

Wilmington, DE

WBAN NO. 13781

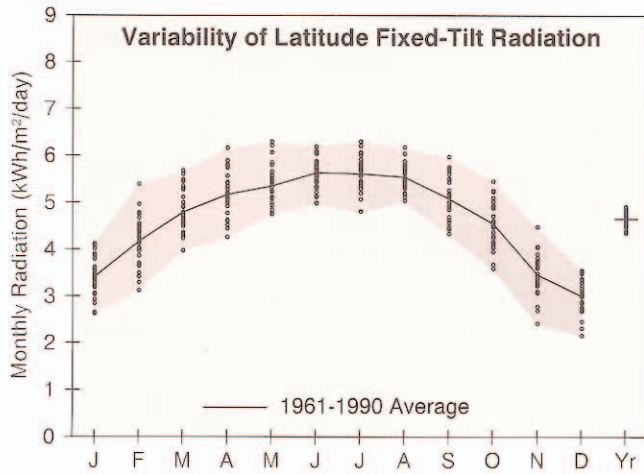
LATITUDE: 39.67° N

LONGITUDE: 75.60° W

ELEVATION: 24 meters

MEAN PRESSURE: 1015 millibars

STATION TYPE: Secondary



Solar Radiation for Flat-Plate Collectors Facing South at a Fixed Tilt (kWh/m²/day), Uncertainty ±11%

Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	2.0	2.9	3.9	4.9	5.6	6.2	6.1	5.4	4.4	3.3	2.2	1.7	4.1
	Min/Max	1.7/2.3	2.4/3.5	3.4/4.4	4.2/5.7	5.1/6.6	5.5/6.9	5.3/6.8	5.0/6.0	3.9/4.9	2.8/3.8	1.8/2.6	1.5/2.0	3.8/4.2
Latitude -15	Average	3.0	3.8	4.6	5.3	5.7	6.1	6.0	5.8	5.0	4.3	3.1	2.6	4.6
	Min/Max	2.4/3.6	2.9/4.8	3.9/5.4	4.4/6.3	5.1/6.7	5.4/6.7	5.2/6.8	5.2/6.4	4.3/5.8	3.5/5.1	2.3/3.9	2.0/3.1	4.3/4.9
Latitude	Average	3.4	4.2	4.8	5.2	5.4	5.6	5.6	5.5	5.1	4.5	3.5	3.0	4.6
	Min/Max	2.6/4.1	3.1/5.4	4.0/5.7	4.3/6.2	4.8/6.3	5.0/6.2	4.8/6.3	5.0/6.2	4.3/6.0	3.6/5.4	2.4/4.5	2.2/3.5	4.3/4.9
Latitude +15	Average	3.6	4.3	4.7	4.8	4.7	4.9	4.9	5.0	4.9	4.6	3.6	3.2	4.4
	Min/Max	2.8/4.4	3.2/5.7	3.8/5.6	3.9/5.7	4.2/5.6	4.3/5.3	4.2/5.5	4.6/5.6	4.1/5.8	3.6/5.5	2.5/4.8	2.2/3.8	4.1/4.7
90	Average	3.4	3.7	3.5	3.0	2.6	2.5	2.6	3.0	3.4	3.7	3.2	3.0	3.1
	Min/Max	2.4/4.2	2.7/5.2	2.8/4.2	2.5/3.6	2.4/3.0	2.3/2.6	2.4/2.8	2.8/3.3	2.8/4.1	2.8/4.4	2.1/4.3	2.0/3.7	2.9/3.3

Solar Radiation for 1-Axis Tracking Flat-Plate Collectors with a North-South Axis (kWh/m²/day), Uncertainty ±11%

Axis Tilt (°)		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
0	Average	2.9	4.0	5.3	6.4	7.1	7.8	7.7	7.0	5.8	4.6	3.0	2.5	5.3
	Min/Max	2.3/3.5	3.0/5.3	4.2/6.3	5.1/8.0	6.2/8.7	6.5/9.1	6.2/8.7	6.2/8.0	4.9/6.8	3.6/5.6	2.2/3.9	1.9/2.9	5.0/5.7
Latitude -15	Average	3.6	4.7	5.9	6.7	7.2	7.8	7.7	7.3	6.3	5.3	3.7	3.1	5.8
	Min/Max	2.7/4.5	3.5/6.3	4.7/7.1	5.3/8.5	6.2/8.8	6.5/9.1	6.2/8.8	6.5/8.4	5.3/7.6	4.1/6.6	2.5/4.9	2.2/3.7	5.4/6.2
Latitude	Average	4.0	5.0	6.0	6.7	7.0	7.5	7.4	7.2	6.3	5.5	4.0	3.4	5.8
	Min/Max	3.0/4.9	3.6/6.7	4.7/7.3	5.2/8.4	6.0/8.6	6.2/8.7	6.0/8.5	6.3/8.2	5.3/7.7	4.2/6.8	2.7/5.3	2.4/4.1	5.4/6.3
Latitude +15	Average	4.1	5.1	5.9	6.4	6.6	7.0	6.9	6.8	6.2	5.5	4.1	3.6	5.7
	Min/Max	3.1/5.2	3.6/6.9	4.6/7.2	4.9/8.1	5.6/8.1	5.8/8.1	5.6/7.9	6.0/7.8	5.1/7.5	4.2/6.9	2.7/5.6	2.4/4.3	5.2/6.1

Solar Radiation for 2-Axis Tracking Flat-Plate Collectors (kWh/m²/day), Uncertainty ±11%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
2-Axis	Average	4.2	5.1	6.0	6.8	7.3	8.0	7.8	7.3	6.4	5.6	4.2	3.6	6.0
	Min/Max	3.1/5.2	3.7/6.9	4.7/7.3	5.3/8.5	6.3/8.9	6.7/9.3	6.3/8.9	6.5/8.4	5.3/7.7	4.2/6.9	2.8/5.6	2.5/4.4	5.6/6.5

Direct Beam Solar Radiation for Concentrating Collectors (kWh/m²/day), Uncertainty ±11%

Tracker		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
1-Axis, E-W Horiz Axis	Average	2.4	2.7	2.9	3.0	3.2	3.6	3.5	3.3	3.0	2.9	2.3	2.1	2.9
	Min/Max	1.5/3.3	1.5/3.8	1.9/4.0	1.7/4.2	2.4/4.4	2.6/4.7	2.3/4.4	2.7/4.2	2.1/4.0	1.9/4.1	1.2/3.6	1.1/2.8	2.6/3.3
1-Axis, N-S Horiz Axis	Average	1.8	2.5	3.3	3.9	4.2	4.7	4.6	4.2	3.5	2.9	1.8	1.4	3.2
	Min/Max	1.1/2.4	1.4/3.5	2.1/4.5	2.3/5.6	3.2/5.8	3.3/6.2	3.0/5.7	3.4/5.3	2.5/4.7	1.9/4.1	1.0/2.8	0.8/1.9	2.8/3.7
1-Axis, N-S Tilt=Latitude	Average	2.6	3.3	3.9	4.1	4.1	4.4	4.4	4.3	4.0	3.7	2.6	2.2	3.6
	Min/Max	1.7/3.6	1.8/4.6	2.5/5.3	2.4/5.8	3.1/5.7	3.1/5.8	2.8/5.4	3.5/5.5	2.8/5.3	2.3/5.1	1.4/4.1	1.2/3.0	3.2/4.1
2-Axis	Average	2.8	3.4	3.9	4.2	4.3	4.8	4.7	4.5	4.0	3.7	2.8	2.4	3.8
	Min/Max	1.8/3.8	1.9/4.8	2.5/5.3	2.4/5.9	3.3/6.0	3.4/6.3	3.0/5.8	3.6/5.6	2.8/5.3	2.4/5.2	1.5/4.3	1.3/3.2	3.3/4.3

Average Climatic Conditions

Element	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature (°C)	-0.8	0.8	5.9	11.2	16.9	21.9	24.7	23.9	20.0	13.4	7.9	2.1	12.3
Daily Minimum Temp	-5.3	-4.0	0.6	5.4	11.2	16.4	19.5	18.8	14.6	7.6	2.8	-2.4	7.1
Daily Maximum Temp	3.7	5.5	11.2	17.0	22.7	27.4	29.8	28.9	25.4	19.2	13.1	6.6	17.6
Record Minimum Temp	-25.6	-21.1	-16.7	-7.8	-1.1	5.0	8.9	6.1	2.2	-4.4	-10.0	-21.7	-25.6
Record Maximum Temp	23.9	25.6	30.0	34.4	35.0	37.2	38.9	38.3	37.8	32.8	29.4	23.3	38.9
HDD, Base 18.3°C	592	492	384	213	68	0	0	0	19	160	312	503	2743
CDD, Base 18.3°C	0	0	0	0	24	111	196	172	69	8	0	0	581
Relative Humidity (%)	68	65	62	62	67	69	70	72	72	71	69	69	68
Wind Speed (m/s)	4.5	4.6	5.1	4.9	4.2	3.8	3.5	3.4	3.6	3.7	4.2	4.3	4.2