

Appendix 1

Solar building design conditions for Low-rise dwelling

1. Nature conditions

The dwelling is located at Chang Xin Dian town, Feng Tai District, Beijing. The path in site is zigzag, houses are well-ordered along with topography. Site map can be found at, www.house-china.net, www.cses.org.cn

2. Basic condition and facilities

This district already has tap water, electricity and telecommunication grid. Rain water is discharged freely. The drainage method is self-drainage by each household, without district sewage system.

3. Building design requirements

- (1) The dwelling property is 173 m², (10-13m from east to west, and 12-17m from south to north). The constructed area is 120-200 m², with one floor or two floors.
- (2) The newly constructed dwelling should satisfy the basic daily living needs. Besides, the seasonal accommodation for tourist mainly in summer should be taken into account. Dwelling includes: one living room, one dining room, three bedrooms or more, 2-3 bathrooms, one kitchen, one closet (more than 12m²), equipment room, etc.

Solar building design conditions for multi-storey dwelling

1. Nature conditions

This dwelling is located at Chao Yang district, Beijing. Site area within red lines is 3887.5 m², near city artery and branch road. Site map can be found at www.house-china.net, www.cses.org.cn

2. Basic condition and facilities

This district already has municipal tap water, drainage system, natural gas system, electricity and telecommunication grid.

3. Building design requirements

- (1) House form is regulated from 5 to 6 storey collective housing, without elevator, total building area should be no less than 5000 m². Each building area of each household should be 90m² (not include balcony), and usable area is 60-75 m².
- (2) The newly built building should satisfy the basic daily living needs. It should include: one living room, two or three bedrooms, one or two bathrooms, and one kitchen, etc.

Beijing meteorologic conditions

1. Solar radiation fraction

Latitude 39°48' and longitude 116°28' Measured point has 32 meters height above sea level.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Ta	-4.6	-2.2	4.5	13.1	19.8	24.0	25.8	24.4	19.4	12.4	4.1	-2.7
Ht	9.143	12.185	16.126	18.787	22.297	22.049	18.701	17.365	16.542	12.730	9.206	7.889
Hd	3.936	5.253	7.152	9.114	9.952	9.192	9.364	8.086	6.362	4.926	4.004	3.515
Hb	5.208	6.931	8.974	9.673	12.345	12.856	9.336	9.279	10.180	7.805	5.201	4.374
H	15.309	18.443	18.483	18.205	18.416	17.222	15.198	15.465	17.481	17.006	15.114	14.205
Ho	15.422	20.464	27.604	34.740	39.725	41.742	40.596	36.420	29.881	22.478	16.508	13.857
Sm	200.8	201.5	239.7	259.9	291.8	268.8	217.9	227.8	239.9	229.5	191.2	186.7
Kt	0.593	0.595	0.584	0.541	0.561	0.528	0.461	0.477	0.554	0.566	0.558	0.569

Ta: mean monthly outdoor temperature

Ht: horizontal global solar radiation, mean monthly irradiation per day (MJ/m² day)

Hd: horizontal diffuse solar radiation, mean monthly irradiation per day (MJ/m² day)

Hb: horizontal direct solar radiation, mean monthly irradiation per day (MJ/m² day)

H: total solar radiation, mean monthly irradiation per day on incline angle, which is equal to local latitude incline exterior (MJ/m² day)

Ho: In interface above aerosphere, global solar radiation, mean monthly irradiation per day (MJ/m² day)

Sm: monthly daily duration of sunshine

Kt: atmosphere clearness index

2. Climate parameters for design

Yearly mean outdoor temperature: 11.4°C, outdoor design temperature for space heating in winter: -9°C, indoor design temperature for space heating in winter: 18°C; outdoor air conditioning design temperature: 33.2°C, indoor air conditioning design temperature: 26°C in summer, dominant wind direction: North direction