17.4	18.2	18.7	19.0
8:01- 9:00	20.3	20.0	19.7	18.1	15.7	13.6	12.9	15.9	19.2	19.9	21.0	19.9
9:01-10:00	21.7	21.8	21.4	20.8	18.5	16.5	16.4	19.6	21.6	21.5	22.9	20.9
10:01-11:00	22.8	24.0	23.1	23.3	20.9	19.2	19.5	22.4	23.9	23.0	24.5	22.1
11:01-12:00	23.9	25.4	24.3	24.9	22.7	20.9	21.6	24.3	25.8	24.2	25.6	22.8
12:01-13:00	24.6	26.1	25.1	25.9	23.9	22.4	23.0	25.7	26.8	24.9	26.3	23.5
13:01-14:00	24.6	26.1	26.0	26.6	24.8	23.4	24.0	26.7	28.0	25.5	26.6	23.6
14:01-15:00	24.8	26.1	26.3	26.9	25.2	24.1	24.8	27.4	28.9	25.8	26.7	23.8
15:01-16:00	24.7	25.6	26.2	26.8	25.4	24.6	25.2	27.5	28.6	25.6	26.7	23.5
16:01-17:00	24.6	25.4	25.6	26.5	25.2	24.5	25.3	27.4	27.6	25.3	25.4	22.9
17:01-18:00	24.2	24.8	25.0	25.6	24.3	23.7	24.7	26.8	27.2	24.5	24.5	23.0
18:01-19:00	23.3	24.0	23.8	24.4	22.6	21.6	22.6	25.0	25.7	23.1	23.4	22.1
19:01-20:00	22.4	22.9	22.3	22.6	20.6	19.6	20.2	22.8	24.1	21.8	22.1	21.2
20:01-21:00	21.5	22.0	21.5	21.5	19.4	18.2	18.8	21.4	23.1	21.0	21.3	20.6
21:01-22:00	20.9	21.3	20.6	20.8	18.7	17.2	17.7	20.4	22.3	20.5	20.7	20.2
22:01-23:00	20.4	20.8	20.1	20.2	17.8	16.2	16.6	19.3	21.4	20.0	20.2	19.9
23:01-24:00	20.0	20.2	19.6	19.3	17.1	15.4	15.6	18.3	20.8	19.6	19.8	19.6
Max Hour	15	15	15	15	16	16	17	16	15	15	16	15
Min Hour	7	7	7	7	7	8	8	8	8	7	7	5

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	23.2	22.7	20.8	23.0	20.9	20.3	19.3	19.9	19.9	20.0	20.1	21.2
Day:Hour	21:17	12:17	8:15	29:12	2:18	6:14	27:18	15:14	26:20	14:14	5:13	2:11
Minimum	14.7	14.1	13.9	11.3	7.9	6.0	2.2	4.9	2.5	11.3	8.2	15.3
Day:Hour	25:05	9:06	24:12	18:07	31:08	19:08	23:19	24:21	21:16	18:05	14:18	4:01

Daily Avg	18.5	18.3	17.8	16.4	14.2	12.1	10.2	11.9	14.2	16.4	16.3	18.0

- Maximum Dew Point temperature of 23.2°C on Jan 21
- Minimum Dew Point temperature of 2.2°C on Jul 23

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC						9	8					
Day:Hour						21:07	25:08					
Average WC						9	8					
Avg Del WC						0	0					
# Hours WC						2	2					
Maximum HI	30	31	32	32	31	27	27	30	31	30	31	29
Day:Hour	19:16	23:15	6:15	29:12	2:16	23:16	29:16	14:15	2:16	20:14	5:13	4:15
Average HI	29	29	29	28	29	27	27	28	28	28	29	28
Avg Del HI	1	1	1	1	1	0	0	0	0	0	1	1
# Hours HI	31	65	80	80	26	1	2	33	70	61	48	18

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32									3			
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	9	21	15	1	0	0	0	0
CDD base 10C	359	336	359	339	285	230	241	323	379	353	358	337
CDD base 18C	111	112	111	99	46	11	8	76	139	105	118	89

CDH base 20C	1433	1625	1645	1723	1211	821	1005	1867	2433	1580	1782	1013
CDH base 23C	474	662	717	766	463	238	316	892	1290	640	811	271
CDH base 27C	14	70	86	85	13	0	2	146	380	90	131	10

- 3900 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 1026 annual cooling degree-days (18°C baseline)
- 45 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	93	93	92	92	91	88	81	79	77	89	89	95
10am	85	84	82	79	78	74	69	63	66	76	70	85
3pm	72	66	64	58	57	54	43	42	42	59	54	72
10pm	88	85	87	81	78	76	64	62	64	80	81	90
Maximum	100	100	100	100	99	100	95	99	100	100	100	100
Day:Hour	24:14	12:06	15:01	27:07	1:06	11:08	18:08	24:06	25:07	21:19	2:04	6:07
Minimum	56	49	45	37	35	30	26	26	15	35	28	45
Day:Hour	19:12	14:15	29:16	9:17	29:18	22:15	28:16	26:15	21:16	19:16	14:18	4:14

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.2	2.2	2.1	2.0	1.8	1.6	1.3	1.5	1.6	1.9	1.8	2.1

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	5095	5362	4127	3706	2737	2764	2226	4303	5151	4540	4432	3988
Direct Max	7119	8331	7389	7362	4541	3937	3662	6719	8235	10011	10177	7974
Day	19	20	30	7	18	5	28	28	17	19	15	30
Diffuse Avg	2965	2814	2718	2269	1918	1459	1856	1673	2167	2942	2973	3304

- Maximum Direct Solar of 10177 Wh/m² on Nov 15

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
130	100	83	39	61	49	46	57	60	80	62	137

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	15.0	12.0	8.0	9.0	8.0	8.0	10.0	9.0	13.0	13.0	10.0
Day:Hour	1:17	17:17	8:20	2:15	19:15	9:18	1:10	24:17	2:24	21:19	30:19	24:14
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:04	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01	1:01
Daily Avg	1.9	1.6	2.0	1.2	1.8	1.8	1.4	1.7	1.8	1.9	1.3	2.0

- Maximum Wind Speed of 15.0 m/s on Feb 17
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Csa" (Köppen classification)
- Mediterranean climate (dry hot summer, mild winter, lat. 30-45°S)

- Typical/Extreme Period Determination

- Summer is Sep:Nov
  Extreme Summer Week (nearest maximum temperature for summer)
  Extreme Hot Week Period selected: Sep 8:Sep 14, Maximum Temp= 33.00°C, Deviation=| 8.471|°C
  Typical Summer Week (nearest average temperature for summer)
  Typical Week Period selected: Oct 6:Oct 12, Average Temp= 21.97°C, Deviation=| 0.015|°C

- Winter is Mar:May

```
    Extreme Winter Week (nearest minimum temperature for winter)
    Extreme Cold Week Period selected: May 10:May 16, Minimum Temp=   9.90°C, Deviation=| 7.283|°C
    Typical Winter Week (nearest average temperature for winter)
    Typical Week Period selected: May  3:May  9, Average Temp=  20.69°C, Deviation=| 0.085|°C

- Autumn is Dec:Feb
    Typical Autumn Week (nearest average temperature for autumn)
    Typical Week Period selected: Jan  6:Jan 12, Average Temp=  21.47°C, Deviation=| 0.037|°C

- Spring is Jun:Aug
    Typical Spring Week (nearest average temperature for spring)
    Typical Week Period selected: Jun  1:Jun  7, Average Temp=  18.64°C, Deviation=| 0.013|°C
```

CURITIBA

Statistics for curitibaCSV
Location -- Curitiba -TRY
     {S 25° 31'} {W 49° 10'} {GMT -3.0 Hours}
Elevation --   910m above sea level
Standard Pressure at Elevation -- 90860Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	0.1	0.8

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	30.2	29.8	28.9	22.1	21.3	20.8

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	31.0	31.0	30.5	25.5	26.3	25.2	26.0	26.5	28.6	29.6	30.5	29.8
Day:Hour	30:17	7:16	18:17	20:17	2:17	8:16	21:15	14:15	25:16	28:15	28:16	20:14
Minimum	13.6	13.0	9.5	10.8	-0.4	-0.2	-2.1	4.9	1.5	4.2	11.0	10.1
Day:Hour	26:07	21:06	16:08	16:08	5:07	5:08	11:08	9:08	6:08	8:03	10:07	26:02
Daily Avg	20.6	20.7	19.6	16.3	14.6	13.1	12.5	13.6	15.4	14.2	18.0	17.8

  - Maximum Dry Bulb temperature of 31.0°C on Jan 30
  - Minimum Dry Bulb temperature of -2.1°C on Jul 11

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	18.2	18.5	17.3	14.6	12.5	11.5	10.2	11.4	12.9	12.2	15.9	15.5
1:01- 2:00	18.0	18.3	17.1	14.5	12.3	11.1	10.0	11.2	12.6	12.0	15.7	15.1
2:01- 3:00	17.7	18.1	16.9	14.4	12.1	10.9	9.8	10.9	12.4	11.9	15.6	15.0
3:01- 4:00	17.4	17.9	16.7	14.3	11.7	10.7	9.5	10.7	12.2	11.7	15.5	14.7
4:01- 5:00	17.1	17.8	16.5	14.1	11.4	10.5	9.2	10.3	12.0	11.6	15.2	14.5
5:01- 6:00	16.8	17.7	16.3	13.9	11.2	10.1	8.8	9.9	11.7	11.4	15.0	14.2
6:01- 7:00	16.5	17.6	16.1	13.8	10.7	9.8	8.4	9.7	11.4	11.5	15.1	14.3
7:01- 8:00	17.5	18.1	16.5	13.9	10.6	9.7	8.1	9.7	11.6	11.9	16.0	15.4
8:01- 9:00	18.9	19.2	17.6	14.7	11.4	10.3	8.7	10.3	12.7	12.9	17.1	16.9
9:01-10:00	20.4	20.6	18.9	15.7	12.9	11.8	10.1	11.7	14.4	14.2	18.4	18.3
10:01-11:00	22.2	22.0	20.6	17.0	14.9	13.6	12.2	13.8	16.5	15.3	19.5	19.7
11:01-12:00	23.8	23.4	21.9	18.2	16.9	15.4	14.7	15.9	17.8	16.3	20.4	20.8
12:01-13:00	24.7	24.4	22.9	19.1	18.2	16.4	16.3	17.2	19.0	17.0	20.7	21.5
13:01-14:00	25.8	24.8	23.8	20.0	19.3	17.2	17.4	18.5	20.1	17.9	21.6	22.0
14:01-15:00	26.4	25.0	24.4	20.5	19.8	17.6	18.0	19.0	20.8	18.1	21.8	22.2
15:01-16:00	25.9	25.0	24.7	20.4	20.0	17.6	18.2	19.2	20.7	17.9	21.8	22.4
16:01-17:00	25.0	24.6	24.5	19.9	19.7	17.2	17.9	18.8	20.3	17.6	21.6	21.6
17:01-18:00	23.5	23.9	23.2	19.1	18.8	16.3	17.1	17.9	19.3	16.8	20.7	20.6
18:01-19:00	22.7	22.7	21.8	17.8	17.0	14.9	15.7	16.5	17.9	15.8	19.6	19.3
19:01-20:00	20.7	21.0	19.5	16.2	15.2	13.5	13.4	14.5	15.8	14.3	18.1	17.8
20:01-21:00	19.6	20.1	18.6	15.6	14.1	12.8	12.5	13.5	15.0	13.7	17.3	16.8
21:01-22:00	19.2	19.4	18.2	15.2	13.5	12.4	11.9	12.6	14.3	13.0	16.6	16.1
22:01-23:00	18.8	19.2	17.9	14.9	13.2	11.8	11.2	12.2	13.8	12.6	16.5	15.9
23:01-24:00	18.5	18.9	17.6	14.6	12.8	11.4	10.8	11.6	13.4	12.5	16.1	15.7
Max Hour	15	15	16	15	16	15	16	16	15	15	15	16
Min Hour	7	7	7	7	8	8	8	7	7	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	22.7	22.7	20.7	19.8	18.1	18.4	17.7	16.2	17.9	20.0	21.5	20.1
Day:Hour	30:18	8:18	21:14	1:12	23:16	14:18	21:19	24:23	7:17	28:21	8:16	20:17
Minimum	11.9	12.6	9.2	8.2	-3.3	-0.7	-3.1	1.6	1.0	2.3	7.2	8.2
Day:Hour	21:14	20:10	16:08	16:15	4:12	4:09	9:23	21:13	5:16	8:03	10:07	27:10

Daily Avg	16.9	17.9	16.4	14.1	11.9	10.8	9.7	10.2	12.1	11.7	15.3	14.5

- Maximum Dew Point temperature of 22.7°C on Jan 30
- Minimum Dew Point temperature of -3.3°C on May 4

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC			9		-3	-6	-10	-2	1	-2		
Day:Hour			16:08		4:11	4:08	10:08	21:09	8:22	7:07		
Average WC			9		4	3	1	4	6	3		
Avg Del WC			0		3	4	5	4	3	5		
# Hours WC			1		31	97	121	133	50	76		
Maximum HI	32	33	30						28	29	31	30
Day:Hour	5:15	7:16	25:16						25:17	28:16	28:16	20:14
Average HI	29	30	28						28	28	29	28
Avg Del HI	1	1	0						0	0	1	0
# Hours HI	64	61	30						11	8	28	7

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32												
Max <= 0												
Min <= 0					1	2	2					
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HDD base 10C	0	0	0	0	2	11	24	8	0	2	0	0	
HDD base 18C	1	8	2	51	107	147	171	137	83	125	34	27	
CDD base 10C	330	301	296	190	144	104	101	120	161	132	240	241	
CDD base 18C	82	85	50	1	1	0	0	1	4	7	34	19	

CDH base 20C	1390	1316	941	183	188	161	185	357	372	227	694	490
CDH base 23C	600	558	371	21	30	34	27	115	147	90	260	124
CDH base 27C	71	89	45	0	0	0	0	0	11	16	41	9

- 2360 annual cooling degree-days (10°C baseline)
- 46 annual heating degree-days (10°C baseline)

- 286 annual cooling degree-days (18°C baseline)
- 892 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	97	98	98	99	99	98	97	97	97	97	97	96
10am	81	86	89	92	92	93	93	90	87	86	85	78
3pm	59	69	64	70	67	71	65	61	64	71	71	65
10pm	91	95	94	97	94	94	93	91	93	95	94	93
Maximum	100	100	100	100	100	100	100	100	100	100	100	100
Day:Hour	2:21	3:01	2:06	1:01	1:02	1:01	1:01	2:02	1:01	1:06	1:22	9:22
Minimum	38	48	33	42	33	46	32	35	27	35	42	36
Day:Hour	30:17	1:18	17:19	27:16	6:15	2:16	11:15	4:16	2:16	27:16	28:16	18:14

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	2.1	1.9	1.6	1.5	1.4	1.3	1.3	1.5	1.4	1.8	1.7

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	3968	3859	3164	2788	1891	2186	2416	3172	2729	2762	3260	4880
Direct Max	8678	7115	7040	6892	4440	4805	5186	6583	7042	8333	7957	11019
Day	16	25	5	19	5	2	30	17	22	11	27	16
Diffuse Avg	3253	3010	2599	2259	1789	1419	1309	1803	2189	2734	3306	3174

- Maximum Direct Solar of 11019 Wh/m² on Dec 16

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
136	125	108	105	111	112	109	120	119	97	129	98

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	10.0	8.0	11.0	11.0	10.0	12.0	10.0	13.0	12.0	11.0	10.0
Day:Hour	1:18	7:19	1:18	28:15	4:15	14:13	15:14	6:12	3:15	5:11	8:16	2:18
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:02	1:06	1:05	1:07	1:03	1:01	1:24	3:23	1:01	3:15	1:08	1:10
Daily Avg	3.5	3.2	3.0	3.1	2.7	3.5	2.6	3.2	3.4	3.8	4.0	4.4

- Maximum Wind Speed of 13.0 m/s on Sep 3
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Cfb" (Köppen classification)
- Marine west coastal (warm summer, mild winter, rain all year, lat. 35-60°S)
- Unbearably humid periods in summer, but passive cooling is possible

- Typical/Extreme Period Determination

- Summer is Jan:Mar
  Extreme Summer Week (nearest maximum temperature for summer)
  Extreme Hot Week Period selected: Feb 5:Feb 11, Maximum Temp= 31.00°C, Deviation=| 8.704|°C
  Typical Summer Week (nearest average temperature for summer)
  Typical Week Period selected: Mar 19:Mar 25, Average Temp= 20.30°C, Deviation=| 0.012|°C

- Winter is Jul:Sep
    Extreme Winter Week (nearest minimum temperature for winter)
    Extreme Cold Week Period selected: Jul 8:Jul 14, Minimum Temp= -2.10°C, Deviation=| 8.878|°C
    Typical Winter Week (nearest average temperature for winter)
    Typical Week Period selected: Jul 22:Jul 28, Average Temp= 13.81°C, Deviation=| 0.177|°C

- Autumn is Apr:Jun
    Typical Autumn Week (nearest average temperature for autumn)
    Typical Week Period selected: Apr 29:May 5, Average Temp= 14.68°C, Deviation=| 0.282|°C

- Spring is Oct:Dec
    Typical Spring Week (nearest average temperature for spring)
    Typical Week Period selected: Dec 24:Dec 30, Average Temp= 16.63°C, Deviation=| 0.307|°C

LabEEE

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Universidade Federal de Santa Catarina
Dep. de Engenharia Civil

FLORIANÓPOLIS

Statistics for florianopolisCSV
Location -- Florianopolis -TRY
     {S 27° 40'} {W 48° 32'} {GMT -3.0 Hours}
Elevation --   7m above sea level
Standard Pressure at Elevation -- 101241Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	5.1	6.3

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	34.3	32.8	31.6	27.7	26.4	25.8						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	36.0	34.5	35.3	29.5	29.5	29.5	28.2	26.0	28.0	28.3	30.8	32.9
Day:Hour	8:15	19:15	7:16	22:14	2:13	30:16	10:17	27:16	18:14	14:13	25:16	31:14
Minimum	18.5	16.7	17.8	12.5	10.2	4.0	5.0	2.0	12.3	12.0	13.0	14.0
Day:Hour	19:06	21:07	30:06	23:08	21:08	21:08	23:22	6:08	17:01	1:05	11:05	22:07
Daily Avg	24.8	24.3	24.3	21.5	19.0	17.0	17.5	17.1	19.1	19.7	21.3	22.6

  - Maximum Dry Bulb temperature of 36.0°C on Jan 8
  - Minimum Dry Bulb temperature of   2.0°C on Aug 6

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	22.8	22.9	22.8	19.5	17.1	15.0	16.0	15.8	17.8	18.1	19.6	20.9
1:01- 2:00	22.7	22.7	22.7	19.3	16.7	14.7	15.8	15.6	17.8	18.0	19.5	20.7
2:01- 3:00	22.6	22.4	22.5	19.1	16.5	14.6	15.6	15.4	17.5	17.9	19.3	20.5
3:01- 4:00	22.6	22.3	22.4	19.0	16.4	14.5	15.4	15.4	17.3	17.9	19.3	20.2
4:01- 5:00	22.5	22.0	22.3	18.8	16.2	14.4	15.1	15.0	17.2	17.8	19.1	20.1
5:01- 6:00	22.4	21.8	22.1	18.4	15.8	14.1	14.8	14.8	17.2	17.6	19.0	20.1
6:01- 7:00	22.4	21.5	22.0	18.1	15.6	13.9	14.5	14.8	17.4	17.7	19.2	20.0
7:01- 8:00	23.5	22.2	22.6	17.9	15.6	13.8	14.5	15.0	17.7	18.5	20.2	21.3
8:01- 9:00	24.5	23.8	23.8	19.8	16.9	14.6	15.1	15.7	18.3	19.4	21.2	22.6
9:01-10:00	25.6	24.9	24.8	21.9	18.8	16.4	16.9	17.0	19.1	20.5	22.3	23.6
10:01-11:00	26.8	26.2	26.0	23.5	20.7	18.2	18.4	18.4	20.3	21.6	23.0	24.7
11:01-12:00	27.7	26.8	26.8	25.0	22.3	19.8	19.8	19.3	21.0	22.2	23.8	25.5
12:01-13:00	28.4	27.3	27.3	25.7	23.3	21.0	20.7	20.2	21.5	22.4	24.1	25.8
13:01-14:00	28.6	27.1	27.6	26.4	23.8	21.8	21.4	20.6	21.9	22.3	24.2	25.8
14:01-15:00	28.4	27.2	27.5	26.3	23.8	21.9	21.7	20.6	21.9	22.1	24.0	25.5
15:01-16:00	27.9	27.0	27.3	25.8	23.4	21.8	21.5	20.3	21.6	21.8	23.8	25.3
16:01-17:00	26.8	26.2	26.4	25.2	22.6	20.7	20.9	19.5	21.4	21.4	23.4	24.8
17:01-18:00	26.1	25.6	25.7	23.9	21.2	19.3	19.8	18.6	20.5	20.8	22.9	24.3
18:01-19:00	24.8	24.5	24.7	22.0	19.4	17.6	18.2	17.4	19.5	19.9	22.1	23.8
19:01-20:00	24.2	24.2	23.9	21.0	18.7	16.7	17.5	16.7	18.8	19.3	21.1	22.5
20:01-21:00	23.8	23.7	23.6	20.4	18.0	16.4	17.0	16.4	18.5	19.0	20.5	21.7
21:01-22:00	23.6	23.5	23.3	19.9	17.8	15.9	16.8	16.1	18.2	18.8	20.2	21.4
22:01-23:00	23.3	23.3	23.1	19.6	17.5	15.5	16.6	16.1	18.1	18.7	19.9	21.2
23:01-24:00	23.0	23.1	23.0	19.4	17.3	15.2	16.4	15.9	17.8	18.6	19.9	21.0
Max Hour	14	13	14	14	15	15	15	14	15	13	14	14
Min Hour	6	7	7	8	8	8	8	6	6	6	6	7

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	30.6	26.4	26.3	24.1	21.4	22.3	19.3	19.5	20.6	23.0	25.0	25.6
Day:Hour	27:14	5:13	17:15	9:14	2:17	11:14	11:15	29:15	26:17	31:17	26:13	9:17
Minimum	16.7	14.1	13.9	10.4	5.4	1.5	2.9	-2.0	9.4	6.2	9.0	12.1
Day:Hour	17:10	8:06	28:15	17:08	4:12	21:08	23:08	6:12	30:23	1:10	21:20	22:07

Daily Avg	22.0	21.7	21.3	18.2	15.3	13.7	14.5	13.9	16.7	16.8	18.2	19.0

- Maximum Dew Point temperature of 30.6°C on Jan 27
- Minimum Dew Point temperature of -2.0°C on Aug 6

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC						5	1	2				
Day:Hour						20:24	23:07	6:09				
Average WC						7	7	5				
Avg Del WC						1	1	2				
# Hours WC						16	15	15				
Maximum HI	56	44	44	33	30	30	29	28	31	37	40	
Day:Hour	27:14	19:15	7:15	2:17	2:13	11:14	11:15	18:15	31:17	25:16	31:14	
Average HI	36	34	33	30	29	29	28	28	30	31	32	
Avg Del HI	6	5	4	2	1	1	1	0	2	3	3	
# Hours HI	174	117	146	60	6	5	10	2	12	32	77	

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	8	1	4									1
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	2	0	0	0	0
HDD base 18C	0	0	0	0	11	49	39	46	10	9	0	0
CDD base 10C	459	399	444	345	278	210	233	222	273	300	339	392
CDD base 18C	211	175	196	105	41	19	23	18	42	61	99	144

CDH base 20C	3586	2886	3287	1637	750	374	471	261	502	724	1390	2237
CDH base 23C	1700	1185	1486	590	182	74	134	27	94	168	417	813
CDH base 27C	439	207	292	47	6	6	7	0	2	7	35	111

- 3894 annual cooling degree-days (10°C baseline)
- 2 annual heating degree-days (10°C baseline)

- 1135 annual cooling degree-days (18°C baseline)
- 163 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	93	94	93	95	92	94	94	92	96	92	92	91
10am	82	83	83	81	82	84	87	82	89	81	81	79
3pm	78	80	75	67	63	65	69	69	79	78	76	72
10pm	91	90	90	90	89	89	90	89	91	90	89	86
Maximum	100	100	100	100	100	100	100	100	100	100	100	100
Day:Hour	9:02	1:01	9:22	4:04	1:07	3:06	1:06	9:07	2:24	3:18	1:01	9:05
Minimum	46	58	42	47	36	40	42	25	37	47	46	48
Day:Hour	9:15	4:12	7:14	22:14	4:15	21:15	10:17	12:15	18:14	7:11	11:11	29:12

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.9	2.8	2.7	2.3	1.8	1.7	1.7	1.7	2.0	2.0	2.2	2.3

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	3989	3749	2183	3661	2374	2060	1747	1818	1405	1837	2149	2722
Direct Max	9218	8966	5211	6166	4563	3376	4041	5072	6100	8394	7962	9642
Day	26	21	4	10	2	26	25	23	19	29	22	12
Diffuse Avg	3095	2962	2610	1778	1566	1277	1255	1762	2155	2339	3009	3077

- Maximum Direct Solar of 9642 Wh/m² on Dec 12

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
129	121	113	124	147	147	149	138	128	137	127	113

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	8.0	9.0	9.0	9.0	9.0	10.0	11.0	10.0	12.0	9.0	12.0
Day:Hour	5:09	11:15	26:14	1:14	15:16	16:01	22:16	12:16	1:15	5:16	5:16	12:21
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	2:02	1:01	1:13	3:04	1:01	2:04	1:01	1:08	2:02	1:23	1:03	2:23
Daily Avg	3.4	2.5	2.9	2.2	2.5	2.4	2.5	2.9	2.7	3.2	3.2	3.3

  - Maximum Wind Speed of 12.0 m/s on Oct 5
  - Minimum Wind Speed of   0.0 m/s on Jan 2

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Cfa" (Köppen classification)
- Humid subtropical (mild with no dry season, hot summer, lat. 20-35°S)
- Unbearably humid periods in summer, but passive cooling is possible

- Typical/Extreme Period Determination

- Summer is Jan:Mar
    Extreme Summer Week (nearest maximum temperature for summer)
    Extreme Hot Week Period selected: Jan 1:Jan 7, Maximum Temp= 36.00°C, Deviation=| 9.353|°C
    Typical Summer Week (nearest average temperature for summer)
    Typical Week Period selected: Jan 29:Feb 4, Average Temp= 24.47°C, Deviation=| 0.112|°C

- Winter is Jul:Sep
    Extreme Winter Week (nearest minimum temperature for winter)
    Extreme Cold Week Period selected: Aug 5:Aug 11, Minimum Temp=   2.00°C, Deviation=|12.226|°C
    Typical Winter Week (nearest average temperature for winter)
    Typical Week Period selected: Aug 19:Aug 25, Average Temp= 17.89°C, Deviation=| 0.238|°C

- Autumn is Apr:Jun
    Typical Autumn Week (nearest average temperature for autumn)
    Typical Week Period selected: May 20:May 26, Average Temp= 19.15°C, Deviation=| 0.164|°C

- Spring is Oct:Dec
    Typical Spring Week (nearest average temperature for spring)
    Typical Week Period selected: Oct 8:Oct 14, Average Temp= 21.21°C, Deviation=| 0.090|°C

FORTALEZA

Statistics for fortalezaCSV
Location -- Fortaleza -TRY
     {S 3° 46'} {W 38° 31'} {GMT -3.0 Hours}
Elevation --   25m above sea level
Standard Pressure at Elevation -- 101025Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	20.4	21.1

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	31.7	31.5	31.3	26.5	26.0	25.9

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	31.6	31.5	30.9	31.4	31.6	31.5	31.4	32.0	32.2	31.4	31.6	31.7
Day:Hour	24:14	20:12	16:15	2:13	5:13	3:13	1:13	1:13	3:13	18:12	2:14	17:14
Minimum	20.8	20.2	21.4	21.3	20.5	19.8	19.7	20.0	20.5	21.2	21.0	22.2
Day:Hour	7:07	7:07	4:06	6:07	8:07	8:07	18:07	17:07	7:07	7:06	7:07	5:06
Daily Avg	27.0	26.8	26.1	26.5	26.4	26.0	26.2	26.3	26.5	26.7	26.8	27.1

- Maximum Dry Bulb temperature of 32.2°C on Sep 3
- Minimum Dry Bulb temperature of 19.7°C on Jul 18

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.6	25.6	24.7	24.8	24.8	24.5	25.0	25.0	25.2	25.3	25.3	25.8
1:01- 2:00	25.4	25.4	24.5	24.7	24.5	24.3	24.8	24.8	24.9	25.2	25.2	25.6
2:01- 3:00	25.1	25.2	24.2	24.5	24.3	24.0	24.4	24.6	24.7	25.0	25.0	25.5
3:01- 4:00	24.7	24.9	24.0	24.1	24.1	23.7	24.0	24.3	24.4	24.8	24.8	25.2
4:01- 5:00	24.5	24.6	23.8	23.9	23.9	23.4	23.5	23.9	24.1	24.5	24.6	24.9
5:01- 6:00	24.1	24.4	23.7	23.7	23.4	23.1	22.9	23.4	23.9	24.2	24.2	24.5
6:01- 7:00	23.7	24.3	23.5	23.8	23.2	22.7	22.8	23.2	23.8	24.1	24.4	24.6
7:01- 8:00	25.0	25.1	24.2	24.9	24.6	23.9	23.9	24.0	24.8	25.3	25.6	25.6
8:01- 9:00	27.2	26.5	25.7	26.6	26.2	25.6	26.2	25.8	26.4	26.5	27.0	27.0
9:01-10:00	28.6	27.5	26.8	27.7	27.8	26.8	27.5	27.3	27.4	27.8	28.0	28.2
10:01-11:00	29.2	28.2	27.8	28.7	28.9	27.9	28.7	28.4	28.6	28.9	28.8	29.1
11:01-12:00	29.9	29.0	28.9	29.4	29.4	28.9	29.4	29.2	29.2	29.5	29.3	29.6
12:01-13:00	30.0	29.4	29.2	29.7	29.8	29.4	29.4	29.7	29.5	29.7	29.6	30.0
13:01-14:00	29.8	29.7	29.0	29.8	29.9	29.6	29.5	29.8	29.6	29.7	30.0	30.2
14:01-15:00	29.9	29.8	29.1	29.6	29.8	29.6	29.5	29.5	29.4	29.5	29.7	30.0
15:01-16:00	29.6	29.5	28.7	29.2	29.4	29.0	29.0	29.0	29.0	29.1	29.4	29.6
16:01-17:00	29.0	28.8	27.9	28.6	28.6	28.4	28.3	28.3	28.3	28.4	28.6	28.8
17:01-18:00	28.0	28.1	27.3	27.6	27.7	27.5	27.4	27.3	27.4	27.5	27.7	27.8
18:01-19:00	27.2	27.1	26.5	26.7	26.7	26.3	26.3	26.3	26.4	26.5	26.7	27.0
19:01-20:00	26.7	26.7	26.1	26.2	26.1	25.8	25.9	25.7	25.9	26.1	26.2	26.6
20:01-21:00	26.4	26.4	25.7	25.8	25.8	25.6	25.6	25.6	25.7	25.8	26.1	26.4
21:01-22:00	26.3	26.2	25.4	25.6	25.3	25.4	25.3	25.3	25.5	25.7	25.9	26.2
22:01-23:00	26.2	26.0	25.2	25.4	25.2	25.0	25.1	25.1	25.4	25.5	25.8	26.1
23:01-24:00	26.1	25.7	24.9	25.0	25.0	24.8	25.0	25.1	25.3	25.4	25.6	26.0
Max Hour	13	15	13	14	14	14	14	14	14	13	14	14
Min Hour	7	7	7	6	7	7	7	7	7	7	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum	28.3	27.5	25.8	26.4	26.0	25.9	25.9	26.1	25.9	25.4	26.7	25.8
Day:Hour	12:12	26:14	30:16	3:14	4:14	12:11	21:16	12:14	3:11	3:13	12:14	7:12
Minimum	19.8	19.5	20.7	19.8	17.8	17.5	18.6	17.2	19.1	18.8	20.2	20.7
Day:Hour	8:07	7:07	6:07	8:08	8:07	8:07	18:07	17:07	7:07	7:08	5:07	8:07
Daily Avg	23.7	23.7	23.4	23.7	23.6	22.9	23.1	22.7	23.1	22.9	23.3	23.7

- Maximum Dew Point temperature of 28.3°C on Jan 12
- Minimum Dew Point temperature of 17.2°C on Aug 17

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	43	41	39	41	41	39	39	41	41	38	40	40
Day:Hour	12:12	26:14	3:15	3:14	5:13	12:11	18:14	3:14	3:13	4:13	2:14	20:14
Average HI	34	34	34	34	34	33	33	33	33	33	34	34
Avg Del HI	5	5	5	5	5	4	5	4	5	4	5	5
# Hours HI	364	307	261	297	298	265	283	270	276	289	298	339

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32								1	1			
Max <= 0												
Min <= 0												

Min <=-18

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	527	472	499	495	509	481	503	504	494	517	504	530
CDD base 18C	279	248	251	255	261	241	255	256	254	269	264	282
CDH base 20C	5215	4599	4546	4680	4783	4356	4636	4668	4645	4962	4904	5273
CDH base 23C	3003	2597	2331	2539	2571	2268	2470	2482	2499	2745	2760	3045
CDH base 27C	715	580	459	585	583	467	513	512	511	562	572	675

- 6036 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 3116 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	92	92	95	95	95	94	93	91	92	89	90	91
10am	79	83	85	83	81	81	79	78	79	77	79	80
3pm	74	76	77	77	75	73	74	71	74	71	74	73
10pm	87	87	91	91	91	89	89	88	88	86	88	87
Maximum	100	100	100	100	100	100	99	99	99	100	100	100
Day:Hour	30:04	4:11	13:07	13:03	4:06	5:07	5:07	4:04	4:08	5:07	2:05	6:08
Minimum	64	66	64	65	60	62	62	55	60	60	61	63
Day:Hour	19:12	2:16	7:13	2:13	8:11	20:14	9:12	17:12	7:13	7:13	15:14	8:13

- Monthly Indicators for Precipitation/Moisture (kPa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	3.1	3.1	3.0	3.1	3.1	2.9	3.0	2.9	3.0	2.9	3.0	3.0

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4566	4282	3968	4053	4419	4408	4462	4742	5107	4090	4146	3744
Direct Max	7393	7139	8044	8262	8627	8104	6939	8552	7140	6493	6598	7110
Day	20	19	29	3	3	3	3	3	22	9	30	14
Diffuse Avg	2486	2627	2744	2522	2240	2069	2040	2255	2285	2589	2511	2561

- Maximum Direct Solar of 8627 Wh/m² on May 3

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	75	80	76	77	83	87	88	103	113	105	96	95

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	9.0	9.0	8.0	9.0	10.0	9.0	9.0	8.0	9.0	10.0	8.0	9.0
Day:Hour	10:17	12:12	2:17	9:16	9:12	9:15	9:12	13:11	16:11	24:14	8:16	9:12
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:01	2:21	1:05	1:06	1:01	1:01	1:06	2:04	1:23	1:01	1:02	1:01
Daily Avg	2.7	2.6	2.1	2.3	2.3	2.5	2.7	3.3	3.8	3.7	3.3	3.4

- Maximum Wind Speed of 10.0 m/s on May 9
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0

2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Sep 24:Sep 30, Average Temp= 26.54°C, Deviation=| 0.110|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Dec 17:Dec 23, Maximum Temp= 32.20°C, Deviation=| 4.395|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Mar 19:Mar 25, Minimum Temp= 19.70°C, Deviation=| 5.568|°C

MACEIÓ

Statistics for maceioCSV
Location -- Maceio -TRY
     {S 9° 31'} {W 35° 46'} {GMT -3.0 Hours}
Elevation --   115m above sea level
Standard Pressure at Elevation -- 99951Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	16.4	17.2

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%	CDP 1%	CDP 2%
Units	{C}		{C}		{C}		{C}	{C}	{C}
COOLING	33.4	32.6	32.0	23.7	23.4	23.3			

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	34.8	33.5	33.3	31.1	30.6	29.0	28.7	29.0	29.1	30.8	32.6	33.0
Day:Hour	13:14	25:14	8:14	4:14	6:14	11:13	28:14	25:12	25:14	6:13	12:12	5:13
Minimum	19.2	20.2	20.0	20.1	19.1	17.8	17.0	16.0	15.8	18.4	19.0	20.0
Day:Hour	19:06	1:06	3:07	13:06	2:07	19:06	11:06	17:06	15:06	10:06	2:06	4:06
Daily Avg	25.9	25.9	25.6	24.8	24.0	22.9	22.3	22.3	22.9	24.2	24.9	25.4

- Maximum Dry Bulb temperature of 34.8°C on Jan 13
- Minimum Dry Bulb temperature of 15.8°C on Sep 15

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	22.8	23.2	23.2	22.4	22.1	21.7	20.2	20.2	20.5	21.5	22.0	22.7
1:01- 2:00	22.5	22.9	23.0	22.2	21.9	21.6	20.0	20.0	20.4	21.3	21.7	22.5
2:01- 3:00	22.2	22.6	22.7	22.0	21.7	21.4	20.0	19.7	20.1	21.0	21.4	22.3
3:01- 4:00	21.9	22.3	22.4	21.8	21.5	21.2	19.8	19.4	19.8	20.8	21.2	22.1
4:01- 5:00	21.6	22.1	22.2	21.6	21.4	21.0	19.7	19.2	19.6	20.5	21.0	21.8
5:01- 6:00	21.3	21.9	22.1	21.4	21.2	20.8	19.5	19.0	19.5	20.4	20.8	21.8
6:01- 7:00	22.2	22.2	22.2	21.4	21.3	20.8	19.5	19.2	19.7	21.2	22.3	22.5
7:01- 8:00	24.2	24.1	23.6	22.9	22.5	21.6	20.7	20.5	21.5	23.4	24.3	24.5
8:01- 9:00	26.8	26.6	26.2	25.1	24.5	22.9	22.3	22.6	23.9	25.8	26.5	26.5
9:01-10:00	28.3	28.1	27.9	26.8	25.8	24.3	23.8	24.6	25.5	26.9	27.3	27.8
10:01-11:00	29.5	29.3	28.6	27.7	26.6	24.8	24.7	25.2	26.3	28.0	28.6	28.9
11:01-12:00	30.5	30.1	29.2	28.4	27.2	25.1	25.5	26.1	26.7	28.5	29.3	29.6
12:01-13:00	31.1	30.7	29.4	28.9	27.4	25.2	25.8	26.1	26.7	28.7	29.7	30.0
13:01-14:00	31.3	31.0	29.7	28.8	27.3	25.3	25.8	26.0	26.7	28.7	29.6	29.8
14:01-15:00	31.1	30.7	29.4	28.7	27.2	25.2	25.5	25.8	26.4	28.4	29.5	29.6
15:01-16:00	30.4	29.9	29.0	28.3	26.8	24.8	25.1	25.5	25.9	27.9	28.7	28.8
16:01-17:00	29.3	29.2	28.4	27.3	26.1	24.5	24.5	24.9	25.2	26.9	27.6	28.0
17:01-18:00	27.9	27.9	27.2	26.3	25.1	23.5	23.6	23.7	24.2	25.6	26.3	26.7
18:01-19:00	26.3	26.4	26.1	25.0	24.0	22.8	22.6	22.4	23.1	24.2	24.8	25.6
19:01-20:00	25.1	25.2	25.2	24.3	23.5	22.5	21.8	21.7	22.1	23.4	23.9	24.6
20:01-21:00	24.5	24.7	24.6	23.8	23.2	22.3	21.4	21.3	21.7	22.8	23.5	24.1
21:01-22:00	24.0	24.3	24.2	23.4	22.8	22.2	21.0	21.0	21.3	22.4	23.1	23.7
22:01-23:00	23.6	23.9	23.9	23.1	22.5	21.9	20.7	20.8	21.0	22.0	22.7	23.3
23:01-24:00	23.2	23.6	23.5	22.7	22.3	21.9	20.3	20.6	20.9	21.7	22.3	23.0
Max Hour	14	14	14	13	13	14	13	13	13	13	13	13
Min Hour	6	6	6	6	6	7	6	6	6	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum	24.1	23.9	24.0	23.9	23.5	23.0	22.1	22.4	22.6	23.8	23.8	23.3
Day:Hour	28:13	27:11	30:17	20:09	16:14	11:15	16:15	19:15	27:13	27:12	27:15	16:13
Minimum	17.2	17.8	18.8	18.9	18.2	16.1	15.0	13.9	13.0	16.4	16.4	18.1
Day:Hour	17:12	1:11	3:14	21:15	2:07	19:15	13:13	17:07	8:16	26:14	19:16	21:13
Daily Avg	20.6	21.1	21.5	21.4	21.2	20.7	19.4	19.0	19.3	19.9	20.2	20.8

- Maximum Dew Point temperature of 24.1°C on Jan 28
- Minimum Dew Point temperature of 13.0°C on Sep 8

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	39	39	36	36	34	32	31	31	32	35	36	36
Day:Hour	15:14	25:14	8:14	4:14	2:12	11:13	28:14	25:15	26:14	12:13	12:14	6:14
Average HI	32	32	32	31	30	30	29	29	29	30	31	31
Avg Del HI	3	3	3	3	2	2	1	1	2	2	2	2
# Hours HI	296	263	266	213	145	28	25	31	86	197	235	264

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	12	9	2								1	3
Max <= 0												
Min <= 0												

Min <=-18

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	493	447	483	443	433	387	380	382	386	442	448	478
CDD base 18C	245	223	235	203	185	147	132	134	146	194	208	230
CDH base 20C	4392	3996	4151	3430	2965	2102	1823	1898	2187	3181	3546	4037
CDH base 23C	2378	2126	2053	1553	1136	542	572	687	866	1484	1755	2010
CDH base 27C	825	692	521	312	150	15	13	18	66	289	450	553

- 5200 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2280 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	93	93	94	96	96	96	96	96	96	95	94	94
10am	65	69	72	78	81	84	82	76	73	66	67	67
3pm	56	58	64	67	73	80	72	68	67	61	59	60
10pm	83	85	88	91	93	94	93	92	91	89	86	88
Maximum	99	98	100	99	100	100	100	100	100	99	100	100
Day:Hour	22:01	16:09	29:13	9:19	15:06	4:24	5:05	6:04	4:06	30:08	29:08	31:05
Minimum	42	48	47	52	57	56	47	43	42	48	46	45
Day:Hour	14:13	1:14	7:13	21:15	2:16	19:15	13:13	23:16	8:16	26:13	12:12	5:13

- Monthly Indicators for Precipitation/Moisture (kPa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2.5	2.5	2.6	2.6	2.5	2.5	2.3	2.2	2.2	2.3	2.4	2.4

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	5993	5010	5420	3789	3199	2302	2837	3267	4626	5274	5674	5562
Direct Max	8214	7056	8630	6913	6443	5671	5289	6594	8106	8414	7936	9394
Day	13	4	6	6	7	11	20	25	22	5	16	5
Diffuse Avg	2439	2738	2446	2405	2395	2354	2013	2244	2362	2238	2309	2489

- Maximum Direct Solar of 9394 Wh/m² on Dec 5

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	56	56	55	60	58	79	67	64	64	59	53	57

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	9.0	8.0	8.0	6.0	8.0	9.0	8.0	9.0	8.0	8.0	9.0	8.0
Day:Hour	6:16	4:16	8:18	1:15	10:11	27:16	15:13	4:12	4:16	2:12	11:16	5:18
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:01	1:01	1:01	1:01	1:01	1:01	1:06	1:01	1:01	1:01	1:01	1:01
Daily Avg	2.8	2.2	1.8	1.5	1.6	2.1	1.6	1.8	2.0	2.2	2.5	2.4

- Maximum Wind Speed of 9.0 m/s on Jan 6
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0

2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Am" (Köppen classification)
- Tropical monsoonal or tradewind-coastal (short dry season, lat. 5-25°)
- Heating may not be required

- Typical/Extreme Period Determination
- No discernible dry period.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Apr 9:Apr 15, Average Temp= 24.25°C, Deviation=| 0.007|°C
- Extremes Selected from annual Min/Max
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Mar 5:Mar 11, Maximum Temp= 34.80°C, Deviation=| 8.452|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Jul 30:Aug 5, Minimum Temp= 15.80°C, Deviation=| 6.087|°C

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Universidade Federal de Santa Catarina
Dep. de Engenharia Civil

NATAL

Statistics for natalCSV
Location -- Natal -TRY
     {S 5° 55'} {W 35° 15'} {GMT -3.0 Hours}
Elevation --   49m above sea level
Standard Pressure at Elevation -- 100738Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	19.1	19.5

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	31.9	31.7	31.5	24.8	24.4	24.2

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	32.0	32.3	32.6	31.5	30.9	30.2	29.8	29.4	30.2	31.7	31.4	31.2
Day:Hour	2:13	9:12	27:14	7:13	3:14	1:12	11:14	4:13	26:13	19:13	8:14	8:14
Minimum	22.4	21.8	22.4	21.6	21.4	21.0	19.0	18.7	19.2	20.8	20.0	21.6
Day:Hour	3:07	4:06	9:05	30:06	17:06	27:06	27:07	22:07	2:06	13:07	26:06	1:06
Daily Avg	26.8	27.1	27.0	25.9	25.3	24.6	23.9	24.1	24.7	26.0	26.2	26.7

- Maximum Dry Bulb temperature of 32.6°C on Mar 27
- Minimum Dry Bulb temperature of 18.7°C on Aug 22

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.3	25.5	25.5	24.3	23.4	23.0	21.8	22.0	22.6	24.0	24.3	24.8
1:01- 2:00	25.1	25.2	25.1	24.0	23.1	22.7	21.5	21.7	22.2	23.9	24.2	24.7
2:01- 3:00	24.9	24.9	24.6	23.6	22.9	22.5	21.3	21.4	22.0	23.7	24.1	24.4
3:01- 4:00	24.7	24.6	24.2	23.3	22.7	22.3	21.2	21.1	21.8	23.5	24.0	24.3
4:01- 5:00	24.5	24.3	23.9	23.1	22.6	22.2	21.1	20.9	21.6	23.2	23.7	24.2
5:01- 6:00	24.4	23.8	23.7	22.9	22.6	22.0	21.0	20.7	21.4	22.9	23.4	23.8
6:01- 7:00	24.4	23.8	23.7	23.0	22.7	22.2	21.1	20.7	21.6	23.4	23.8	24.1
7:01- 8:00	25.7	25.2	25.4	24.2	24.0	23.4	22.3	22.1	23.2	25.1	25.4	25.9
8:01- 9:00	27.3	27.5	27.5	26.4	25.7	24.6	24.0	24.5	25.3	27.3	27.3	27.8
9:01-10:00	28.2	28.7	28.7	27.4	26.9	25.8	25.3	25.9	26.5	28.3	28.2	28.8
10:01-11:00	28.9	29.7	29.5	28.3	27.8	26.7	26.2	26.9	27.5	29.0	28.8	29.4
11:01-12:00	29.3	30.5	30.2	29.2	28.4	27.4	27.0	27.4	28.4	29.4	29.3	29.8
12:01-13:00	29.8	30.8	30.5	29.6	28.7	27.5	27.6	28.1	28.7	29.5	29.3	30.0
13:01-14:00	29.9	30.8	30.4	29.3	28.6	27.6	27.5	28.1	28.8	29.4	29.5	30.0
14:01-15:00	29.4	30.5	30.1	29.1	28.6	27.7	27.5	28.1	28.4	29.2	29.3	29.8
15:01-16:00	29.1	30.0	29.8	28.4	28.1	27.4	27.3	27.5	27.9	28.7	28.8	29.3
16:01-17:00	28.5	29.1	29.1	28.0	27.3	26.9	26.5	26.5	26.9	27.7	27.9	28.7
17:01-18:00	27.6	28.0	28.3	27.0	26.3	25.9	25.4	25.5	25.9	26.5	26.7	27.5
18:01-19:00	26.5	27.2	27.2	26.1	25.6	25.0	24.4	24.4	24.9	25.3	25.6	26.2
19:01-20:00	26.1	26.6	26.6	25.6	25.1	24.4	23.6	23.8	24.3	24.9	25.2	25.7
20:01-21:00	25.9	26.4	26.4	25.3	24.7	23.9	23.3	23.4	24.0	24.7	25.0	25.4
21:01-22:00	25.8	26.2	26.3	25.0	24.4	23.7	22.8	23.1	23.7	24.6	24.8	25.2
22:01-23:00	25.6	26.1	26.0	24.7	24.1	23.4	22.4	22.7	23.4	24.5	24.7	25.1
23:01-24:00	25.5	25.9	25.8	24.5	23.7	23.2	22.0	22.4	23.0	24.2	24.5	25.0
Max Hour	14	14	13	13	13	15	13	15	14	13	14	14
Min Hour	6	7	7	6	6	6	6	7	6	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum	24.8	24.9	24.9	24.9	25.1	24.0	23.6	23.8	23.4	23.6	23.2	23.1
Day:Hour	20:12	25:11	8:13	2:11	11:15	6:14	19:11	9:12	6:12	11:12	21:10	29:12
Minimum	19.0	19.0	20.5	19.3	19.7	18.1	15.5	17.2	17.6	17.1	17.7	18.7
Day:Hour	13:15	4:07	27:14	14:14	17:15	21:16	2:13	22:07	2:08	2:13	8:15	20:12
Daily Avg	22.1	22.4	22.8	22.5	22.0	21.7	20.5	20.9	20.8	20.6	20.8	21.1

- Maximum Dew Point temperature of 25.1°C on May 11
- Minimum Dew Point temperature of 15.5°C on Jul 2

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	38	38	38	37	35	34	32	34	34	34	34	35
Day:Hour	7:13	11:14	14:13	17:14	6:12	1:12	7:14	4:13	6:13	5:13	22:14	11:14
Average HI	32	33	33	33	32	31	30	31	31	31	31	32
Avg Del HI	3	4	4	4	3	3	2	3	3	2	2	3
# Hours HI	290	304	353	243	210	155	148	171	203	271	271	306

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	1	2	3									
Max <= 0												
Min <= 0												

Min <=-18

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	520	480	528	478	475	439	432	438	442	495	485	517
CDD base 18C	272	256	280	238	227	199	184	190	202	247	245	269
CDH base 20C	5035	4793	5225	4264	3968	3341	2928	3076	3420	4431	4434	4957
CDH base 23C	2806	2782	2998	2136	1827	1352	1176	1298	1551	2246	2310	2740
CDH base 27C	598	741	810	492	358	181	147	181	264	484	479	656

- 5727 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2807 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	87	89	92	95	95	95	94	95	92	84	83	83
10am	73	71	74	80	79	82	79	80	75	65	66	65
3pm	66	62	66	70	71	73	69	70	67	62	61	61
10pm	82	82	83	88	89	90	90	89	87	80	80	81
Maximum	100	100	99	100	99	100	99	99	99	96	96	92
Day:Hour	22:06	15:06	7:09	2:16	7:16	16:03	16:24	10:06	9:05	19:05	10:22	7:21
Minimum	51	51	50	50	56	59	44	58	53	46	46	51
Day:Hour	15:14	26:16	27:14	14:14	18:15	17:14	2:13	12:14	29:14	2:13	8:14	20:11

- Monthly Indicators for Precipitation/Moisture (kPa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2.7	2.7	2.8	2.8	2.7	2.6	2.5	2.6	2.5	2.4	2.4	2.5

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4501	4706	4309	3317	2969	3171	3315	2907	3500	4456	4870	4718
Direct Max	8100	7936	8410	7086	5934	7437	6998	5559	6155	7931	7091	7876
Day	22	2	15	27	16	17	2	29	5	13	9	17
Diffuse Avg	2751	2656	2746	2813	2602	2319	2151	2569	2748	2711	2529	2595

- Maximum Direct Solar of 8410 Wh/m² on Mar 15

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
109	97	124	158	163	153	166	134	146	108	110	102

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	8.0	8.0	10.0	9.0	10.0	10.0	10.0	10.0	10.0	10.0	8.0	9.0
Day:Hour	1:17	2:17	2:19	12:11	16:11	21:10	1:15	12:10	11:13	31:12	1:13	5:14
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	8:08	1:01	1:05	1:01	2:05	1:20	4:03	2:03	1:03	1:01	1:01	2:01
Daily Avg	3.5	2.9	3.0	3.3	3.9	3.6	4.2	3.6	4.2	3.9	4.1	3.7

- Maximum Wind Speed of 10.0 m/s on Mar 2
- Minimum Wind Speed of 0.0 m/s on Jan 8

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0

2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Apr 2:Apr 8, Average Temp= 25.69°C, Deviation=| 0.016|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Feb 12:Feb 18, Maximum Temp= 32.60°C, Deviation=| 5.099|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Jul 16:Jul 22, Minimum Temp= 18.70°C, Deviation=| 4.574|°C

PORTO ALEGRE

Statistics for porto alegreCSV
Location -- PortoAlegre -TRY
     {S 30° 0'} {W 51° 10'} {GMT -3.0 Hours}
Elevation --   4m above sea level
Standard Pressure at Elevation -- 101277Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	2.4	3.1

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%	CDP 1%	CDP 2%
Units	{C}		{C}		{C}		{C}	{C}	{C}
COOLING	36.1	35.1	33.6	24.7	24.1	23.8			

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	36.5	35.0	33.5	32.0	29.5	26.0	27.5	31.0	27.3	30.4	33.5	36.5
Day:Hour	24:16	24:18	14:14	9:14	27:16	27:16	10:14	17:17	3:14	15:15	14:16	5:17
Minimum	12.5	16.0	14.7	8.0	1.3	2.5	4.2	3.5	8.7	7.3	11.0	9.4
Day:Hour	4:07	1:07	29:08	30:23	20:04	7:07	6:06	11:08	7:06	12:07	3:05	21:07
Daily Avg	24.6	24.3	23.4	19.8	14.4	14.9	13.7	16.2	16.9	18.3	21.3	23.2

- Maximum Dry Bulb temperature of 36.5°C on Jan 24
- Minimum Dry Bulb temperature of   1.3°C on May 20

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	22.1	22.3	21.4	18.0	11.6	13.5	12.3	14.3	15.5	16.2	18.3	20.1
1:01- 2:00	21.6	22.0	21.1	17.7	11.2	13.4	12.1	13.9	15.3	15.9	17.8	19.4
2:01- 3:00	21.2	21.6	20.7	17.5	10.7	13.2	11.8	13.5	15.1	15.5	17.2	19.0
3:01- 4:00	21.0	21.2	20.2	17.0	10.4	13.1	11.7	13.1	14.7	15.2	16.7	18.4
4:01- 5:00	20.8	21.1	19.9	16.8	10.2	13.0	11.5	12.8	14.4	14.9	16.4	18.0
5:01- 6:00	20.5	21.0	19.7	16.5	10.1	12.6	11.2	12.4	14.3	14.8	16.2	17.9
6:01- 7:00	20.5	20.7	19.5	16.1	10.1	12.7	11.1	12.0	14.1	14.6	16.2	17.7
7:01- 8:00	21.6	21.2	19.5	15.9	10.4	12.8	11.1	11.9	14.5	15.5	18.2	19.7
8:01- 9:00	23.2	22.8	21.0	17.2	10.9	12.9	11.3	12.8	15.2	16.9	20.2	21.9
9:01-10:00	24.7	24.3	23.0	19.1	12.7	13.7	12.2	14.8	16.3	18.5	21.9	23.5
10:01-11:00	25.9	25.6	24.8	21.2	14.8	14.7	13.4	16.9	17.6	19.9	23.6	25.1
11:01-12:00	27.1	26.6	26.2	22.3	16.7	15.8	14.6	18.7	18.5	21.0	24.9	26.3
12:01-13:00	28.1	27.6	27.2	23.4	18.1	17.1	15.7	19.9	19.6	21.9	25.9	27.4
13:01-14:00	28.8	28.4	27.7	24.0	19.3	17.7	16.5	20.9	20.3	22.5	26.7	28.1
14:01-15:00	29.2	28.3	28.2	24.4	20.2	18.2	16.9	21.4	20.4	22.8	26.9	28.7
15:01-16:00	28.9	28.2	27.9	24.3	20.9	18.4	17.6	21.7	20.2	22.4	26.5	29.1
16:01-17:00	28.9	28.0	27.6	24.1	20.8	18.1	17.4	21.4	20.0	21.8	26.3	29.0
17:01-18:00	28.5	27.4	26.9	23.5	19.7	17.3	16.7	20.6	19.4	21.1	25.3	28.3
18:01-19:00	27.9	26.9	25.9	22.1	17.7	16.3	15.6	18.9	18.5	20.2	23.9	27.3
19:01-20:00	26.5	25.5	24.4	20.3	15.9	15.4	14.6	17.0	17.6	19.0	22.4	25.2
20:01-21:00	24.8	24.4	23.3	19.6	14.7	15.0	13.8	16.1	17.0	18.0	20.9	23.5
21:01-22:00	23.6	23.4	22.5	18.8	13.7	14.4	13.4	15.2	16.3	17.4	19.9	21.8
22:01-23:00	22.9	23.1	22.1	18.4	13.0	14.0	13.1	14.9	16.1	17.0	19.3	21.1
23:01-24:00	22.3	22.7	21.7	17.9	12.5	13.7	12.8	14.5	15.8	16.5	18.8	20.4
Max Hour	15	14	15	15	16	16	16	16	15	15	15	16
Min Hour	6	7	7	8	6	6	7	8	7	7	7	7

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Maximum	25.6	25.1	24.7	23.8	19.8	18.5	18.2	21.8	20.1	22.6	24.0	23.1
Day:Hour	25:01	24:17	17:15	3:15	27:18	27:18	27:16	13:19	16:17	4:17	8:15	27:18
Minimum	7.6	12.8	13.8	5.9	-0.1	2.2	3.3	-0.4	6.9	2.6	4.8	5.5
Day:Hour	7:20	2:15	28:13	30:07	19:15	7:07	22:09	10:13	14:08	4:16	27:16	19:13
Daily Avg	20.2	20.4	19.3	16.3	11.1	12.7	11.2	12.8	14.1	14.5	15.8	16.8

- Maximum Dew Point temperature of 25.6°C on Jan 25
- Minimum Dew Point temperature of -0.4°C on Aug 10

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC				8	1	-1	1	-2	7	9		
Day:Hour				30:22	19:07	7:09	5:11	7:06	15:08	12:08		
Average WC				8	6	6	5	4	9	9		
Avg Del WC				0	1	2	3	4	1	0		
# Hours WC				1	49	18	51	38	5	1		
Maximum HI	44	42	38	34	30			33	29	32	35	43
Day:Hour	24:14	24:18	15:18	9:18	27:18			19:16	3:14	15:15	14:15	24:15
Average HI	34	32	32	31	30			30	29	30	30	32
Avg Del HI	4	3	2	2	1			1	2	2	1	2
# Hours HI	213	154	148	20	4			37	2	17	88	165

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	16	5	7	1							1	14
Max <= 0												
Min <= 0												

Min <=-18

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	5	0	3	0	0	0	0	0
HDD base 18C	0	0	0	6	118	94	135	78	42	27	2	0
CDD base 10C	453	402	416	295	142	147	118	194	208	258	338	409
CDD base 18C	205	178	168	61	7	1	1	24	11	37	101	161
CDH base 20C	3643	2986	2747	1081	333	118	153	695	326	668	1788	2970
CDH base 23C	2027	1378	1324	345	100	19	45	350	80	219	837	1653
CDH base 27C	761	364	370	48	8	0	1	99	0	25	191	679

- 3379 annual cooling degree-days (10°C baseline)
- 9 annual heating degree-days (10°C baseline)

- 954 annual cooling degree-days (18°C baseline)
- 504 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	94	94	94	94	97	96	95	93	94	94	93	88
10am	78	81	82	83	88	94	93	85	87	79	74	68
3pm	63	67	62	64	63	76	75	67	73	64	53	54
10pm	85	86	86	90	90	93	90	90	89	85	80	77
Maximum	100	100	100	100	100	100	100	100	100	100	100	100
Day:Hour	4:04	1:07	3:07	4:04	1:03	1:06	1:19	1:03	1:08	5:06	4:06	4:04
Minimum	34	35	43	46	37	53	39	34	46	21	20	29
Day:Hour	9:19	2:15	15:17	9:14	11:18	2:14	10:14	18:16	15:14	4:16	27:16	5:17

- Monthly Indicators for Precipitation/Moisture (kPa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	2.5	2.5	2.3	1.9	1.5	1.6	1.4	1.7	1.7	1.7	1.8	2.0

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4526	4258	4419	3252	2158	1417	1702	2956	2519	3956	4906	6340
Direct Max	8823	9224	8215	7237	4432	3936	4735	5323	7897	9019	6917	10683
Day	4	22	2	8	1	1	28	31	24	19	12	14
Diffuse Avg	2926	2777	2232	1893	1487	1480	1333	1487	2410	2335	2854	2501

- Maximum Direct Solar of 10683 Wh/m² on Dec 14

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	136	112	116	124	132	133	131	123	137	135	131	154

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	13.0	11.0	13.0	11.0	10.0	12.0	12.0	13.0	13.0	12.0	13.0	13.0
Day:Hour	25:15	2:23	4:16	28:15	28:02	16:24	11:22	26:13	22:10	7:14	9:06	13:14
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:06	1:02	1:01	3:06	1:01	1:06	2:09	1:03	1:03	1:07	2:22	2:09
Daily Avg	2.8	2.7	2.9	2.9	2.0	2.9	2.7	3.0	3.4	3.2	3.7	3.3

- Maximum Wind Speed of 13.0 m/s on Jan 25
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0

2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Cfa" (Köppen classification)
- Humid subtropical (mild with no dry season, hot summer, lat. 20-35°S)

- Typical/Extreme Period Determination

- Summer is Dec:Feb
  Extreme Summer Week (nearest maximum temperature for summer)
  Extreme Hot Week Period selected: Jan 20:Jan 26, Maximum Temp= 36.50°C, Deviation=| 9.489|°C
  Typical Summer Week (nearest average temperature for summer)
  Typical Week Period selected: Feb 3:Feb 9, Average Temp= 24.04°C, Deviation=| 0.137|°C

- Winter is Jun:Aug
  Extreme Winter Week (nearest minimum temperature for winter)
  Extreme Cold Week Period selected: Jun 29:Jul 5, Minimum Temp=   2.50°C, Deviation=| 8.918|°C
  Typical Winter Week (nearest average temperature for winter)
  Typical Week Period selected: Jun 22:Jun 28, Average Temp= 14.94°C, Deviation=| 0.537|°C

- Autumn is Mar:May
  Typical Autumn Week (nearest average temperature for autumn)
  Typical Week Period selected: Apr 12:Apr 18, Average Temp= 19.22°C, Deviation=| 0.731|°C

- Spring is Sep:Nov
  Typical Spring Week (nearest average temperature for spring)
  Typical Week Period selected: Sep 29:Oct 5, Average Temp= 18.84°C, Deviation=| 0.315|°C

RECIFE

Statistics for recifeCSV
Location -- Recife -TRY
     {S 8° 7'} {W 34° 55'} {GMT -3.0 Hours}
Elevation --   11m above sea level
Standard Pressure at Elevation -- 101193Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	19.9	20.3

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	29.6	29.4	29.1	25.4	24.7	24.2

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	29.0	29.9	29.5	29.5	28.8	28.2	27.2	27.9	28.2	28.5	31.4	30.2
Day:Hour	6:15	24:13	4:13	2:11	8:12	4:13	5:14	13:13	27:15	30:12	16:15	6:15
Minimum	22.4	23.1	22.1	21.7	21.4	19.8	19.9	19.6	20.0	21.5	23.1	23.0
Day:Hour	26:07	16:08	15:07	10:07	26:06	19:07	13:07	30:04	14:05	4:07	19:11	17:03
Daily Avg	26.7	26.9	26.7	26.0	25.7	24.6	24.0	24.3	25.1	26.0	26.3	26.5

  - Maximum Dry Bulb temperature of 31.4°C on Nov 16
  - Minimum Dry Bulb temperature of 19.6°C on Aug 30

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.8	26.3	26.0	25.3	25.1	23.8	23.0	23.4	24.2	25.1	25.4	25.7
1:01- 2:00	25.7	26.1	25.7	25.0	24.7	23.6	22.9	23.3	24.1	25.0	25.2	25.6
2:01- 3:00	25.5	25.9	25.3	24.6	24.5	23.4	22.6	23.1	23.9	24.8	25.1	25.5
3:01- 4:00	25.3	25.6	25.1	24.3	24.0	23.3	22.4	22.8	23.7	24.7	25.0	25.4
4:01- 5:00	25.0	25.5	24.9	23.9	23.8	23.2	22.2	22.7	23.6	24.5	24.9	25.2
5:01- 6:00	24.7	25.2	24.8	23.7	23.6	23.1	21.9	22.6	23.5	24.4	24.8	25.0
6:01- 7:00	24.8	25.1	24.8	23.8	23.6	23.1	21.8	22.6	23.8	24.8	25.3	25.3
7:01- 8:00	26.0	26.1	25.6	24.8	24.5	24.0	22.5	23.3	24.7	25.8	26.2	26.3
8:01- 9:00	27.0	26.9	26.8	26.0	25.7	24.9	23.8	24.5	25.6	26.8	26.8	26.9
9:01-10:00	27.8	27.6	27.6	27.1	26.6	25.7	24.9	25.4	26.0	27.2	27.3	27.4
10:01-11:00	28.0	28.0	28.0	27.6	27.1	26.0	25.4	25.9	26.4	27.5	27.3	27.7
11:01-12:00	28.2	28.4	28.3	27.7	27.4	26.2	25.8	26.0	26.6	27.6	27.7	28.0
12:01-13:00	28.3	28.6	28.3	27.6	27.5	26.2	26.0	26.1	26.6	27.6	27.9	28.1
13:01-14:00	28.5	28.6	28.3	27.8	27.4	26.2	26.1	26.3	26.5	27.5	27.9	28.2
14:01-15:00	28.3	28.4	28.1	27.8	27.3	26.1	26.0	26.2	26.3	27.5	28.0	28.0
15:01-16:00	28.2	28.4	28.0	27.7	27.2	26.1	25.6	25.8	26.1	27.2	27.5	27.7
16:01-17:00	27.9	28.0	27.8	27.3	26.8	25.8	25.4	25.5	25.8	26.9	27.0	27.3
17:01-18:00	27.3	27.5	27.2	26.8	26.4	25.1	24.7	24.8	25.4	26.2	26.6	26.9
18:01-19:00	26.7	27.0	26.8	26.4	26.1	24.8	24.3	24.4	25.0	25.8	26.1	26.5
19:01-20:00	26.4	26.8	26.7	26.2	25.9	24.5	24.2	24.2	24.9	25.6	26.0	26.2
20:01-21:00	26.3	26.5	26.5	26.1	25.8	24.4	24.1	24.0	24.8	25.5	25.8	26.1
21:01-22:00	26.2	26.5	26.5	26.0	25.6	24.1	23.8	24.0	24.6	25.4	25.7	25.9
22:01-23:00	26.1	26.5	26.4	25.8	25.4	24.0	23.6	23.8	24.7	25.3	25.6	25.8
23:01-24:00	26.0	26.3	26.2	25.6	25.1	23.9	23.4	23.7	24.5	25.2	25.5	25.7
Max Hour	14	13	13	14	13	12	14	14	12	12	15	14
Min Hour	6	7	6	6	6	6	7	7	6	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	24.2	25.4	25.5	24.5	24.9	23.5	24.8	23.4	23.3	23.6	23.9	24.1
Day:Hour	13:12	26:15	1:13	26:12	8:23	11:11	28:15	19:17	12:19	30:05	18:12	16:20
Minimum	19.4	20.1	20.2	20.0	19.3	17.8	18.2	16.7	16.7	18.4	19.3	18.6
Day:Hour	31:10	4:14	15:02	10:11	26:07	18:23	9:20	16:11	8:23	15:05	20:08	6:18

Daily Avg	21.8	22.1	22.7	22.4	22.1	21.5	20.8	20.4	20.6	20.9	21.5	21.9

- Maximum Dew Point temperature of 25.5°C on Mar 1
- Minimum Dew Point temperature of 16.7°C on Aug 16

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	34	36	35	34	33	31	31	30	31	32	34	34
Day:Hour	13:12	26:14	26:14	2:11	20:13	4:13	28:15	13:13	30:12	30:12	16:15	31:14
Average HI	31	31	31	31	31	30	30	29	29	30	30	31
Avg Del HI	3	3	3	3	3	2	3	2	2	2	3	3
# Hours HI	308	319	361	237	194	64	7	22	68	233	234	271

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32												
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	517	474	516	481	487	439	435	445	452	496	489	512
CDD base 18C	269	250	268	241	239	199	187	197	212	248	249	264

CDH base 20C	4959	4647	4950	4347	4252	3344	2994	3238	3645	4459	4527	4854
CDH base 23C	2728	2631	2724	2197	2048	1319	1030	1217	1551	2236	2367	2622
CDH base 27C	307	335	342	208	138	24	1	6	18	111	169	243

- 5742 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2822 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	82	81	87	89	91	90	91	86	82	80	82	82
10am	72	75	77	78	79	80	82	76	75	71	73	74
3pm	70	71	75	76	76	79	77	74	75	69	70	71
10pm	78	78	82	83	83	88	85	81	79	78	79	81
Maximum	98	99	100	100	99	100	100	100	100	99	98	99
Day:Hour	14:02	9:08	12:15	11:21	22:02	22:19	1:03	1:18	18:07	30:05	19:11	17:02
Minimum	60	61	64	65	63	60	66	56	57	57	54	56
Day:Hour	31:10	4:13	11:15	27:12	11:13	19:14	11:13	16:11	24:14	9:13	16:15	6:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.6	2.7	2.8	2.7	2.7	2.6	2.5	2.5	2.5	2.5	2.6	2.6

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4806	5038	4294	3543	2991	2473	1977	3245	4566	5275	4829	4746
Direct Max	6586	8312	8420	7533	6252	5608	4854	6251	6987	7115	7326	9033
Day	17	4	29	8	2	26	28	24	14	20	3	27
Diffuse Avg	2630	2580	2761	2567	2478	2337	2099	2233	2373	2429	2562	2518

- Maximum Direct Solar of 9033 Wh/m² on Dec 27

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
91	108	133	156	151	165	162	146	133	127	88	103

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	9.0	10.0	10.0	9.0	10.0	11.0	10.0	10.0	9.0	10.0	13.0
Day:Hour	13:16	25:18	7:18	15:17	25:14	2:14	1:05	4:04	18:15	6:16	12:17	16:09
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	2:03	1:02	7:02	2:21	4:03	9:14	1:20	12:04	1:01	1:03	4:04	3:02
Daily Avg	3.4	3.3	3.6	3.6	3.6	4.4	4.3	4.5	4.3	4.3	4.1	4.5

- Maximum Wind Speed of 13.0 m/s on Dec 16
- Minimum Wind Speed of 0.0 m/s on Jan 2

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Unbearably humid periods in summer, but passive cooling is possible
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Oct 1:Oct 7, Average Temp= 25.73°C, Deviation=| 0.063|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Mar 5:Mar 11, Maximum Temp= 31.40°C, Deviation=| 3.910|°C
  Week closest to minimum annual temperature selected for Typical Period

Extreme Cold Week Period selected: Jun 18:Jun 24, Minimum Temp= 19.60°C, Deviation=| 4.094|°C

RIO DE JANEIRO

Statistics for rio de janeiroCSV
Location -- RiodeJaneiro -TRY
     {S 22° 49'} {W 43° 15'} {GMT -3.0 Hours}
Elevation --   5m above sea level
Standard Pressure at Elevation -- 101265Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	14.4	14.9

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	36.3	35.1	33.9	26.9	26.2	25.3						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	37.5	35.0	35.0	31.7	32.0	29.0	33.2	35.0	31.8	34.0	37.3	38.2
Day:Hour	8:16	19:16	9:13	12:14	13:15	17:13	22:13	12:15	6:15	27:15	26:18	5:15
Minimum	22.5	20.3	22.0	19.0	15.7	13.9	14.2	13.0	16.5	18.7	17.4	16.6
Day:Hour	16:02	10:07	29:24	19:07	6:08	24:09	8:08	8:07	19:07	2:06	16:06	23:08
Daily Avg	27.2	25.8	26.9	24.1	21.8	20.5	20.5	21.0	22.9	23.0	24.6	24.6

  - Maximum Dry Bulb temperature of 38.2°C on Dec 5
  - Minimum Dry Bulb temperature of 13.0°C on Aug 8

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.5	24.5	25.8	23.2	20.8	19.5	19.6	19.9	21.6	22.0	23.2	23.3
1:01- 2:00	25.3	24.2	25.5	22.8	20.6	19.1	19.2	19.5	21.3	21.8	23.0	23.2
2:01- 3:00	25.1	24.1	25.2	22.6	20.2	18.8	18.8	19.1	21.0	21.5	22.9	23.0
3:01- 4:00	24.7	23.9	24.7	22.2	19.5	18.4	18.2	18.8	20.7	21.4	22.6	22.7
4:01- 5:00	24.4	23.6	24.5	21.9	19.1	18.0	17.8	18.4	20.5	21.2	22.6	22.4
5:01- 6:00	24.3	23.5	24.3	21.7	18.8	17.7	17.5	18.1	20.3	21.1	22.5	22.2
6:01- 7:00	24.4	23.3	24.1	21.4	18.4	17.5	17.2	17.8	20.2	21.1	22.6	22.4
7:01- 8:00	25.2	23.7	24.6	21.7	18.4	17.5	17.0	17.9	20.6	21.5	23.4	23.2
8:01- 9:00	26.5	24.9	26.0	22.6	19.8	18.2	17.9	18.9	21.6	22.3	24.5	24.4
9:01-10:00	27.9	26.0	27.0	24.1	21.4	19.5	19.5	20.5	22.7	23.2	25.5	25.7
10:01-11:00	29.0	26.9	27.8	24.9	22.8	21.0	20.7	21.7	23.9	24.2	26.2	26.2
11:01-12:00	30.0	27.6	28.6	25.8	23.9	22.1	22.2	22.7	24.8	24.6	26.8	26.6
12:01-13:00	30.2	28.1	29.0	26.3	24.6	23.1	23.2	23.5	25.4	24.9	26.8	27.1
13:01-14:00	30.7	28.7	29.4	26.7	24.8	23.6	23.7	24.3	25.6	25.2	26.9	27.0
14:01-15:00	30.4	28.7	29.5	26.5	25.1	24.0	23.9	24.4	25.9	25.2	26.7	27.0
15:01-16:00	30.2	28.6	29.7	26.5	25.0	23.8	23.8	24.2	25.9	25.0	26.5	26.7
16:01-17:00	29.8	28.1	29.3	26.2	24.5	23.4	23.5	23.9	25.3	24.8	25.8	26.2
17:01-18:00	29.0	27.5	28.8	25.6	24.0	22.6	22.8	23.4	24.9	24.2	25.8	25.9
18:01-19:00	28.3	26.8	28.1	25.0	23.3	21.9	22.1	22.6	23.9	23.8	25.3	25.4
19:01-20:00	27.6	26.0	27.7	24.7	22.8	21.6	21.6	22.0	23.5	23.5	24.8	24.9
20:01-21:00	26.9	25.5	27.1	24.3	22.4	21.2	21.2	21.5	23.1	22.9	24.3	24.4
21:01-22:00	26.4	25.1	26.6	23.8	21.8	20.7	20.8	21.1	22.8	22.6	24.0	24.1
22:01-23:00	26.2	24.9	26.4	23.5	21.4	20.2	20.3	20.7	22.5	22.4	23.8	23.7
23:01-24:00	25.9	24.8	26.0	23.4	21.0	19.8	19.8	20.2	22.2	22.3	23.4	23.6
Max Hour	14	15	16	14	15	15	15	15	16	15	14	13
Min Hour	6	7	7	7	8	7	8	7	7	7	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	28.3	26.7	28.7	23.8	26.0	21.9	23.3	27.7	23.3	27.2	25.4	28.2
Day:Hour	1:13	2:17	7:21	10:21	15:17	8:15	21:15	12:15	25:18	27:15	29:12	30:11
Minimum	18.4	17.3	18.0	15.3	12.4	9.0	12.3	10.1	11.5	16.7	15.4	14.7
Day:Hour	10:12	9:18	26:16	18:13	5:11	22:10	5:11	6:18	21:16	20:01	16:06	23:16

Daily Avg	22.8	21.7	22.0	20.2	18.5	17.1	17.7	17.8	19.3	20.6	21.2	20.3

- Maximum Dew Point temperature of 28.7°C on Mar 7
- Minimum Dew Point temperature of 9.0°C on Jun 22

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	46	41	40	36	37	30	39	49	36	46	42	44
Day:Hour	9:13	19:14	28:17	12:14	13:15	9:14	22:13	12:15	6:14	27:15	26:18	30:11
Average HI	35	33	33	30	31	29	34	32	31	33	33	33
Avg Del HI	5	4	3	2	3	1	4	3	2	4	4	4
# Hours HI	342	206	338	73	44	14	13	29	73	55	144	163

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	14	5	7		1		2	1		3	5	5
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	1	3	0	0	0	0
CDD base 10C	534	442	524	422	367	316	326	342	388	404	437	453
CDD base 18C	286	218	276	182	119	77	78	97	148	156	197	205

CDH base 20C	5386	3890	5138	2934	1728	984	1062	1392	2171	2274	3320	3468
CDH base 23C	3160	1940	2915	1093	538	216	284	449	747	741	1512	1668
CDH base 27C	1079	453	743	63	54	10	38	59	123	113	314	428

- 4956 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2040 annual cooling degree-days (18°C baseline)
- 4 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	90	89	86	89	92	92	93	91	90	94	91	87
10am	77	79	77	81	83	84	86	83	82	86	80	76
3pm	68	68	66	71	71	69	77	74	72	83	76	70
10pm	83	83	78	83	85	84	86	84	83	91	86	81
Maximum	98	99	100	101	100	100	100	100	100	100	123	98
Day:Hour	17:21	7:01	29:24	12:02	12:08	1:23	3:07	15:06	1:08	1:21	30:04	6:21
Minimum	43	49	40	46	52	47	55	45	33	46	41	35
Day:Hour	10:12	19:16	27:16	16:14	5:15	22:14	11:16	28:16	21:16	28:11	26:18	5:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.8	2.6	2.6	2.4	2.2	2.0	2.2	2.2	2.3	2.6	2.6	2.4

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	5463	5706	3697	3764	2407	2948	1959	4306	2602	3680	3849	4750
Direct Max	9223	9723	5459	6270	3364	4658	2825	7530	3711	9563	8364	9525
Day	10	17	7	9	6	6	30	31	29	31	24	3
Diffuse Avg	2686	2528	2683	1956	1863	1330	1661	1557	2537	2493	2863	2631

- Maximum Direct Solar of 9723 Wh/m² on Feb 17

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
130	124	127	142	127	141	129	135	129	146	131	147

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	11.0	11.0	10.0	10.0	9.0	9.0	10.0	10.0	10.0	10.0	10.0	17.0
Day:Hour	11:17	24:16	4:16	2:17	22:18	21:16	26:17	27:18	13:18	17:20	3:14	11:20
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:01	1:01	1:06	1:01	1:01	1:21	1:06	1:01	1:02	1:02	1:02	1:02
Daily Avg	2.8	3.0	2.9	2.9	2.0	2.3	2.2	2.6	2.8	3.0	3.1	3.9

- Maximum Wind Speed of 17.0 m/s on Dec 11
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	16.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.4	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Aw" (Köppen classification)
- Tropical savanna (pronounced wet & dry seasons, lat. 15-20°)

- Typical/Extreme Period Determination
- No discernible dry period.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Nov 12:Nov 18, Average Temp= 23.58°C, Deviation=| 0.005|°C
- Extremes Selected from annual Min/Max
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Jan 8:Jan 14, Maximum Temp= 38.20°C, Deviation=| 9.242|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Jun 18:Jun 24, Minimum Temp= 13.00°C, Deviation=| 6.203|°C

SALVADOR

Statistics for salvadorCSV
Location -- Salvador -TRY
     {S 12° 53'} {W 38° 19'} {GMT -3.0 Hours}
Elevation --   13m above sea level
Standard Pressure at Elevation -- 101169Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	15.3	16.2

Design Stat	CDB .4%	CDB 1%	CDB 2%	CDP .4%	CDP 1%	CDP 2%
Units	{C}	{C}	{C}	{C}	{C}	{C}
COOLING	31.6	31.3	31.0	26.1	25.8	25.6

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	32.3	32.4	33.6	30.4	29.9	29.0	28.1	27.6	29.3	29.4	30.2	30.4
Day:Hour	19:13	25:15	3:13	5:14	20:14	2:11	6:14	22:14	28:14	26:15	9:13	16:15
Minimum	18.6	18.8	18.7	19.3	18.0	17.2	15.4	14.2	15.4	18.3	19.0	18.8
Day:Hour	30:07	2:06	13:06	30:06	13:07	15:07	22:05	22:06	12:07	25:06	22:06	27:06
Daily Avg	26.6	26.7	26.8	26.2	25.2	24.4	23.2	23.4	24.2	25.3	25.9	25.9

  - Maximum Dry Bulb temperature of 33.6°C on Mar 3
  - Minimum Dry Bulb temperature of 14.2°C on Aug 22

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.0	25.6	25.7	25.3	24.1	23.2	21.7	22.0	22.7	23.8	24.3	24.8
1:01- 2:00	24.8	25.3	25.4	24.7	23.7	23.0	21.2	21.7	22.5	23.7	23.9	24.6
2:01- 3:00	24.5	24.7	24.8	24.4	23.4	23.0	21.1	21.6	22.1	23.5	23.7	24.4
3:01- 4:00	23.9	23.9	24.4	24.2	23.0	22.7	21.1	21.3	21.3	23.1	23.1	24.0
4:01- 5:00	23.3	23.5	23.9	23.8	22.5	22.4	20.6	21.0	20.8	22.9	22.5	23.2
5:01- 6:00	22.8	22.7	23.4	23.4	22.2	22.2	20.4	20.7	20.3	22.8	21.9	22.6
6:01- 7:00	22.9	22.3	23.1	23.1	22.0	22.5	20.7	20.7	20.3	23.2	22.9	22.7
7:01- 8:00	25.2	24.3	24.8	24.7	23.6	23.7	21.7	21.7	22.7	25.3	25.9	25.4
8:01- 9:00	27.5	27.4	27.7	27.0	25.9	25.0	23.7	23.9	25.1	26.4	27.5	27.0
9:01-10:00	28.7	28.5	28.9	27.9	26.9	25.9	25.1	25.1	26.5	27.1	28.0	27.5
10:01-11:00	29.2	28.9	29.7	28.5	27.6	26.5	25.5	25.7	27.1	27.5	28.6	28.3
11:01-12:00	29.9	29.7	29.6	28.6	27.9	26.6	25.7	26.2	27.5	27.9	28.9	28.6
12:01-13:00	29.9	29.8	29.9	28.7	28.0	26.9	26.0	26.3	27.6	27.9	29.1	28.7
13:01-14:00	29.9	30.1	29.8	28.8	28.0	27.0	26.0	26.5	27.6	28.2	29.1	28.6
14:01-15:00	29.8	29.7	29.4	28.4	27.7	26.8	25.7	26.1	27.4	27.9	28.9	28.5
15:01-16:00	29.0	29.4	29.2	28.3	27.3	26.4	25.4	25.5	26.9	27.3	28.4	28.0
16:01-17:00	28.6	29.0	28.4	28.0	26.9	25.8	25.0	25.1	26.2	26.6	27.7	27.5
17:01-18:00	28.0	28.3	27.6	27.2	26.0	25.0	24.2	23.9	25.0	25.6	26.9	26.8
18:01-19:00	26.7	27.2	26.6	26.3	25.3	24.0	23.5	23.2	24.1	24.5	25.6	25.8
19:01-20:00	26.0	26.3	26.2	25.9	25.1	23.7	23.2	22.9	23.8	24.3	25.1	25.3
20:01-21:00	25.8	26.1	26.2	25.7	24.9	23.6	22.8	22.6	23.6	24.3	24.9	25.0
21:01-22:00	25.5	26.0	26.2	25.6	24.6	23.5	22.5	22.5	23.5	24.3	24.9	24.9
22:01-23:00	25.4	25.8	26.0	25.5	24.4	23.3	22.3	22.4	23.4	24.1	24.8	24.8
23:01-24:00	25.3	25.8	25.9	25.5	24.2	23.2	21.9	22.2	23.1	24.0	24.6	24.7
Max Hour	13	14	13	14	13	14	13	14	13	14	14	13
Min Hour	6	7	7	7	7	6	6	6	7	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	26.4	26.0	26.1	26.6	25.5	24.6	24.2	22.8	23.7	25.3	24.6	26.0
Day:Hour	27:12	5:12	9:10	21:13	5:12	3:13	5:11	29:13	27:13	13:14	15:13	1:12
Minimum	18.3	18.3	18.4	18.9	17.2	17.1	15.0	13.8	15.2	17.6	18.1	17.8
Day:Hour	30:07	2:06	13:06	26:07	13:07	15:06	22:04	22:06	11:07	25:06	12:06	27:05

Daily Avg	23.5	23.3	23.7	23.4	22.3	21.7	20.3	20.1	20.7	21.8	22.0	22.7

- Maximum Dew Point temperature of 26.6°C on Apr 21
- Minimum Dew Point temperature of 13.8°C on Aug 22

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	37	38	39	37	35	32	30	29	32	34	34	35
Day:Hour	27:12	13:12	3:13	21:13	5:12	4:14	6:14	30:14	28:14	13:14	15:15	1:12
Average HI	33	33	33	32	31	30	29	28	29	30	31	31
Avg Del HI	3	3	4	3	2	2	1	1	1	2	2	3
# Hours HI	308	280	291	255	196	106	33	32	154	205	279	259

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	1	2	1									
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	514	467	520	487	471	432	409	414	426	473	477	493
CDD base 18C	266	243	272	247	223	192	161	166	186	225	237	245

CDH base 20C	4891	4485	5051	4486	3889	3201	2543	2625	3154	3922	4241	4395
CDH base 23C	2729	2550	2877	2390	1871	1250	807	823	1269	1752	2198	2242
CDH base 27C	674	638	696	418	231	64	8	7	108	214	414	371

- 5584 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 2664 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	89	86	87	87	87	86	84	82	85	83	83	85
10am	68	69	70	74	73	74	71	70	66	68	65	70
3pm	65	65	68	72	70	71	69	66	63	66	62	66
10pm	83	80	81	82	81	85	80	79	77	78	76	82
Maximum	98	100	99	100	100	100	100	100	99	97	97	97
Day:Hour	23:06	6:06	9:05	1:01	3:06	14:07	9:02	27:04	12:04	23:06	21:05	9:10
Minimum	55	52	54	57	54	56	54	52	48	53	51	53
Day:Hour	3:14	25:13	3:13	30:13	11:12	24:14	14:12	10:15	20:11	25:12	18:07	24:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
3.1	3.0	3.1	3.0	2.9	2.8	2.6	2.5	2.6	2.8	2.8	2.9

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4629	4986	4299	3902	2443	2193	2921	3329	4782	5097	5651	4195
Direct Max	8669	7231	8975	7886	6154	5050	5760	6884	7566	9061	8791	9772
Day	2	16	7	5	11	14	31	31	29	25	15	21
Diffuse Avg	2825	2763	2699	2345	2379	1977	1946	2122	2237	2349	2411	2902

- Maximum Direct Solar of 9772 Wh/m² on Dec 21

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
94	120	124	125	129	138	133	139	126	140	120	116

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	11.0	9.0	11.0	8.0	9.0	10.0	10.0	10.0	11.0	13.0	12.0	11.0
Day:Hour	8:15	2:12	29:21	6:05	23:23	8:05	14:05	7:15	30:14	28:16	11:14	8:16
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	2:03	1:06	1:02	1:01	1:02	1:01	4:04	2:12	1:01	2:06	5:05	1:05
Daily Avg	4.1	3.3	3.6	2.7	2.8	3.4	3.2	3.5	3.8	4.6	4.5	3.9

- Maximum Wind Speed of 13.0 m/s on Oct 28
- Minimum Wind Speed of 0.0 m/s on Jan 2

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Oct 8:Oct 14, Average Temp= 25.30°C, Deviation=| 0.004|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Mar 19:Mar 25, Maximum Temp= 33.60°C, Deviation=| 6.348|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Jul 16:Jul 22, Minimum Temp= 14.20°C, Deviation=| 8.527|°C

SÃO LUÍS

Statistics for sao luisCSV
Location -- Sao Luis -TRY
     {S 2° 34'} {W 44° 13'} {GMT -3.0 Hours}
Elevation --   53m above sea level
Standard Pressure at Elevation -- 100690Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	21.3	21.8

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	33.6	33.2	33.1	25.9	25.5	25.2						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	33.3	33.9	33.1	33.0	33.7	33.0	32.6	33.0	33.5	33.7	34.2	35.0
Day:Hour	13:14	28:15	12:14	18:14	12:16	14:15	28:15	18:15	27:14	1:15	7:14	7:15
Minimum	23.5	22.3	20.3	22.0	22.7	21.0	21.0	22.0	22.2	22.4	21.7	22.4
Day:Hour	10:06	12:06	9:07	14:20	31:06	6:05	5:08	20:07	20:05	6:05	16:21	11:03
Daily Avg	27.5	26.6	26.2	26.3	26.4	26.5	26.5	26.7	26.9	27.2	27.2	27.0

  - Maximum Dry Bulb temperature of 35.0°C on Dec 7
  - Minimum Dry Bulb temperature of 20.3°C on Mar 9

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	25.3	24.9	24.4	24.6	24.5	24.3	24.4	24.4	24.3	24.7	25.0	25.0
1:01- 2:00	24.9	24.7	24.2	24.3	24.4	24.1	24.3	24.1	24.1	24.5	24.8	24.8
2:01- 3:00	24.5	24.4	24.0	24.1	24.2	23.9	24.0	23.9	24.0	24.2	24.7	24.6
3:01- 4:00	24.3	24.2	23.9	23.9	24.1	23.7	23.8	23.6	23.8	24.1	24.5	24.4
4:01- 5:00	24.2	24.0	23.7	23.7	23.9	23.5	23.7	23.4	23.7	23.9	24.4	24.3
5:01- 6:00	24.1	23.8	23.5	23.6	23.7	23.4	23.5	23.4	23.6	23.7	24.2	24.2
6:01- 7:00	24.5	24.2	23.7	23.9	23.8	23.5	23.8	23.5	24.0	23.8	24.2	24.4
7:01- 8:00	25.5	24.9	24.6	24.7	24.9	24.6	24.6	24.6	25.5	25.5	24.5	25.6
8:01- 9:00	27.2	26.3	26.3	26.4	26.6	26.5	26.7	27.0	27.4	27.8	25.8	27.4
9:01-10:00	28.5	27.4	27.6	27.6	28.1	27.9	28.0	28.1	28.6	29.1	27.8	28.6
10:01-11:00	29.6	28.2	28.8	29.0	29.0	29.0	28.9	29.2	29.7	30.0	28.8	29.5
11:01-12:00	30.4	29.3	29.5	29.7	29.8	29.8	29.8	30.1	30.5	30.8	30.1	30.3
12:01-13:00	31.3	30.0	30.0	29.9	30.1	30.6	30.4	30.8	31.3	31.4	30.8	30.6
13:01-14:00	31.8	30.3	30.1	30.1	30.2	30.7	30.3	31.3	31.6	31.7	31.4	30.8
14:01-15:00	31.8	29.8	29.8	29.4	29.6	30.5	30.6	31.4	31.7	31.8	31.6	30.7
15:01-16:00	31.5	29.2	29.0	28.3	29.0	29.8	29.6	30.7	31.2	31.2	31.5	30.3
16:01-17:00	30.8	29.1	28.1	27.8	28.1	29.0	29.3	29.8	30.2	30.1	30.9	29.5
17:01-18:00	29.5	28.3	26.9	27.2	27.1	27.6	28.2	28.3	28.8	28.8	29.8	28.4
18:01-19:00	28.0	27.1	26.0	26.4	26.3	26.5	26.6	26.9	27.0	27.1	28.5	27.1
19:01-20:00	27.1	26.4	25.6	26.0	25.8	25.8	25.8	26.2	26.1	26.2	26.9	26.4
20:01-21:00	26.5	26.0	25.2	25.6	25.4	25.4	25.4	25.4	25.4	25.7	26.1	26.0
21:01-22:00	26.1	25.7	24.9	25.3	25.0	25.1	25.1	25.1	25.1	25.3	25.7	25.7
22:01-23:00	25.8	25.5	24.7	25.0	24.8	24.9	24.8	24.9	24.7	25.1	25.4	25.5
23:01-24:00	25.5	25.2	24.5	24.8	24.6	24.7	24.6	24.6	24.5	24.9	25.2	25.2
Max Hour	15	14	14	14	14	14	15	15	15	15	15	14
Min Hour	6	6	6	6	6	6	6	6	6	6	7	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	25.8	26.3	26.8	26.5	25.9	26.0	25.0	24.7	24.2	24.2	24.0	24.7
Day:Hour	10:09	4:14	12:15	2:15	6:18	17:15	3:19	2:15	28:08	22:13	29:21	10:12
Minimum	20.7	19.5	19.4	20.7	21.0	20.7	19.9	20.4	19.3	19.9	20.1	20.0
Day:Hour	13:12	25:20	9:07	15:10	6:05	6:05	26:16	10:16	29:11	17:12	21:13	7:18

Daily Avg	22.6	22.8	23.0	23.4	23.5	23.1	23.0	22.8	22.3	22.1	22.3	22.8

- Maximum Dew Point temperature of 26.8°C on Mar 12
- Minimum Dew Point temperature of 19.3°C on Sep 29

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	40	40	41	40	41	38	37	39	38	38	38	39
Day:Hour	17:15	28:15	12:15	21:15	12:16	4:16	1:15	1:16	14:15	8:15	6:15	5:13
Average HI	34	34	34	34	34	34	34	34	34	34	34	34
Avg Del HI	4	4	5	5	5	4	4	4	4	4	4	4
# Hours HI	366	252	258	244	273	276	293	312	315	329	315	318

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	23	12	13	6	6	10	11	19	18	23	23	14
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	0	0	0	0	0	0
CDD base 10C	541	465	503	489	507	494	511	517	508	532	516	528
CDD base 18C	293	241	255	249	259	254	263	269	268	284	276	280

CDH base 20C	5545	4452	4623	4539	4733	4645	4832	4980	5002	5320	5180	5241
CDH base 23C	3313	2440	2441	2388	2503	2497	2607	2759	2846	3090	3035	3012
CDH base 27C	1053	641	643	569	625	727	727	848	938	1030	976	854

- 6112 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 3192 annual cooling degree-days (18°C baseline)
- 0 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	92	91	94	95	96	96	95	95	94	90	90	92
10am	73	79	80	80	80	79	77	75	70	66	74	74
3pm	60	71	72	74	74	67	64	61	57	58	58	65
10pm	83	85	91	91	93	93	92	90	88	85	84	86
Maximum	97	99	99	100	100	100	100	99	97	97	99	98
Day:Hour	3:07	13:08	4:22	14:18	4:08	6:05	5:08	6:05	1:07	1:02	17:03	9:05
Minimum	52	52	54	55	56	53	48	49	49	48	46	45
Day:Hour	2:15	3:14	19:14	17:15	12:15	14:15	29:16	10:16	29:12	3:15	7:14	7:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.8	2.9	2.9	3.0	3.0	2.8	2.7	2.7	2.6	2.6	2.6	2.8

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	3148	3871	3117	3164	3327	3647	3884	4661	4484	4669	4311	3785
Direct Max	6491	7964	6108	6262	6069	5946	7692	6479	7422	7438	8006	7836
Day	1	28	31	17	8	13	30	18	30	28	6	8
Diffuse Avg	2927	2961	3136	2977	2641	2294	2234	2368	2623	2641	2677	2746

- Maximum Direct Solar of 8006 Wh/m² on Nov 6

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
52	57	54	57	66	51	74	65	68	59	55	55

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	10.0	15.0	11.0	9.0	9.0	9.0	10.0	10.0	13.0	13.0	10.0	13.0
Day:Hour	1:10	22:24	25:15	19:10	9:23	25:10	11:11	10:11	29:12	1:10	1:11	10:24
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:02	1:01	1:04	1:01	1:01	1:01	1:01	1:01	1:01	2:21	1:20	1:01
Daily Avg	3.5	2.6	2.8	2.2	2.4	1.9	3.1	3.6	4.8	4.4	3.7	3.3

- Maximum Wind Speed of 15.0 m/s on Feb 22
- Minimum Wind Speed of   0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Af" (Köppen classification)
- Tropical wet (no dry season, rainforest, hot all year, lat. < 10°)
- Heating may not be required

- Typical/Extreme Period Determination
- No dry season.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Jul 30:Aug 5, Average Temp= 26.75°C, Deviation=| 0.008|°C
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Nov 5:Nov 11, Maximum Temp= 35.00°C, Deviation=| 7.200|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Mar 5:Mar 11, Minimum Temp= 20.30°C, Deviation=| 4.483|°C

SÃO PAULO

Statistics for sao pauloCSV
Location -- Sao Paulo -TRY
     {S 23° 37'} {W 46° 39'} {GMT -3.0 Hours}
Elevation --   802m above sea level
Standard Pressure at Elevation -- 92054Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	9.0	9.6

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	32.1	31.4	30.7	23.1	22.3	21.7						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	32.5	32.8	31.0	28.8	27.0	25.0	27.1	27.9	32.0	31.0	32.6	31.4
Day:Hour	26:15	25:15	3:16	11:16	5:16	12:17	15:16	4:14	18:16	9:16	9:15	26:15
Minimum	15.5	16.5	15.0	11.5	9.2	8.7	9.1	7.5	9.4	10.0	12.5	12.4
Day:Hour	4:07	12:07	22:08	18:07	24:08	21:06	8:08	30:08	1:08	24:06	21:07	30:06
Daily Avg	22.5	22.1	21.2	18.5	16.7	16.8	16.0	17.2	18.1	17.9	18.9	20.0

  - Maximum Dry Bulb temperature of 32.8°C on Feb 25
  - Minimum Dry Bulb temperature of   7.5°C on Aug 30

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	20.3	20.4	19.4	16.8	15.4	15.0	14.2	15.2	16.1	16.1	16.6	18.0
1:01- 2:00	20.0	20.2	19.2	16.6	15.2	14.8	13.8	14.8	15.9	15.8	16.4	17.8
2:01- 3:00	19.6	20.0	18.9	16.3	15.1	14.6	13.5	14.2	15.7	15.6	16.1	17.5
3:01- 4:00	19.3	19.8	18.7	16.1	14.8	14.4	13.3	13.7	15.6	15.5	15.9	17.3
4:01- 5:00	19.2	19.6	18.5	15.9	14.7	14.2	13.1	13.4	15.5	15.4	15.7	17.1
5:01- 6:00	19.1	19.4	18.4	15.8	14.7	14.0	12.8	13.1	15.2	15.2	15.5	16.7
6:01- 7:00	19.0	19.1	18.3	15.7	14.6	13.9	12.8	12.8	15.0	15.3	15.5	16.7
7:01- 8:00	19.6	19.4	18.4	16.0	14.7	13.7	12.7	12.9	15.1	15.9	16.7	17.6
8:01- 9:00	21.0	20.5	19.3	16.7	15.1	14.0	13.2	13.8	16.0	16.8	17.9	19.1
9:01-10:00	22.6	22.2	20.7	18.0	16.2	15.3	14.4	15.6	17.5	18.1	19.6	20.6
10:01-11:00	24.7	23.9	22.5	19.5	17.3	16.9	16.0	18.1	19.3	19.6	21.2	22.1
11:01-12:00	26.0	25.0	24.0	20.7	18.5	18.6	17.6	20.0	20.9	20.9	22.9	23.1
12:01-13:00	26.9	25.8	25.3	21.7	19.7	19.9	19.1	21.4	22.5	21.7	24.1	23.6
13:01-14:00	27.8	26.2	26.2	22.5	20.4	20.8	20.4	22.7	23.6	22.2	24.5	24.2
14:01-15:00	27.6	25.9	25.9	22.9	20.6	21.2	21.5	23.0	23.7	22.1	23.9	24.0
15:01-16:00	26.8	25.8	25.6	22.9	20.3	21.5	21.5	23.0	22.8	21.3	22.5	23.5
16:01-17:00	25.5	25.0	24.3	22.2	19.4	21.0	21.0	22.5	21.1	20.5	21.2	23.0
17:01-18:00	24.3	24.1	22.8	20.5	18.3	19.7	19.9	21.1	20.0	19.4	20.4	22.0
18:01-19:00	23.1	22.9	21.4	19.2	17.2	18.1	18.0	19.2	18.8	18.3	19.1	21.1
19:01-20:00	22.3	22.0	20.7	18.4	16.6	16.9	16.5	17.9	17.8	17.5	18.2	19.9
20:01-21:00	21.6	21.5	20.3	17.9	16.1	16.5	15.8	17.0	17.2	17.1	17.8	19.3
21:01-22:00	21.3	21.1	20.1	17.6	15.9	16.1	15.2	16.4	16.9	16.7	17.4	18.9
22:01-23:00	21.0	20.9	19.8	17.3	15.6	15.7	14.7	15.9	16.6	16.5	17.1	18.6
23:01-24:00	20.7	20.7	19.6	17.1	15.4	15.3	14.3	15.6	16.3	16.4	16.8	18.3
Max Hour	14	14	14	16	15	16	15	15	15	14	14	14
Min Hour	7	7	7	7	7	8	8	7	7	6	6	7

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	23.4	23.9	23.0	20.0	19.4	18.3	16.0	17.0	17.7	19.8	19.0	22.8
Day:Hour	29:18	21:16	14:17	10:20	13:14	2:14	8:12	23:17	21:20	9:18	15:15	12:19
Minimum	11.2	14.1	13.9	10.4	9.0	3.9	7.4	2.0	6.7	7.5	5.6	6.1
Day:Hour	16:16	2:13	15:16	17:09	23:12	20:18	10:10	17:15	10:13	22:13	3:15	5:15

Daily Avg	18.1	18.8	18.2	15.3	14.3	13.6	11.8	10.9	13.7	14.7	15.0	15.6

- Maximum Dew Point temperature of 23.9°C on Feb 21
- Minimum Dew Point temperature of 2.0°C on Aug 17

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC						7	4	1	9			
Day:Hour						28:08	5:10	29:08	1:08			
Average WC						7	8	4	9			
Avg Del WC						3	2	5	0			
# Hours WC						1	6	10	1			
Maximum HI	34	39	33	28	27			27	30	32	30	33
Day:Hour	29:16	21:16	5:13	25:16	5:16			9:16	25:14	9:16	23:14	27:17
Average HI	30	31	30	28	27			27	28	29	28	29
Avg Del HI	1	2	1	0	0			0	0	0	0	1
# Hours HI	104	68	69	13	1			2	13	27	13	46

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	2	2							1		2	
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	1	0	1	23	51	42	64	43	29	36	7	8
CDD base 10C	387	340	346	255	209	203	188	224	244	245	266	310
CDD base 18C	140	116	99	38	12	4	4	19	33	33	33	70

CDH base 20C	2136	1619	1401	615	305	318	379	781	867	741	772	1202
CDH base 23C	1033	670	602	214	66	39	75	288	415	336	301	482
CDH base 27C	267	164	110	7	0	0	0	3	108	61	74	82

- 3217 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 601 annual cooling degree-days (18°C baseline)
- 304 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	94	94	96	95	97	96	93	88	91	95	94	90
10am	78	82	85	85	89	89	84	77	78	82	75	74
3pm	58	70	66	64	71	65	55	46	59	69	62	62
10pm	86	90	92	91	94	89	86	75	88	90	90	86
Maximum	100	100	100	100	100	100	100	100	100	100	100	100
Day:Hour	8:03	4:17	3:07	4:07	5:22	4:05	1:24	1:01	2:23	1:01	9:01	3:24
Minimum	32	37	37	39	47	35	32	21	25	31	22	30
Day:Hour	16:16	25:15	15:16	11:16	5:16	29:16	15:16	17:15	4:16	26:15	3:15	5:15

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.1	2.2	2.1	1.7	1.7	1.6	1.3	1.2	1.6	1.7	1.8	1.8

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4109	3642	3553	3663	2201	2742	2883	4220	3807	3912	4564	4853
Direct Max	8654	8938	7480	8077	5021	5094	5488	6620	7726	9441	8724	11033
Day	29	25	15	9	24	20	21	19	8	17	20	6
Diffuse Avg	3089	3133	2668	2091	1963	1456	1383	1533	2038	2710	2758	3074

- Maximum Direct Solar of 11033 Wh/m² on Dec 6

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
171	144	148	148	152	158	156	127	149	161	133	172

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	15.0	18.0	10.0	11.0	12.0	12.0	14.0	14.0	12.0	17.0	11.0	14.0
Day:Hour	6:14	7:15	2:17	2:18	10:15	19:15	15:16	29:12	11:17	28:01	23:22	29:15
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:04	4:11	1:01	2:07	4:15	1:24	1:21	1:02	1:04	4:20	2:10	4:04
Daily Avg	3.7	3.8	3.6	3.9	4.1	3.2	3.8	3.9	4.3	4.6	4.5	4.5

  - Maximum Wind Speed of 18.0 m/s on Feb 7
  - Minimum Wind Speed of   0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Cfa" (Köppen classification)
- Humid subtropical (mild with no dry season, hot summer, lat. 20-35°S)
- Unbearably humid periods in summer, but passive cooling is possible

- Typical/Extreme Period Determination

- Summer is Jan:Feb
    Extreme Summer Week (nearest maximum temperature for summer)
    Extreme Hot Week Period selected: Feb 19:Feb 25, Maximum Temp= 32.80°C, Deviation=| 8.538|°C
    Typical Summer Week (nearest average temperature for summer)
    Typical Week Period selected: Jan 8:Jan 14, Average Temp= 22.31°C, Deviation=| 0.325|°C

- Winter is Jun:Aug
    Extreme Winter Week (nearest minimum temperature for winter)
    Extreme Cold Week Period selected: Aug 24:Aug 30, Minimum Temp=   7.50°C, Deviation=| 6.996|°C
    Typical Winter Week (nearest average temperature for winter)
    Typical Week Period selected: Jul 6:Jul 12, Average Temp= 16.68°C, Deviation=| 0.330|°C

- Autumn is Mar:May
    Typical Autumn Week (nearest average temperature for autumn)
    Typical Week Period selected: May 3:May 9, Average Temp= 18.81°C, Deviation=| 0.081|°C

- Spring is Sep:Nov
    Typical Spring Week (nearest average temperature for spring)
    Typical Week Period selected: Nov 10:Nov 16, Average Temp= 18.30°C, Deviation=| 0.041|°C

LabEEE

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Universidade Federal de Santa Catarina
Dep. de Engenharia Civil

VITÓRIA

Statistics for vitoriaCSV
Location -- Vitoria -TRY
     {S 20° 16'} {W 40° 16'} {GMT -3.0 Hours}
Elevation --   5m above sea level
Standard Pressure at Elevation -- 101265Pa

WMO Station *unknown*

- Using Design Conditions calculated from this weather file.

- The following design temperature statistics are calculated based on THIS weather file ONLY
- and may not be representative of a long-term period of record normally used for
- design temperatures. Also, note that dew point temperatures are listed where
- wet-bulb temperatures are normally presented.

Design Stat	HDB 99.6%	HDB 99%
Units	{C}	{C}
HEATING	12.4	14.3

Design Stat	CDB .4%		CDB 1%		CDB 2%		CDP .4%		CDP 1%		CDP 2%	
Units	{C}		{C}		{C}		{C}		{C}		{C}	
COOLING	33.1	32.6	32.3	26.6	26.0	25.4						

- Monthly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	35.6	33.7	33.4	33.9	32.4	28.8	29.0	33.0	32.3	32.2	32.8	33.8
Day:Hour	3:16	23:14	4:13	2:14	3:17	22:14	6:14	30:15	28:13	3:15	3:14	3:14
Minimum	19.9	20.9	19.4	17.1	16.4	14.5	11.2	14.3	15.6	15.6	17.4	18.8
Day:Hour	2:05	28:24	2:07	22:07	10:07	16:04	30:05	8:06	18:04	8:06	15:06	8:05
Daily Avg	25.7	26.0	25.5	24.3	22.5	20.0	20.1	21.4	22.0	22.6	24.1	24.6

  - Maximum Dry Bulb temperature of 35.6°C on Jan 3
  - Minimum Dry Bulb temperature of 11.2°C on Jul 30

- Average Hourly Statistics for Dry Bulb temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0:01- 1:00	23.8	24.2	23.5	22.3	20.5	18.1	18.2	19.1	20.2	21.1	22.2	23.0
1:01- 2:00	23.5	24.1	23.2	22.0	20.3	17.9	18.0	18.8	20.0	20.6	22.0	22.8
2:01- 3:00	23.4	23.9	23.0	21.7	20.0	17.6	17.7	18.7	19.8	20.3	21.8	22.5
3:01- 4:00	23.2	23.7	22.7	21.3	19.7	17.4	17.4	18.3	19.6	20.1	21.7	22.4
4:01- 5:00	23.0	23.6	22.4	21.0	19.5	17.2	17.2	17.9	19.5	19.9	21.4	22.1
5:01- 6:00	22.8	23.3	22.1	20.7	19.2	17.0	16.9	17.6	19.4	19.7	21.3	22.1
6:01- 7:00	23.1	23.4	21.8	20.5	19.1	16.9	16.8	17.3	19.3	20.1	21.8	22.5
7:01- 8:00	24.5	24.5	23.2	21.7	19.6	17.4	17.4	18.2	20.6	21.6	23.6	23.9
8:01- 9:00	26.0	25.9	25.5	23.9	21.7	19.1	19.0	20.5	22.2	23.2	25.0	25.0
9:01-10:00	27.2	27.1	27.4	26.2	23.9	20.7	20.9	22.5	23.4	24.3	26.1	25.9
10:01-11:00	28.1	28.2	28.5	27.7	25.1	22.1	22.8	24.6	24.4	25.0	27.0	26.5
11:01-12:00	28.3	29.2	29.4	28.3	25.8	23.2	23.6	25.7	25.3	25.6	27.5	27.3
12:01-13:00	28.9	29.8	29.7	28.7	26.3	23.5	24.2	26.1	25.5	25.6	27.9	27.5
13:01-14:00	29.2	30.0	29.8	28.9	26.7	23.8	24.1	26.2	25.5	25.7	27.8	28.0
14:01-15:00	29.0	29.3	29.4	28.3	26.6	23.9	24.0	26.1	25.0	25.4	27.4	27.5
15:01-16:00	28.5	28.9	28.8	27.6	26.1	23.4	23.5	25.4	24.6	25.0	26.5	27.2
16:01-17:00	27.6	28.1	27.8	26.8	25.4	22.7	22.8	24.2	23.9	24.4	25.5	26.4
17:01-18:00	26.8	27.2	26.8	25.9	24.2	21.9	21.9	23.2	22.9	23.5	24.7	25.6
18:01-19:00	25.9	26.1	25.8	24.8	22.9	20.7	20.8	21.8	21.9	22.8	24.0	24.8
19:01-20:00	25.2	25.1	25.0	24.0	22.1	19.9	19.9	20.8	21.2	22.1	23.3	24.2
20:01-21:00	24.8	24.6	24.5	23.6	21.5	19.5	19.5	20.4	21.0	21.7	23.0	23.8
21:01-22:00	24.6	24.5	24.2	23.2	21.2	19.0	19.1	20.0	20.8	21.4	22.8	23.5
22:01-23:00	24.3	24.3	23.9	22.7	20.9	18.8	18.8	19.8	20.6	21.3	22.6	23.4
23:01-24:00	24.0	24.2	23.7	22.6	20.7	18.5	18.5	19.5	20.4	21.0	22.5	23.2
Max Hour	14	14	14	14	14	15	13	14	14	14	13	14
Min Hour	6	6	7	7	7	7	7	7	7	6	6	6

- Monthly Statistics for Dew Point temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	27.6	26.7	27.3	27.2	25.0	22.0	23.1	24.2	25.4	24.2	26.5	25.3
Day:Hour	15:16	18:14	4:14	30:14	3:12	7:14	18:18	30:13	28:13	5:10	16:11	3:14
Minimum	17.2	19.5	18.5	15.5	11.9	12.1	9.3	12.2	12.1	7.6	13.4	17.4
Day:Hour	9:08	19:07	2:07	4:24	31:14	1:08	31:08	25:18	15:17	22:01	13:05	7:04

Daily Avg	22.5	22.2	22.3	20.7	19.1	17.2	17.3	17.9	18.8	19.3	20.1	21.5

- Maximum Dew Point temperature of 27.6°C on Jan 15
- Minimum Dew Point temperature of 7.6°C on Oct 22

- Monthly Statistics for Wind Chill/Heat Index temperatures °C **

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum WC												
Day:Hour												
Average WC												
Avg Del WC												
# Hours WC												
Maximum HI	44	44	45	44	39	32	32	40	41	38	41	43
Day:Hour	15:15	18:14	4:13	30:14	3:13	22:14	19:13	30:15	28:13	4:11	16:11	3:14
Average HI	33	33	33	32	32	30	30	31	32	32	32	33
Avg Del HI	4	4	4	3	3	2	2	2	3	3	3	4
# Hours HI	230	211	234	154	84	5	21	57	60	81	150	146

- **WindChill/HeatIndex Temps -- statistics...only those different from Air Temps

- Monthly Statistics for Extreme temperatures °C

#Days	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max >= 32	5	9	7	6	2			1	1	2	5	3
Max <= 0												
Min <= 0												
Min <=-18												

- Monthly Heating/Cooling Degree Days/Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HDD base 10C	0	0	0	0	0	0	0	0	0	0	0	0
HDD base 18C	0	0	0	0	0	0	3	0	0	0	0	0
CDD base 10C	485	447	480	430	386	300	314	352	359	389	424	454
CDD base 18C	237	223	233	190	138	60	69	104	119	141	184	206

CDH base 20C	4204	4007	4093	3159	2137	836	999	1591	1758	2157	3031	3460
CDH base 23C	2076	2043	2019	1448	843	165	291	624	619	814	1348	1544
CDH base 27C	466	530	513	308	158	5	15	97	91	149	311	318

- 4821 annual cooling degree-days (10°C baseline)
- 0 annual heating degree-days (10°C baseline)

- 1904 annual cooling degree-days (18°C baseline)
- 3 annual heating degree-days (18°C baseline)

- Monthly Average Daily Relative Humidity %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4am	94	92	94	93	92	92	92	92	93	93	90	92
10am	78	77	77	73	78	83	81	78	79	80	73	80
3pm	73	70	71	70	70	74	77	70	73	74	70	76
10pm	90	89	90	88	89	91	90	88	90	88	87	89
Maximum	100	100	100	100	100	100	100	100	99	100	100	100
Day:Hour	6:05	1:20	1:01	18:07	2:01	7:06	2:03	6:02	1:05	13:09	10:21	25:04
Minimum	49	50	49	42	50	51	57	42	48	32	43	54
Day:Hour	3:16	13:13	30:14	26:15	6:16	3:15	6:14	27:14	17:15	22:01	14:12	18:13

- Monthly Indicators for Precipitation/Moisture (kPa)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.9	2.8	2.9	2.6	2.4	2.2	2.2	2.3	2.3	2.3	2.5	2.7

- Monthly Statistics for Solar Wh/m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Direct Avg	4974	4539	4639	3609	2271	2621	2628	3987	2754	3024	3955	3919
Direct Max	10369	10036	7624	6087	4598	5293	6112	7215	7324	9193	7994	10574
Day	15	3	15	16	2	22	26	30	28	8	14	31
Diffuse Avg	2967	2936	2417	2096	1995	1640	1657	1772	2347	2936	2792	3262

- Maximum Direct Solar of 10574 Wh/m² on Dec 31

- Monthly Average Daily Wind Direction ° {N=0 or 360,E=90,S=180,W=270}

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
111	90	104	142	162	161	155	129	115	115	119	103

- Monthly Statistics for Wind Speed m/s

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum	15.0	14.0	14.0	14.0	12.0	11.0	11.0	12.0	14.0	15.0	15.0	12.0
Day:Hour	24:17	17:16	11:16	10:14	27:11	14:14	11:11	16:17	8:17	6:12	19:17	31:17
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Day:Hour	1:23	1:01	1:02	1:06	1:01	1:20	1:02	1:08	1:21	1:04	7:06	1:09
Daily Avg	4.4	5.3	3.3	3.8	3.9	3.2	3.7	4.3	4.5	4.6	5.8	5.0

- Maximum Wind Speed of 15.0 m/s on Jan 24
- Minimum Wind Speed of 0.0 m/s on Jan 1

- Monthly Calculated "undisturbed" Ground Temperatures °C

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5 m	22.8	23.9	24.2	23.9	22.2	20.4	18.7	17.5	17.2	17.8	19.2	21.0
2.0 m	21.7	22.8	23.3	23.3	22.4	21.1	19.8	18.6	18.1	18.2	19.0	20.3
4.0 m	20.9	21.8	22.3	22.5	22.1	21.4	20.5	19.6	19.0	18.9	19.3	20.0

- Climate type "Am" (Köppen classification)
- Tropical monsoonal or tradewind-coastal (short dry season, lat. 5-25°)

- Typical/Extreme Period Determination
- No discernible dry period.....
  Week closest to average annual temperature selected for Typical Period
  Typical Week Period selected: Sep 3:Sep 9, Average Temp= 23.21°C, Deviation=| 0.244|°C
- Extremes Selected from annual Min/Max
  Week closest to maximum annual temperature selected for Typical Period
  Extreme Hot Week Period selected: Feb 12:Feb 18, Maximum Temp= 35.60°C, Deviation=| 8.547|°C
  Week closest to minimum annual temperature selected for Typical Period
  Extreme Cold Week Period selected: Jun 11:Jun 17, Minimum Temp= 11.20°C, Deviation=| 8.217|°C

ANEXO 3

Planilhas Resumo

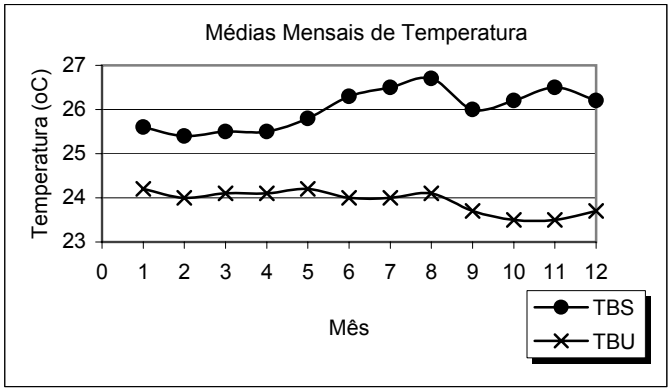
Resumo do Arquivo Climático
Cidade: Belem
Ano: 1964

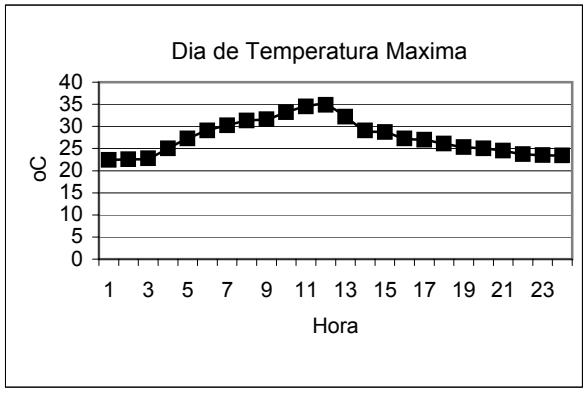
Média dos dados horários							
	tbs	**tbu**	**pressão**	**neb**	**rad global**	**rad direta**	**veloc.do ar**
	(oC)	**(oC)**	**(kPa)**		**(Wh/m²)**	**(Wh/m²)**	**(m/s)**
Máxima	34.9	28.6	101.5	10	1020	989	10
Média	26.0	23.9	101.0	6.3	223.7	146.4	1.6
Mínima	20	19.5	100.2	0	0	0	0

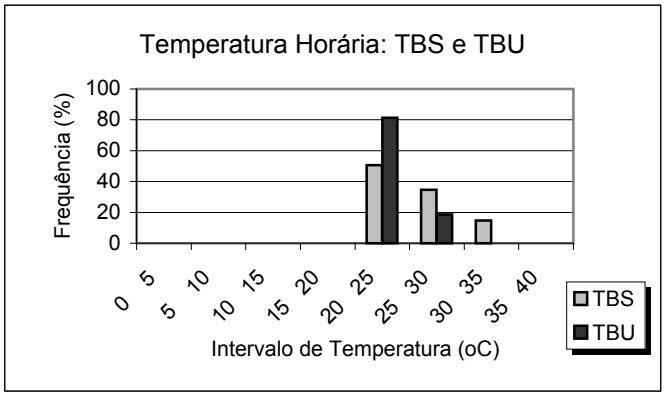
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

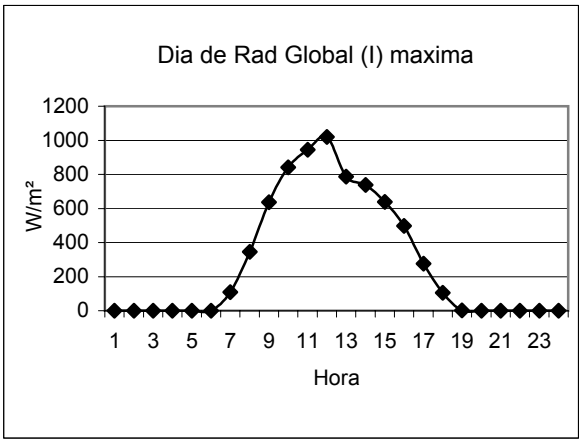
*Das 21 h às 4 h
**Das 8 h às 17 h

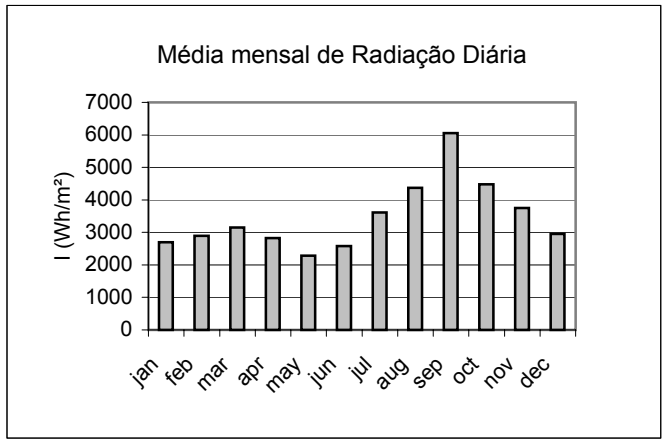
Tmax	
Mês	Dia
1	6
Imax	
Mês	Dia
9	22











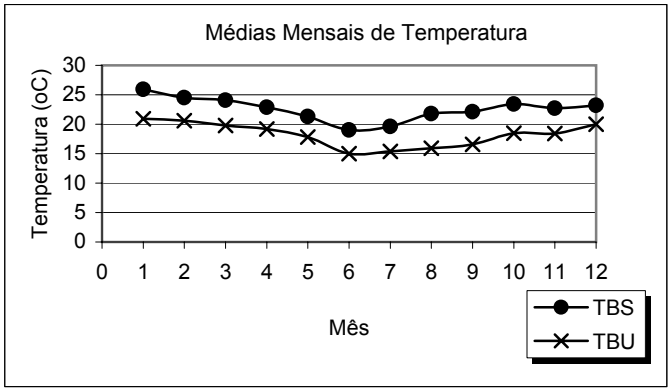
Resumo do Arquivo Climático
Cidade: Belo Horizonte
Ano: 1995

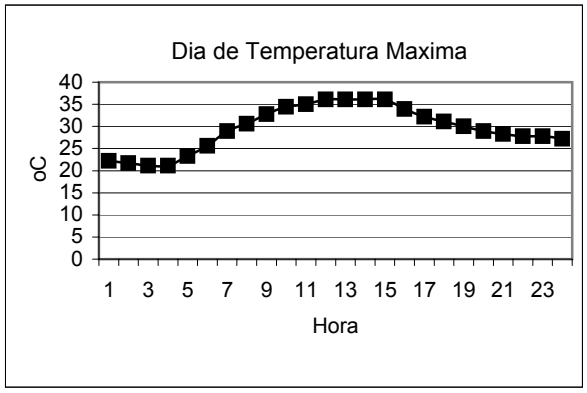
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	36.1	25.6	101.1				2.1
Média	22.6	18.2	101.1				2.1
Mínima	9.4	8.9	101.1				2.1

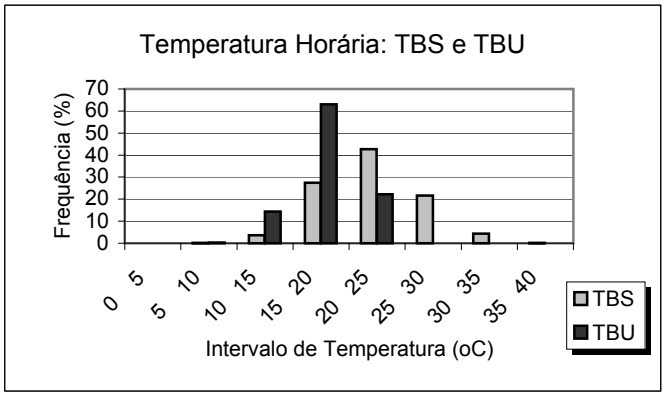
TBS>TBU	OK
I noturna*=0	OK

*Das 21 h às 4 h

Tmax	
Mês	Dia
1	17
Imax	
Mês	Dia
9	22







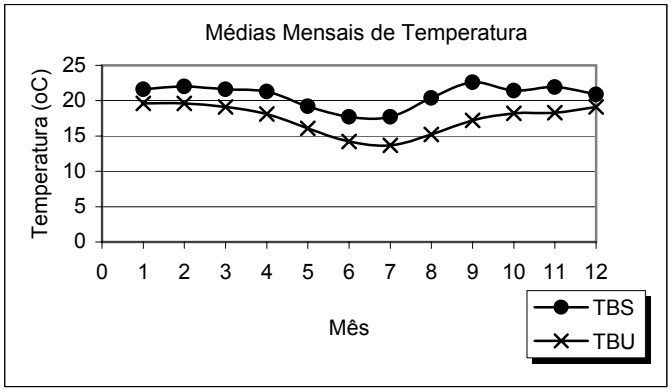
Resumo do Arquivo Climático
Cidade: Brasília
Ano: 1962

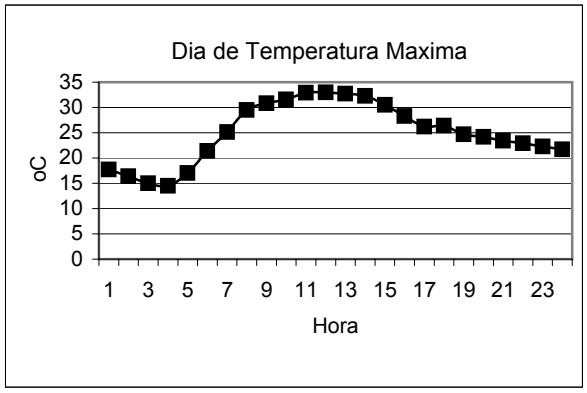
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	33	24.5	90.5	10	1286	1135	15
Média	20.7	17.3	89.8	6.1	238.8	167.7	1.7
Mínima	6.1	5.1	89	0	0	0	0

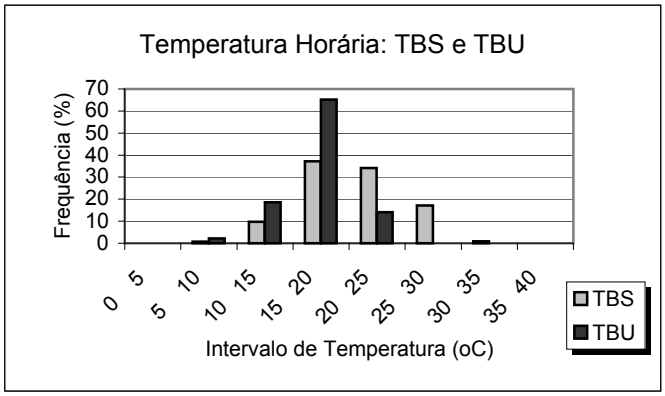
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

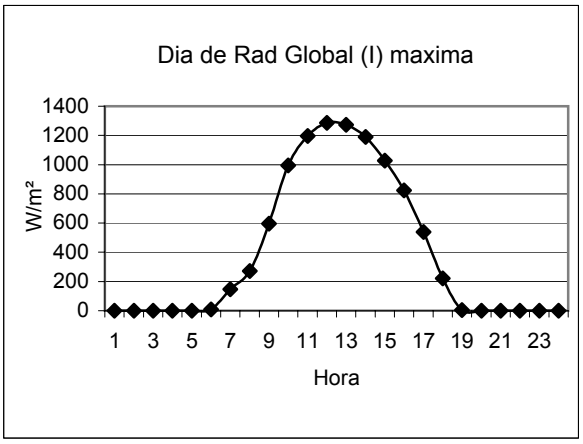
*Das 21 h às 4 h
**Das 8 h às 17 h

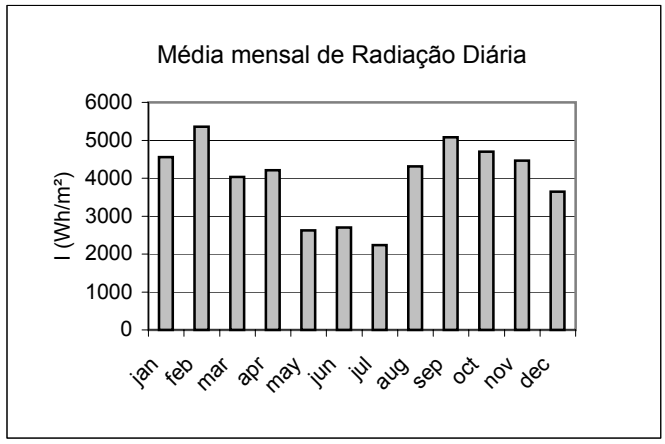
Tmax	
Mês	Dia
9	22
Imax	
Mês	Dia
10	18











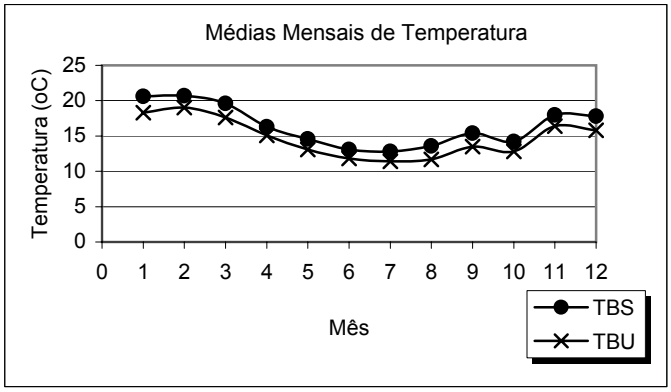
Resumo do Arquivo Climático
Cidade: Curitiba
Ano: 1969

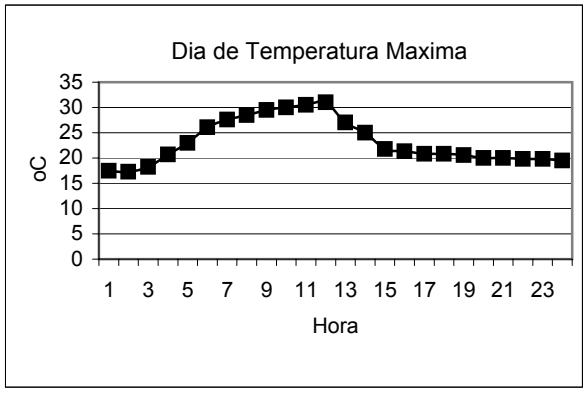
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	31	24.2	92.4	10	1237	1053	13
Média	16.3	14.6	91.2	6.9	194.7	128.6	3.4
Mínima	-2.1	-2.2	90	0	0	0	0

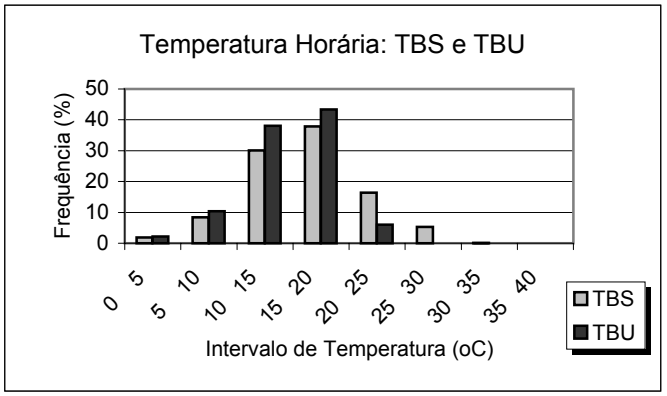
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

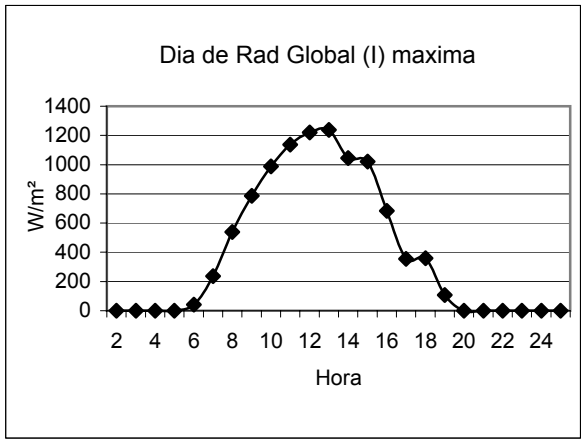
*Das 21 h às 4 h
**Das 8 h às 17 h

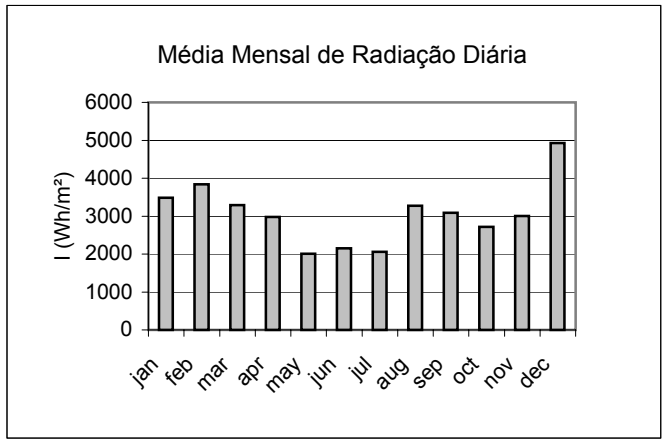
Tmax	
Mês	Dia
1	30
Imax	
Mês	Dia
12	27











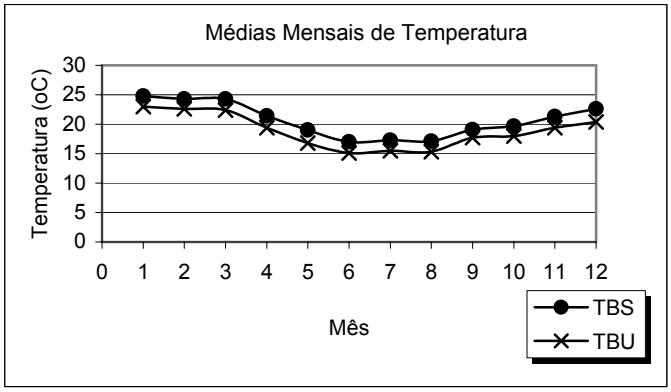
Resumo do Arquivo Climático
Cidade: Florianópolis
Ano: 1963

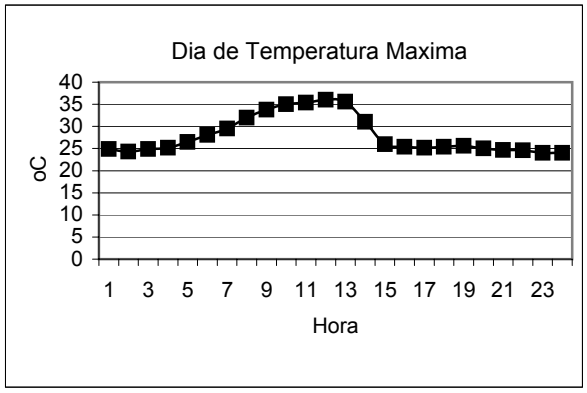
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	36	31.7	102.9	10	1062	980	13
Média	20.7	18.8	101.5	6.4	173.2	102.7	2.9
Mínima	2	1.6	99.8	0	0	0	0

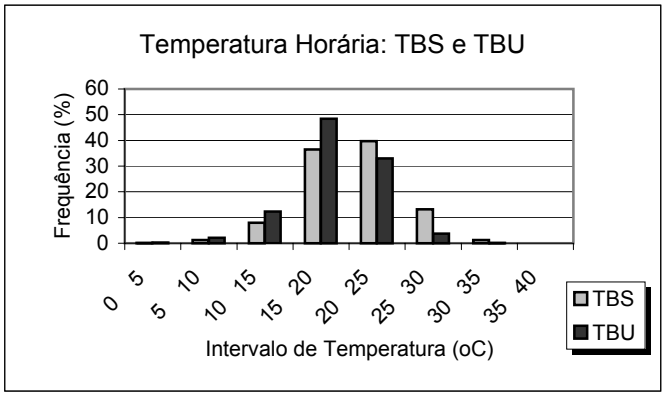
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

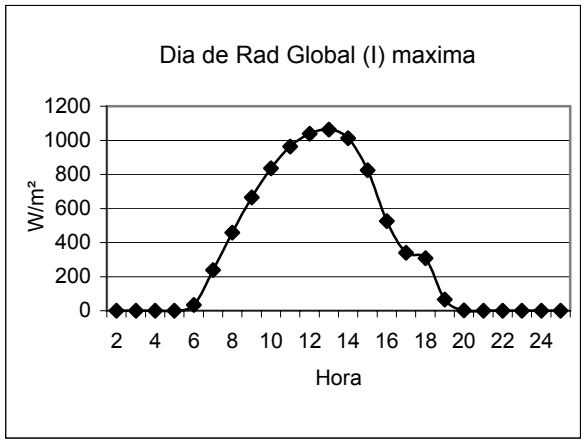
*Das 21 h às 4 h
**Das 8 h às 17 h

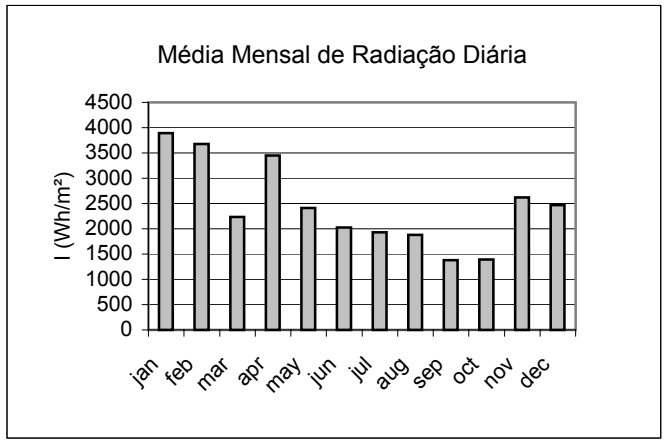
Tmax	
Mês	Dia
1	8
Imax	
Mês	Dia
1	3











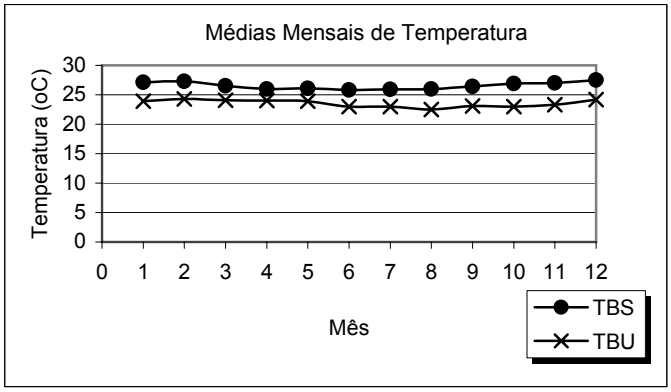
Resumo do Arquivo Climático
Cidade: Fortaleza
Ano: 1962

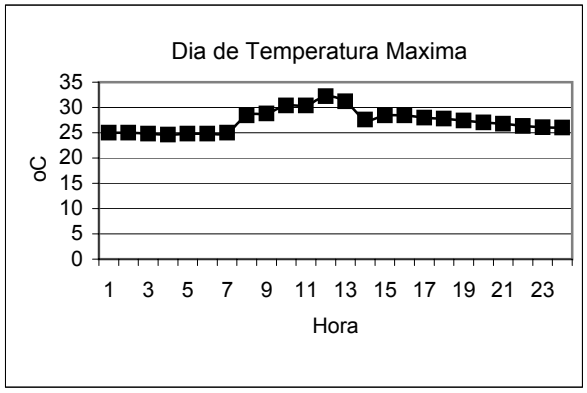
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	32.2	28.5	101.6	10	1114	1023	10
Média	26.5	23.5	101.0	4.8	238.1	180.5	2.9
Mínima	19.7	17.4	100.4	0	0	0	0

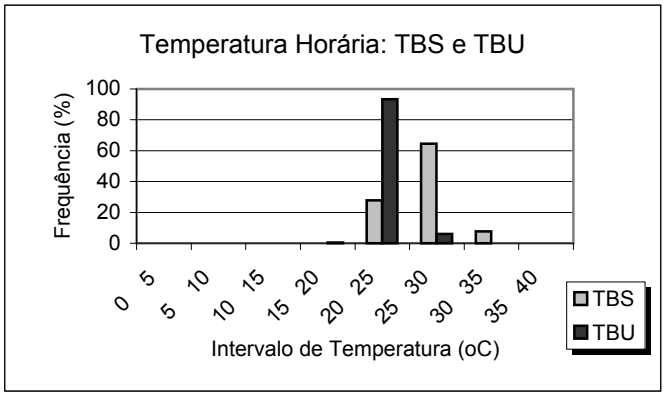
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

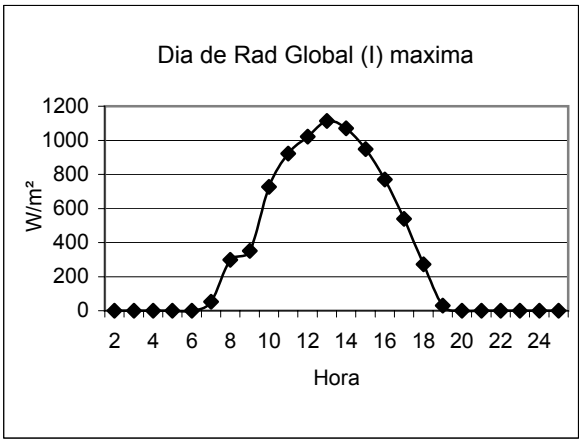
*Das 21 h às 4 h
**Das 8 h às 17 h

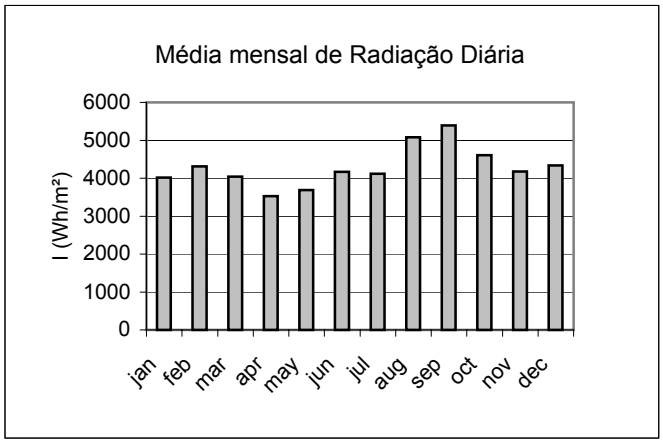
Tmax	
Mês	Dia
3	9
Imax	
Mês	Dia
3	5











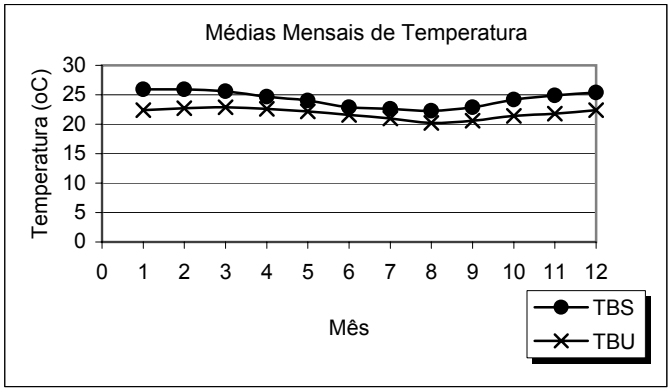
Resumo do Arquivo Climático
Cidade: Maceió
Ano: 1962

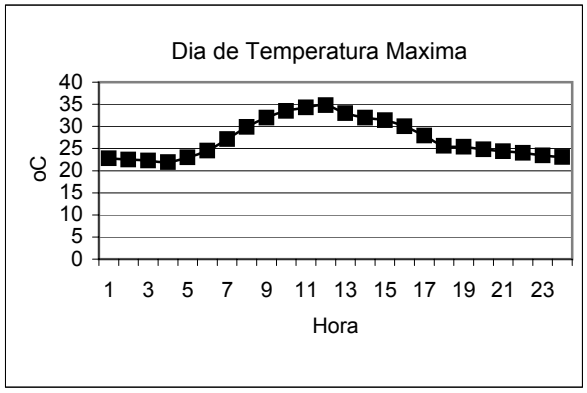
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	34.8	26.2	100.8	10	1152	1016	9
Média	24.2	21.8	100.0	5.0	238.6	183.8	2.0
Mínima	15.8	15	99.2	0	0	0	0

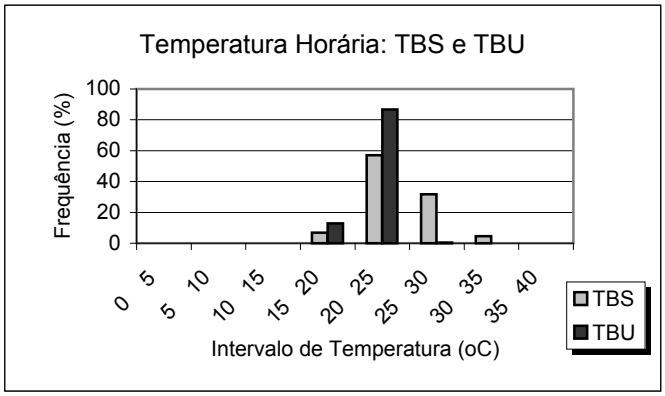
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

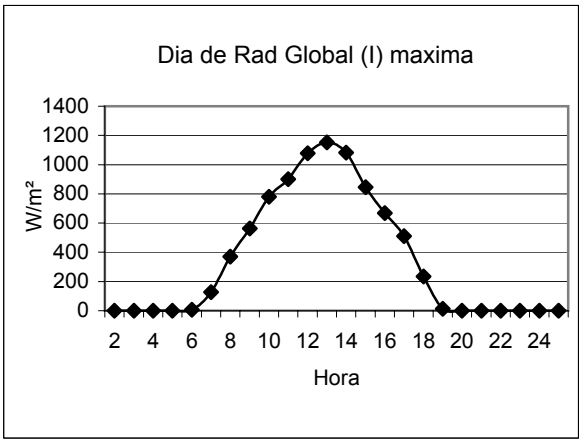
*Das 21 h às 4 h
**Das 8 h às 17 h

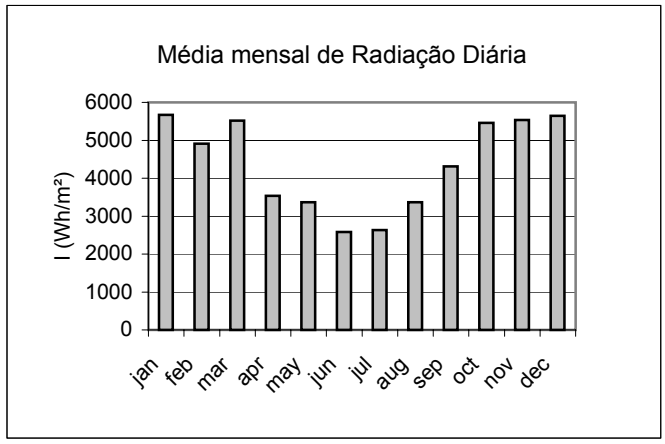
Tmax	
Mês	Dia
1	13
Imax	
Mês	Dia
12	2











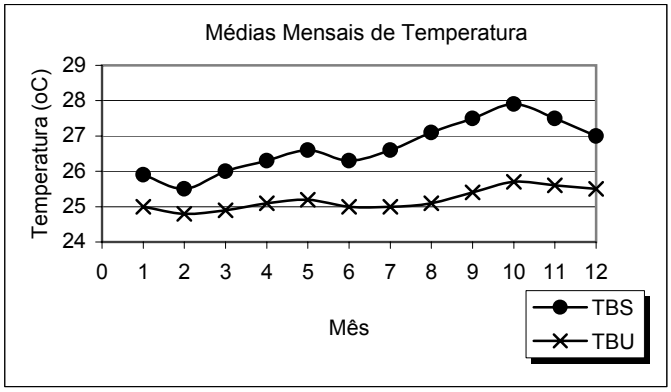
Resumo do Arquivo Climático
Cidade: Manaus
Ano: 1994

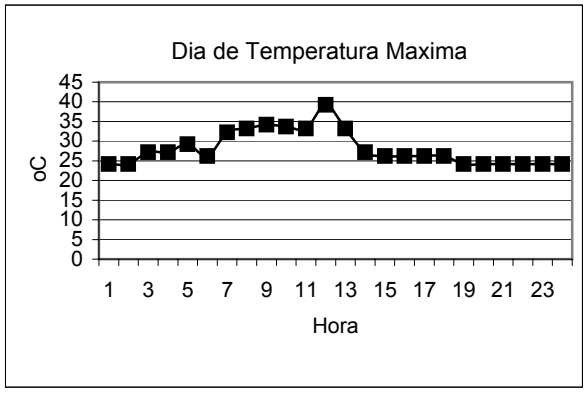
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	39.2	30.6	101.1				2.1
Média	26.7	25.2	101.1				2.1
Mínima	21.2	21.2	101.1				2.1

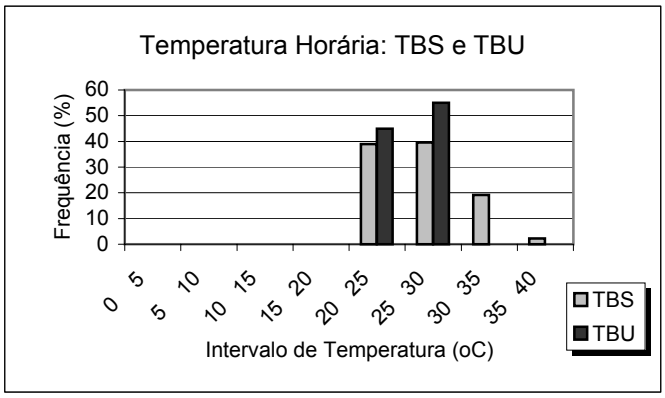
TBS>TBU	OK
I noturna*=0	OK

*Das 21 h às 4 h

Tmax	
Mês	Dia
6	24







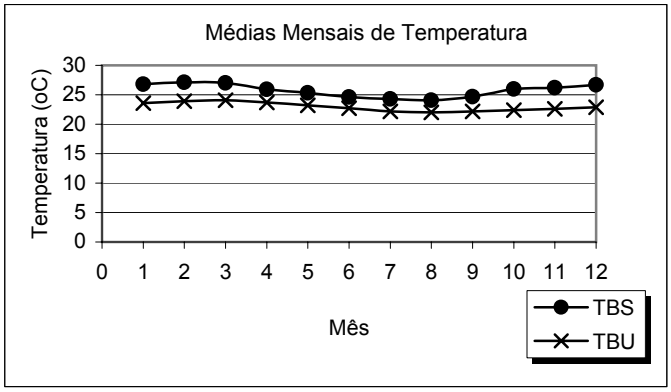
Resumo do Arquivo Climático
Cidade: Natal
Ano: 1954

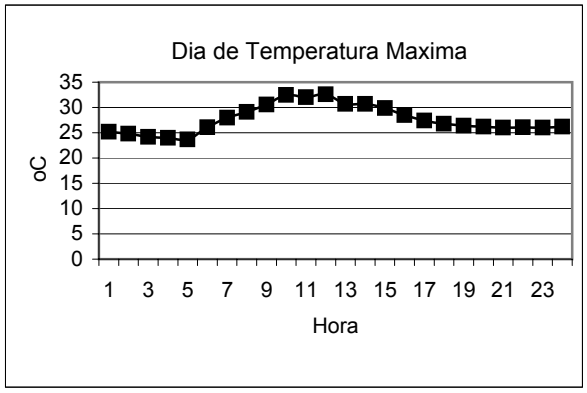
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	32.6	26.5	101.4	10	1143	1016	10
Média	25.7	22.9	100.7	6.2	229.4	162.1	3.7
Mínima	18.7	17.9	100.1	0	0	0	0

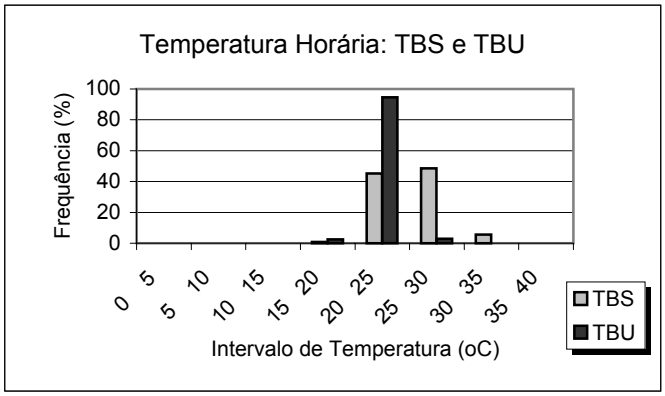
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

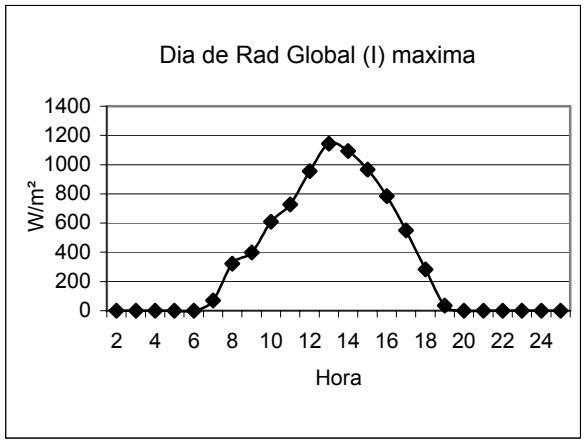
*Das 21 h às 4 h
**Das 8 h às 17 h

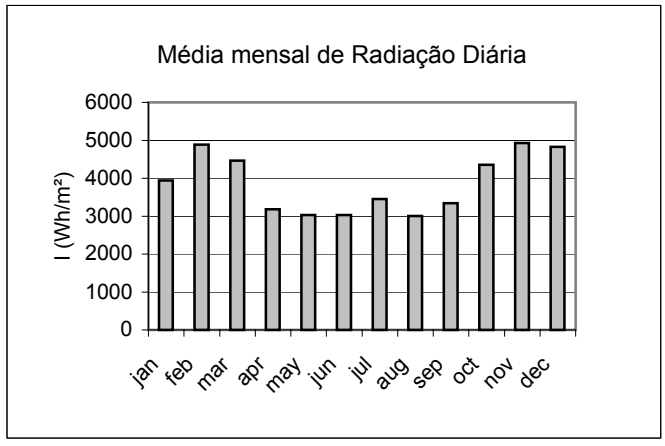
Tmax	
Mês	Dia
3	27
Imax	
Mês	Dia
1	10











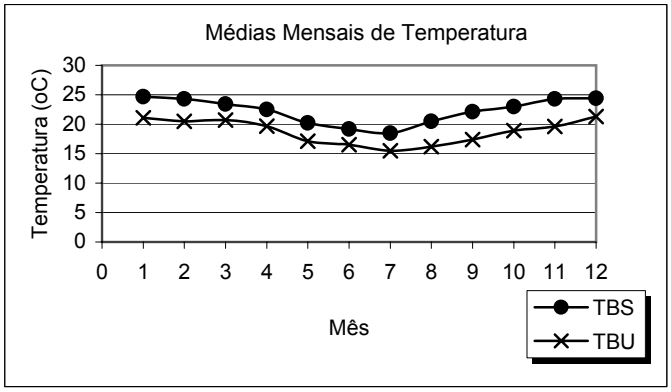
Resumo do Arquivo Climático
Cidade: Maringá
Ano: 1991

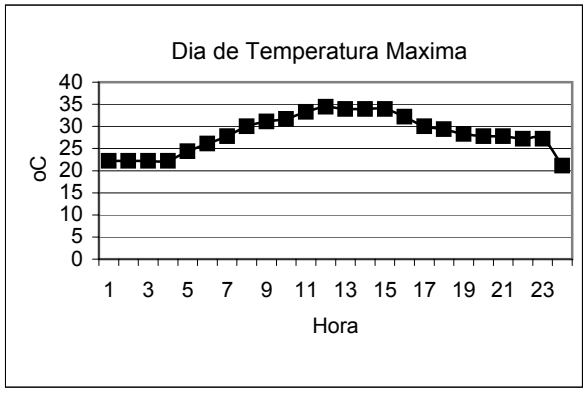
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	34.4	27.2	101.1				2.1
Média	22.2	18.6	101.1				2.1
Mínima	2.8	1.7	101.1				2.1

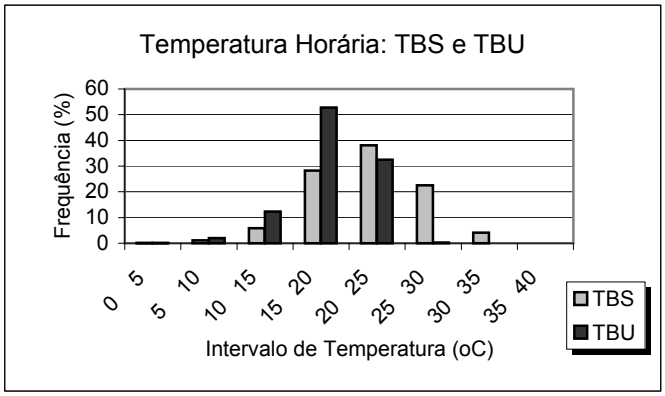
TBS>TBU	OK
I noturna*=0	OK

*Das 21 h às 4 h

Tmax	
Mês	Dia
1	21







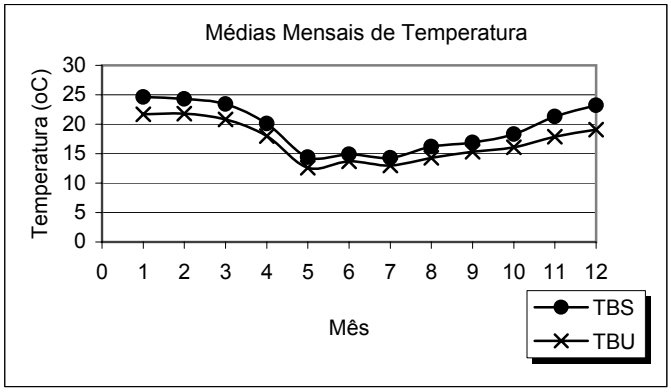
Resumo do Arquivo Climático
Cidade: Porto Alegre
Ano: 1954

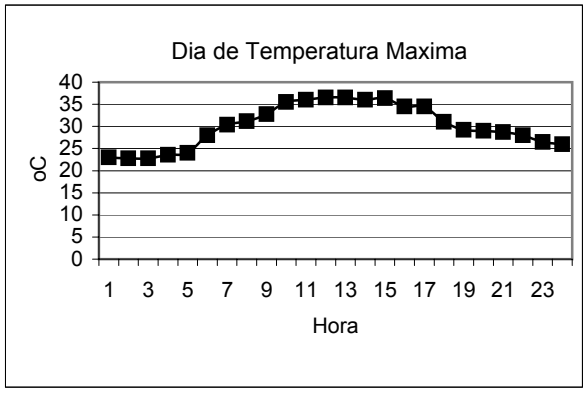
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	36.5	27.5	103.2	10	1106	1011	13
Média	19.2	16.9	101.3	5.1	197.9	147.2	3.0
Mínima	1.3	1.3	99.5	0	0	0	0

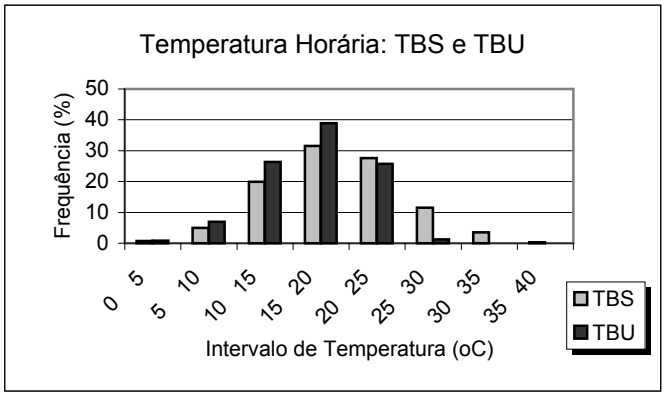
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

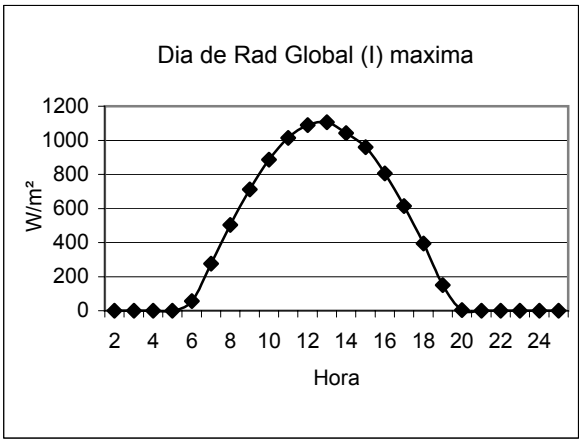
*Das 21 h às 4 h
**Das 8 h às 17 h

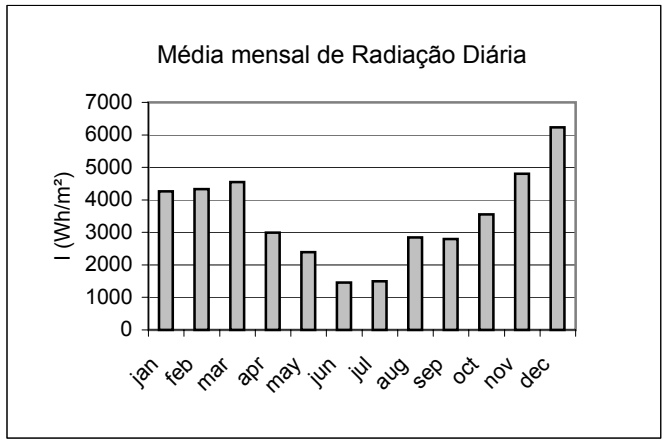
Tmax	
Mês	Dia
1	24
Imax	
Mês	Dia
12	30











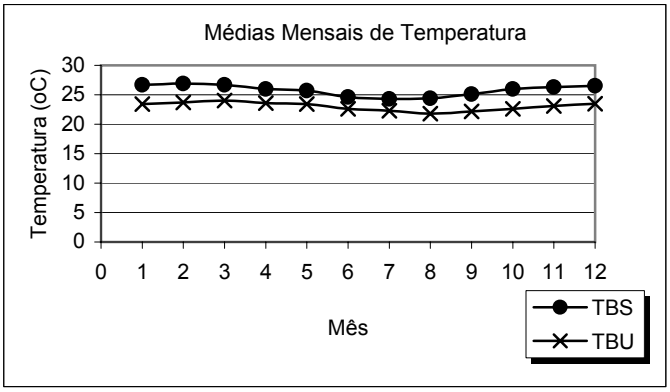
Resumo do Arquivo Climático
Cidade: Recife
Ano: 1962

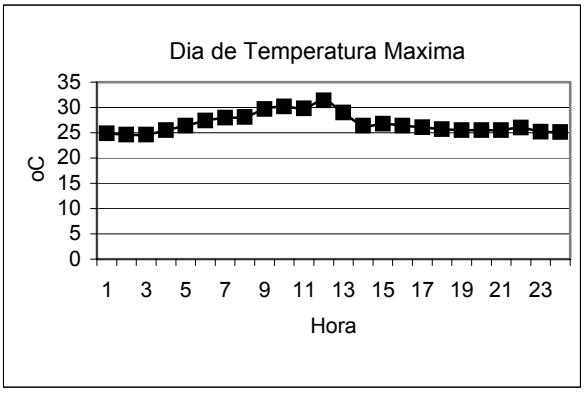
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	31.4	26.6	102	10	1105	1002	13
Média	25.7	23.0	101.2	5.8	227.0	165.6	4.0
Mínima	19.6	18.4	100.5	0	0	0	0

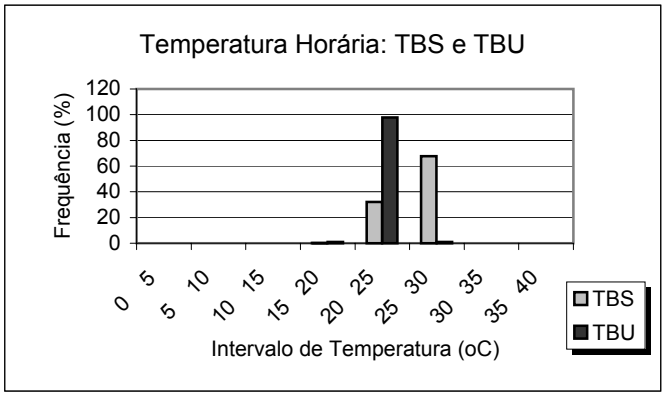
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

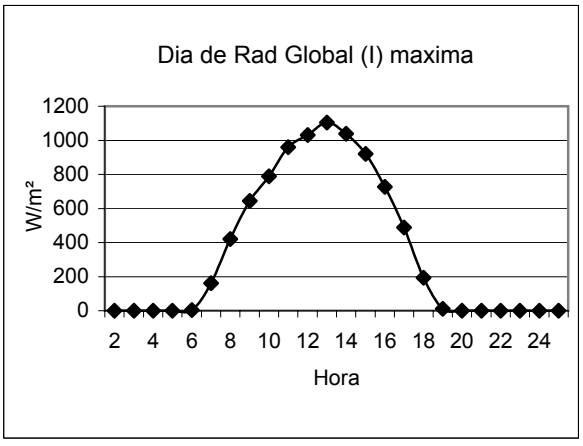
*Das 21 h às 4 h
**Das 8 h às 17 h

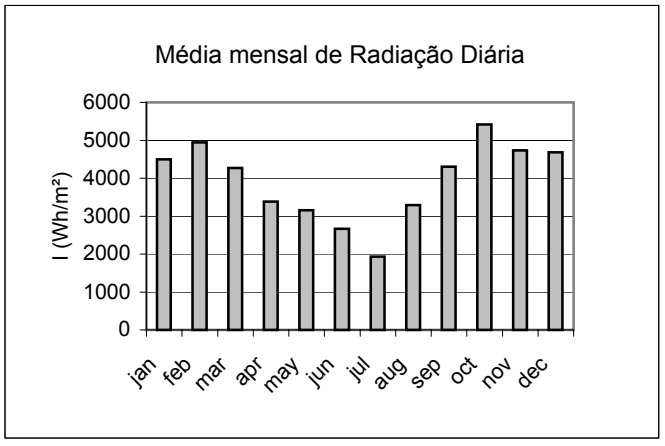
Tmax	
Mês	Dia
11	16
Imax	
Mês	Dia
12	4











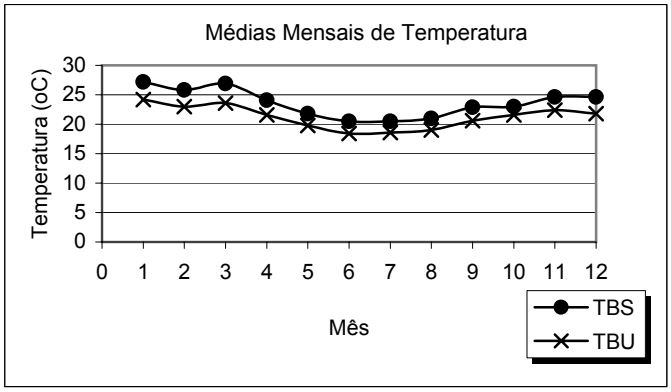
Resumo do Arquivo Climático
Cidade: Rio de Janeiro
Ano: 1963

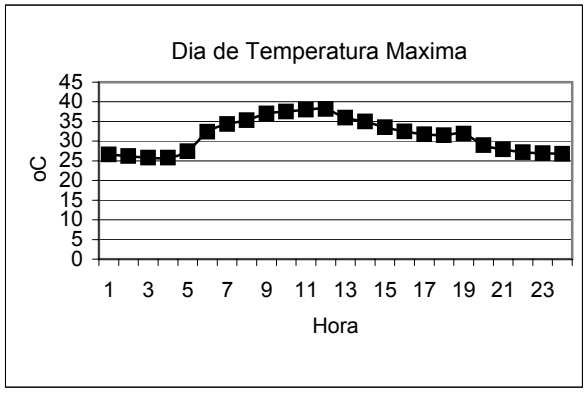
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	38.2	29.6	102.8	10	1088	992	17
Média	23.6	21.2	101.5	4.5	209.7	156.3	2.8
Mínima	13	12.3	100	0	0	0	0

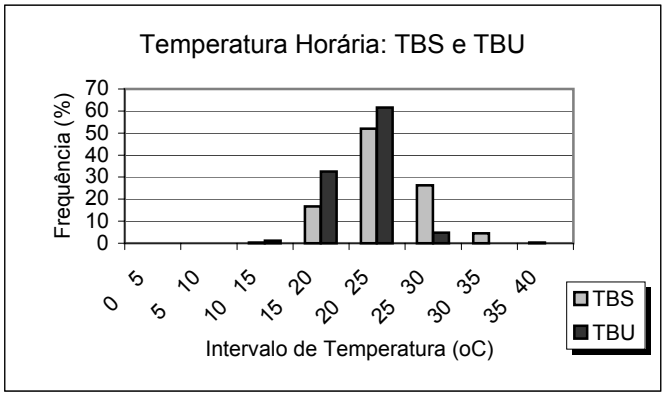
TBS>TBU	Há erro
I noturna*=0	OK
I diurna**>0	OK

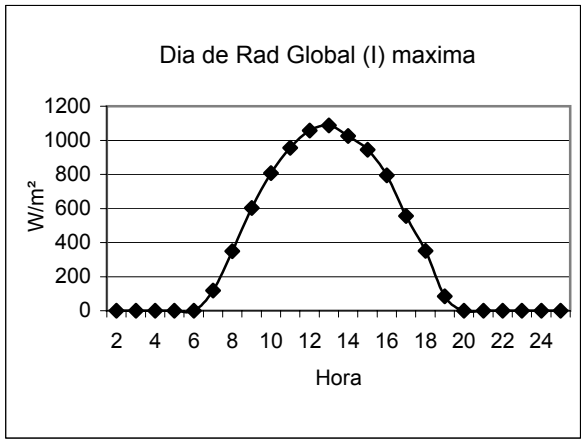
*Das 21 h às 4 h
**Das 8 h às 17 h

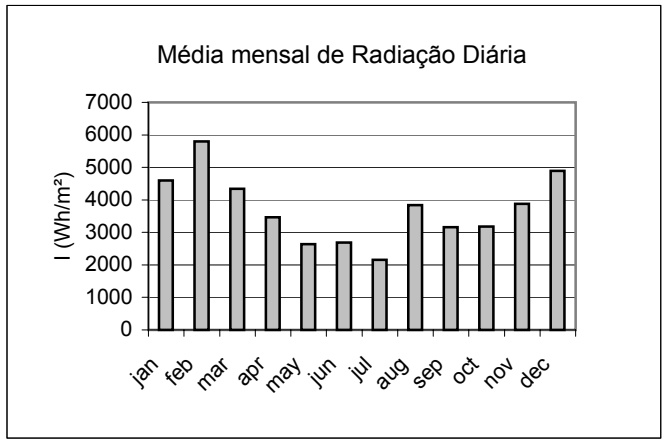
Tmax	
Mês	Dia
12	5
Imax	
Mês	Dia
2	11











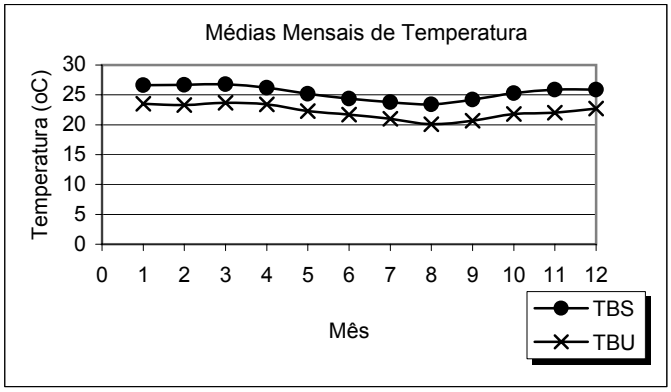
Resumo do Arquivo Climático
Cidade: Salvador
Ano: 1961

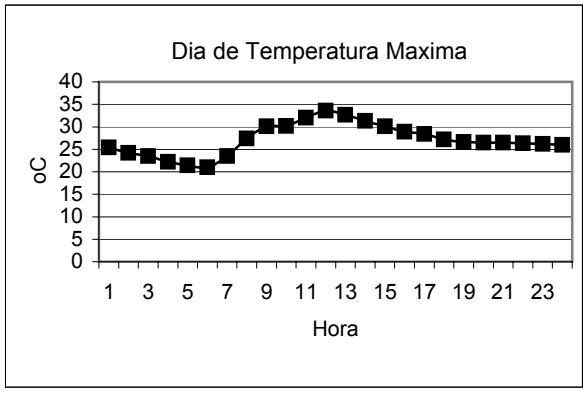
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	33.6	26.6	102.2	10	1198	1045	13
Média	25.3	22.1	101.4	5.5	227.0	167.8	3.6
Mínima	14.2	13.8	100.8	0	0	0	0

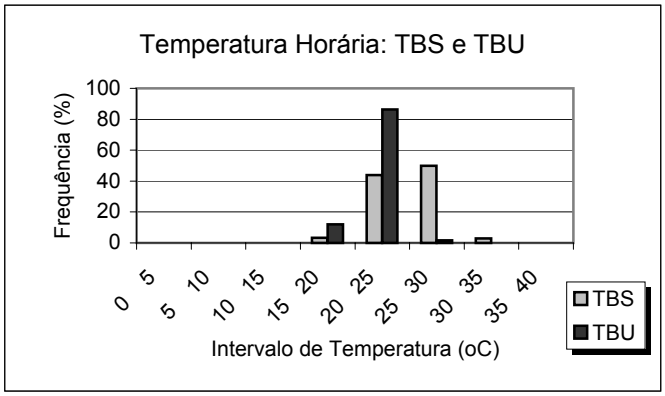
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

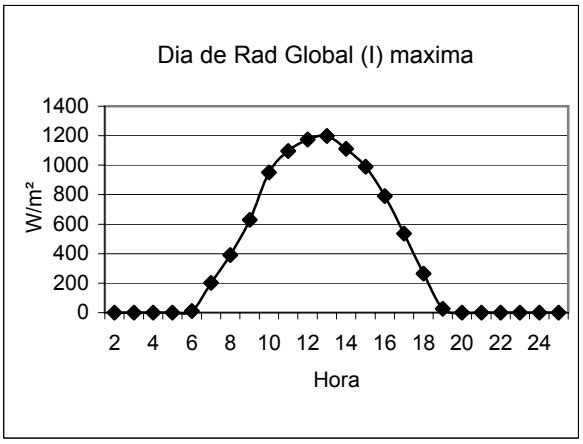
*Das 21 h às 4 h
**Das 8 h às 17 h

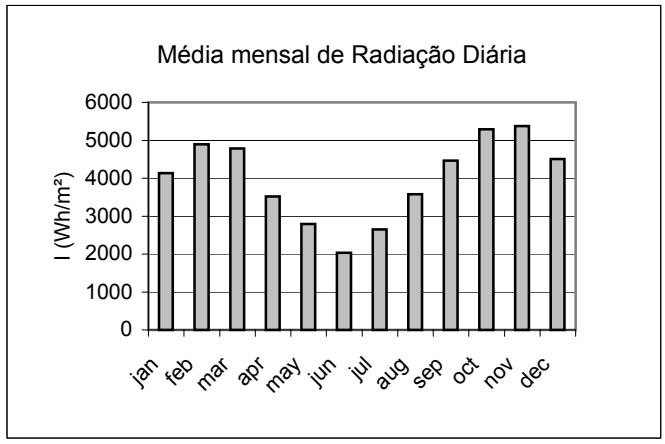
Tmax	
Mês	Dia
3	3
Imax	
Mês	Dia
12	5











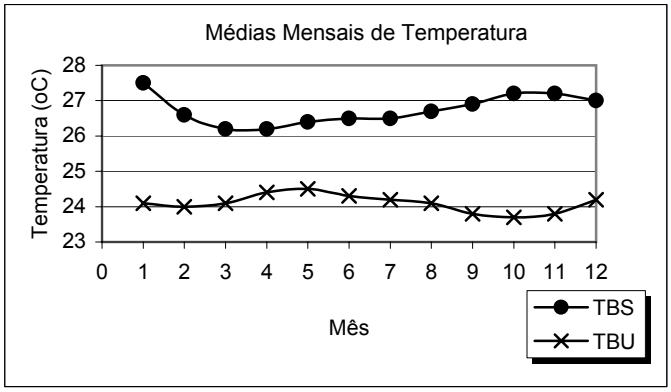
Resumo do Arquivo Climático
Cidade: São Luís
Ano: 1966

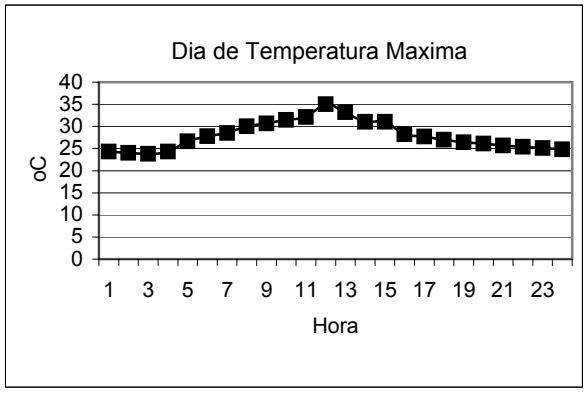
Média dos dados horários							
	tbs	tbu	pressão	neb	rad global	rad direta	veloc.do ar
	(oC)	(oC)	(kPa)		(Wh/m²)	(Wh/m²)	(m/s)
Máxima	35	28.1	101.1	10	1099	1018	15
Média	26.7	24.1	100.5	5.2	229.5	159.9	3.2
Mínima	20.3	19.9	99.8	0	0	0	0

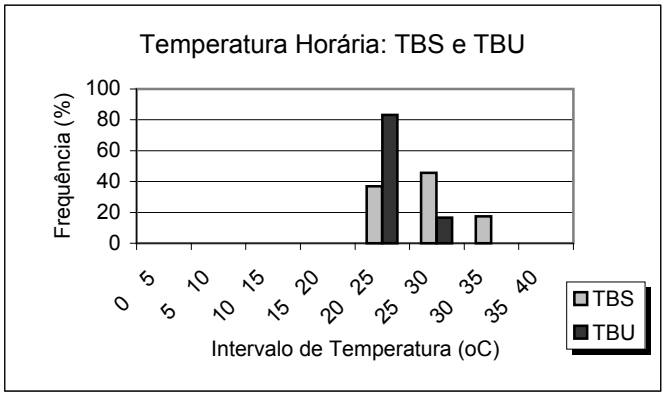
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

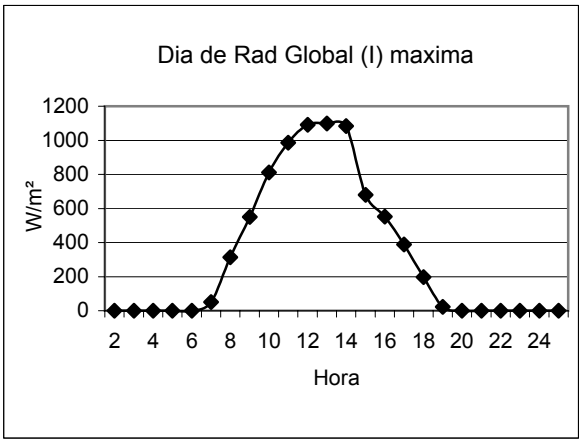
*Das 21 h às 4 h
**Das 8 h às 17 h

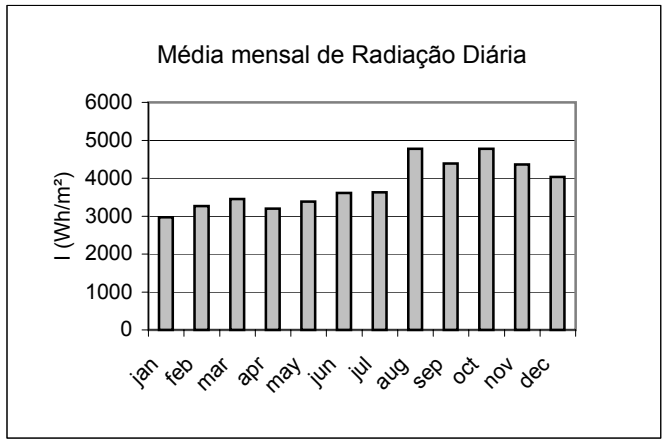
Tmax	
Mês	Dia
12	7
Imax	
Mês	Dia
2	28











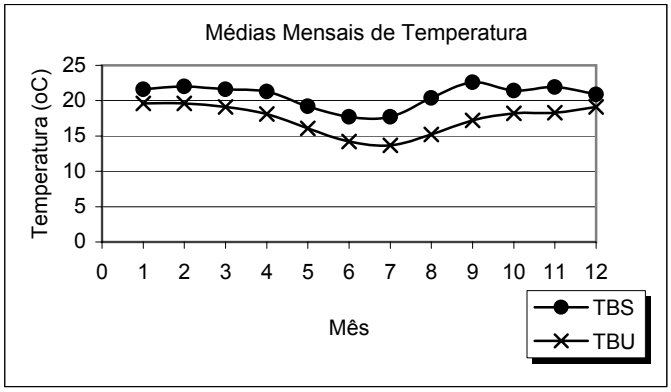
Resumo do Arquivo Climático
Cidade: São Paulo
Ano: 1954

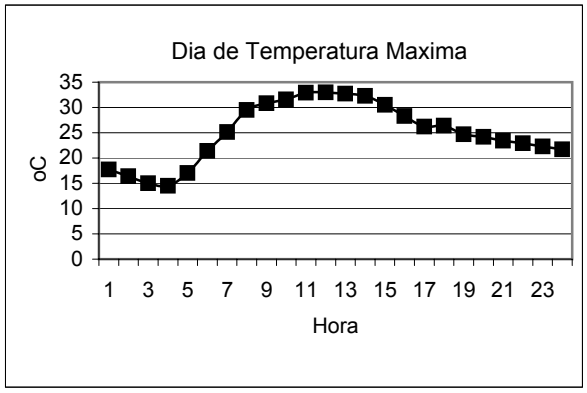
Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	33	24.5	90.5	10	1286	1135	15
Média	20.7	17.3	89.8	6.1	238.8	167.7	1.7
Mínima	6.1	5.1	89	0	0	0	0

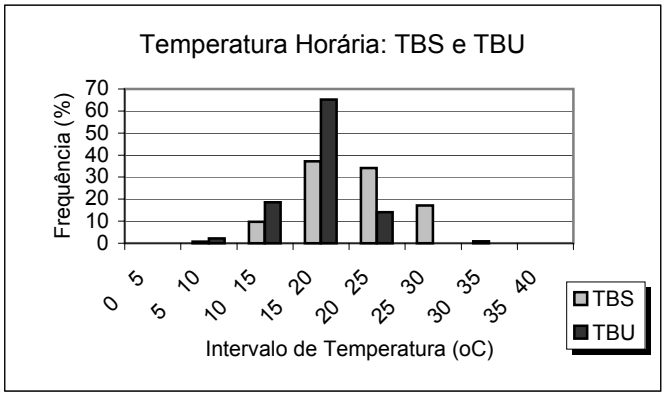
TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

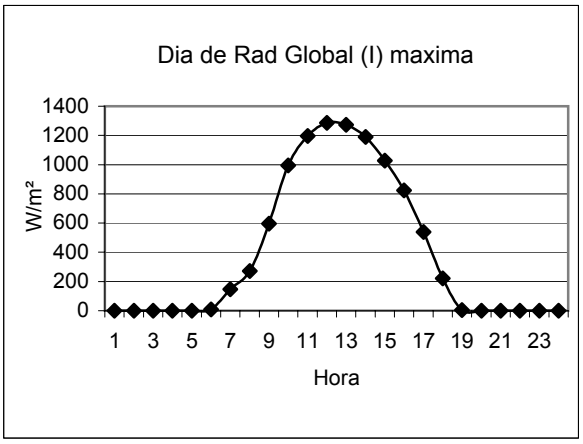
*Das 21 h às 4 h
**Das 8 h às 17 h

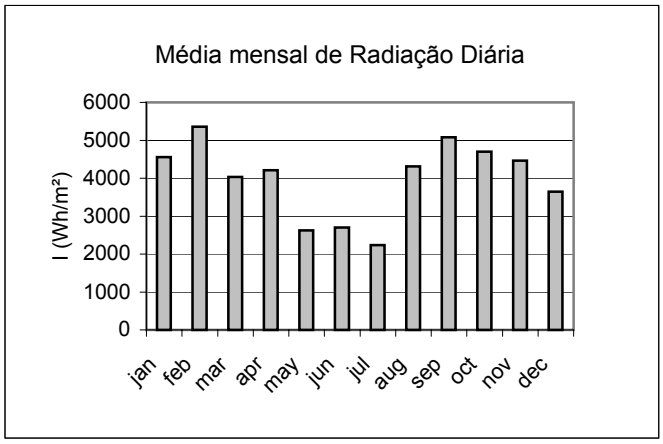
Tmax	
Mês	Dia
9	22
Imax	
Mês	Dia
10	18











Resumo do Arquivo Climático
Cidade: Vitória
Ano: 1962

Média dos dados horários							
	tbs (oC)	tbu (oC)	pressão (kPa)	neb	rad global (Wh/m²)	rad direta (Wh/m²)	veloc.do ar (m/s)
Máxima	35.6	28.8	102.7	10	1237	1059	15
Média	23.2	21.1	101.5	6.0	211.4	148.9	4.3
Mínima	11.2	10.8	100.2	0	0	0	0

TBS>TBU	OK
I noturna*=0	OK
I diurna**>0	OK

*Das 21 h às 4 h
**Das 8 h às 17 h

Tmax	
Mês	Dia
1	3
Imax	
Mês	Dia
12	3