



Beijing Local Standard

No.: DB 11/938-2012
Record No.: J 12161-2012

Design Standard of Green Building

绿色建筑设计的标准

Issued on: December 12, 2012

Implemented on: July 1, 2013

Jointly Issued by Beijing Municipal Commission of Urban Planning
Beijing Municipal Administration of Quality and
Technology Supervision



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DB 11/938 — 2012

Chief Development Organizations: Beijing Municipal Office of Investigation & Design and
Surveying & Mapping Management
China Academy of Building Research
Tsinghua University

Approval Department: Beijing Municipal Commission of Urban Planning
Beijing Municipal Administration of Quality and Technology Supervision

Implementation Date: Jul. 1st, 2013

China Architecture & Building Press

Beijing 2014

图书在版编目(CIP)数据

绿色建筑标准 DB 11/938—2012/北京市勘察设计
与测绘管理办公室组织编译. —北京:中国建筑工业
出版社,2015. 2

(工程建设标准英文版)

ISBN 978-7-112-17400-3

I. ①绿… II. ①北… III. ①生态建筑-建筑设计-
标准-北京市-指南-英文 IV. ①TU2-65

中国版本图书馆 CIP 数据核字(2014)第 264606 号

Chinese edition first published in the People's Republic of China in 2013

English edition first published in the People's Republic of China in 2015

by China Architecture & Building Press

No. 9 Sanlihe Road

Beijing, 100037

www. cabp. com. cn

Printed in China by BeiJing YanLinJiZhao printing CO. ,LTD

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Surveying & Mapping Management

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ISBN 978-7-112-17400-3(26165)

Announcement of Beijing Local Standard

NO. 11 in 2012 standard number (The total No. 124th)

The following one Beijing Local Standard Jointly Issued by Beijing Municipal Commission of Urban Planning and Beijing Municipal Administration of Quality and Technology Supervision, which has approved by Beijing Municipal Administration of Quality and Technology Supervision, and are made public(See appendix).

Appendix: Approval of the publication of Beijing Local Standard.

Beijing Municipal Commission of Urban Planning
Beijing Municipal Administration of Quality
and Technology Supervision
Dec. 12th, 2012

Appendix:

Approval of the publication of Beijing Local Standard

No.	No. of Local Standard	Name of Local Standard	Approval Data	Implementation Date
1	DB11/938—2012	Design Standard Of Green Buildings	Dec. 12th, 2012	Jul. 1st, 2013

Note: The above Local Standard in text can inquired by sign in the website of Beijing Municipal Administration of Quality and Technology Supervision (www.bjtsb.gov.cn) or website of the capital standard (www.china-std.com).

Foreword

This standard is formulated according to the standard development plan of Beijing Municipal Administration of Quality and Technology Supervision and Beijing Municipal Commission of Urban Planning and jointly by China Academy of Building Research, Tsinghua University and other units which have made a wide investigation and study, carefully summarized the practical experience in green buildings in recent years, referenced domestic and foreign associated standards and application study results, and combined the urban-rural construction and development demands of Beijing.

This standard includes totally 14 chapters, and their main technical contents are: 1. General Provisions; 2. Terms; 3. Basic Requirements; 4. Index System; 5. Scheme and Design Documents of Green Building; 6. Planning and Design; 7. Architectural Design; 8. Structure Design; 9. Design of Water Supply and Sewerage; 10. Heating, Ventilation and Air-conditioning Design; 11. Building Electrical Design; 12. Landscape Design; 13. Interior Decoration Design; and 14. Special Design Control.

The provisions printed in bold type are compulsory ones and must be enforced strictly.

This standard is put under the centralized management by Beijing Municipal Commission of Urban Planning. China Academy of Building Research and Tsinghua University are responsible for interpretation of its specific technical contents, and the Standardization Office of Urban-Rural Planning of Beijing is in charge of its daily management.

In order to adapt this standard to the needs of Beijing's green building design, all relevant organizations are kindly requested to feed back the comments and suggestions duly to China Academy of Building Research (address: No. 30, East Road, North 3rd Ring, Beijing; zip code: 100013; telephone: 64517259; Email: bjlsjzbz@cabr-design.com).

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Beijing Institute of Architectural Design Co. , Ltd.
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1 General Provisions

1.0.1 This standard is formulated with a view to implementing the development strategy of “Culture-enriched Beijing, Technology-empowered Beijing and Environment-friendly Beijing” proposed by the People’s Government of Beijing Municipality, and lead the development of low-carbon ecological planning and green buildings.

1.0.2 This standard is applicable to the green design and management of construction, renovation and extension buildings, and also to the low-carbon ecological planning at the detailed planning stage.

1.0.3 Green design of civil buildings shall take full consideration of the dialectical relationship of the building functions with energy, land, water and material saving and environmental protection in the building life cycle, and reflect the unity of economic, social and environmental benefit; reduce the impact of construction behaviors on the natural environment, comply with the healthy, simple and efficient design idea, and realize the harmonious coexistence of man, buildings and nature.

1.0.4 The green design of civil buildings and the low-carbon ecological planning shall comply with the requirements of the current national and Beijing’s associated standards in addition to those of this standard.

2 Terms

2.0.1 Green design of civil buildings

Reflecting the idea of sustainable development in design, realizing resource saving and environmental protection in the building life cycle on the basics of meeting building functions, and providing the healthy, applicable and efficient use space for people.

2.0.2 Low-carbon ecological planning

Fusing the low-carbon target with the ecological idea, and realizing the harmonious coexistence of man and natural environment with the sustainable development by integrating the low-carbon ecological strategies of land, industry, traffic, energy, resource, environment and society in the regional, urban or block planning.

2.0.3 Building life cycle

All process of buildings from construction, use to demolition, including the acquisition of raw materials, the processing and manufacturing of building materials and components, the construction and installation on site, the operation and maintenance of buildings, and the final demolition and disposal of buildings.

2.0.4 Passive techniques

Non-mechanical techniques consuming no or less energy, directly using the natural conditions of sunshine, wind, air temperature, humidity, terrain, plants, etc. on site through optimizing the planning and building design to reduce the heating, air-conditioning and lighting loads of buildings, so as to raise the indoor and outdoor environmental performance.

2.0.5 Active techniques

Energy-consumed mechanical techniques employed in order to raise the indoor comfort and realize indoor and outdoor environmental performance.

2.0.6 Incremental cost of green building

Increase or decrease in the initial investment cost due to the implementation of the green building idea and strategy.

3 Basic Requirements

3.0.1 Scientific outlook on development shall be used as a guide for developing urban-rural planning, and the associated indexes of low-carbon ecological planning shall be determined at the detailed planning stage in combination with the land use situation, so as to guide the green design of civil buildings at the subsequent stage.

3.0.2 Green design of civil buildings shall, in combination with the specific situation of the project, enforce the planning indexes made at the planning stage and associated building indexes, and realize the expected green building targets.

3.0.3 Design shall comply with the principle of adjusting measures to local conditions, and combine the climate, resource, eco-environment, economy, humanity and other features of Beijing.

3.0.4 Design shall synthesize the technical and economic characteristics of the building life cycle, and use the planning design patterns, architectural forms, techniques, materials and equipments in favor of promoting sustainable development.

3.0.5 Design shall embody the ideas of sharing, balance and integration. In the course of design, planning; architecture; structure; water supply and sewerage; heating, ventilation, air-conditioning and cooling; gas; electricity and intelligentization; indoor design; landscape; economy; and other specialties shall work cooperatively.

4 Index System

4.1 General Requirements

4.1.1 The low-carbon and ecological planning at the detailed planning stage shall be represented and controlled by the key indexes of land use planning, traffic planning, resource utilization and eco-environment. The green design at the building design stage shall be represented and controlled by the key indexes of architecture; structure; water supply and sewerage; heating, ventilation, air-conditioning and cooling; electricity; landscape; and interior decoration.

4.1.2 The calculation method, value and scope of application of each index shall be in accordance with the requirements specified in Table 4.2.2 and Table 4.3.2 in this chapter.

4.2 Low Carbon Ecological Design index System at Detailed Planning Stage

4.2.1 The indexes in Table 4.2.2 shall be made for the low-carbon and ecological planning at the detailed planning stage.

4.2.2 The key indexes of the low-carbon and ecological planning at the detailed planning stage shall be in accordance with the requirements specified in Table 4.2.2.

Table 4.2.2 Low Carbon Ecological Design index Table at Detailed Planning Stage

No.	Classification	Content	Definition and Calculation Method	Recommended Value	Remarks
P1	Land Use Planning	Plot scale	The length and width range of the plot enclosed by branch roads	150m~250m	Mainly applicable to new cities, center cities and old cities refer to this standard
P2		Residential land area per capita	1) The ratio of residential land area to the accommodated resident population in it. 2) The population in the residential area is calculated according to the ratio of 2.8 persons/household	1 st ~ 3 rd floor \leq 49m ² /capita; 4 th ~6 th floor \leq 32m ² /capita; 7 th ~9 th floor \leq 27m ² /capita; 10 th floor and above \leq 17m ² /capita	Applicable to the residential projects of new cities, center cities and old cities
P3		Underground building floor area ratio	The ratio of total underground floor area to site area of the plot	High-rise building \geq 0.5; Multi-storey building \geq 0.3	Applicable to various projects of new cities, center cities and old cities, excluding buildings without underground space utilization conditions due to the impact of geological conditions, foundation forms and municipal infrastructures, etc

continue 4. 2. 2

No.	Classification	Content	Definition and Calculation Method	Recommended Value	Remarks
P4	Land Use Planning	Accessibility to public facilities	<p>1) It refers to meeting the walking distance from the building entrance/exit to above 6 types of community public service facilities</p> <p>2) Community public service facilities mainly include kindergartens, primary schools, community health service stations, culture activity stations, small community commerce, post offices, bank, community management and service centers, indoor and outdoor sports fitness facilities, etc</p>	$\leq 500\text{m}$	Applicable to the residential projects of new cities, center cities and old cities
P5		Accessibility to urban open space	<p>1) The walking distance from the building main entrance/exit in the planning area to the surrounding urban open space (excluding community-level parks).</p> <p>2) The urban open space refers to the ground or water area covered with no or few buildings or structures in cities, including urban public green spaces (excluding road attached green spaces such as green belts and street trees), parks, squares, etc</p>	$\leq 500\text{m}$	Applicable to various projects of new cities, center cities and old cities
P6		Ratio of the number of jobs within 1km of rail transit stations to daily average passenger flow volume	<p>The ratio of the number of available jobs within 1km of the rail transit station to daily average unidirectional passenger flow volume designed for the station</p>	$\geq 10\%$	Applicable to various projects of new cities, center cities and old cities
P7		Ratio of barrier-free residences (guest rooms)	<p>1) The ratio of the number of barrier-free residences (guest rooms) meeting barrier-free residence design standard to the total residences (guest rooms) in the project</p> <p>2) The barrier-free residence refers to a residence which has the entrance/exit, passageway, communication, furniture, kitchen, bathroom, etc. provided with barrier-free facilities, and the spatial scale convenient for the mobility impaired to move safely.</p> <p>3) The barrier-free guest room refers to a guest room which has the entrance/exit, passageway, communication, furniture, kitchen, bathroom, etc. provided with barrier-free facilities, and the spatial scale convenient for the mobility impaired to move safely</p>	<p>Residential area $\geq 2\%$;</p> <p>Hotel $\geq 1\%$</p>	Applicable to the residential projects of new cities, center cities and old cities

No.	Classification	Content	Definition and Calculation Method	Recommended Value	Remarks
P8	Traffic Planning	Coverage rate of public transport stations	The ratio of land area with a walking distance of less than 500m from the main entrance/exit of the main functional building to the nearest public transport station to total land area	100%	Applicable to various projects of new cities, center cities and old cities
P9		Outdoor parking ratio	The ratio of outdoor parking spaces to total parking volume of the project	Residential building $\leq 10\%$; Luxury apartment and villa $\leq 7.5\%$. The requirements of public buildings are presented according to the project and site features	Applicable to various projects of new cities, center cities and old cities
P10	Resource Utilization	Energy consumption per unit floor area	<p>1) to Public buildings: the indicator Refers to the energy consumption (excluding urban municipal heating) due to various activities in buildings, including that of air conditioning, lighting, socket outlets, elevators, cooking, various service facilities and special functional equipment, in kWh/($m^2 \cdot a$).</p> <p>2) to Residential buildings: the indicator Refers to the indicator of heat loss of building. The heat consumed on the unit floor area in unit time and supplied by indoor heating equipment under the condition of calculating the outdoor average temperature in the heating period, in order to keep the indoor design calculation temperature, in W/m^2.</p>	<p>Public buildings:</p> <p>Large administrative office $\leq 74kWh/(m^2 \cdot a)$;</p> <p>Large business office $\leq 135kWh/(m^2 \cdot a)$;</p> <p>General office (split air conditioner) $\leq 37 kWh/(m^2 \cdot a)$;</p> <p>Large shopping mall and supermarket $\leq 137 kWh/(m^2 \cdot a)$;</p> <p>General shopping mall and supermarket $\leq 75kWh/(m^2 \cdot a)$;</p> <p>Large hotel $\leq 160kWh/(m^2 \cdot a)$;</p> <p>General hotel $\leq 80 kWh/(m^2 \cdot a)$;</p> <p>Large education $\leq 90 kWh/(m^2 \cdot a)$;</p> <p>General education $\leq 22kWh/(m^2 \cdot a)$;</p> <p>Medical $\leq 138 kWh/(m^2 \cdot a)$</p> <p>Residential buildings:</p> <p>3rd floor and below $\leq 14.5W/m^2$;</p> <p>4th floor ~ 8th floor $\leq 10.5W/m^2$;</p> <p>9th floor ~ 13th floor $\leq 9.5W/m^2$;</p> <p>14th floor and above $\leq 8.5W/m^2$</p>	Applicable to various projects of new cities, center cities and old cities. "Large" refers to the building with a floor area of above 20,000 m^2 , and see Table B.0.9 in Appendix B of this standard for the data source

continue 4. 2. 2

No.	Classification	Content	Definition and Calculation Method	Recommended Value	Remarks
P11		Contribution rate of renewable energy	<p>The ratio of conventional energy consumption saved by renewable energy in the project in whole year to total energy consumption in the project in whole year</p> <p>Contribution rate of renewable energy</p> $= \frac{\text{Saving by renewable energy in the project (tce)}}{\text{Total energy consumption in the project (tce)}} \times 100\%$ <p>(4. 2. 2-1)</p> $= \frac{\text{Conventional energy consumption before using renewable energy (tce)} - \text{Conventional energy consumption after using renewable energy (tce)}}{\text{Total energy consumption in the project (tce)}} \times 100\%$ <p>(4. 2. 2-2)</p> <p>The renewable energy includes non-fossil energy such as solar energy, geothermal energy, biomass energy and wind energy</p>	<p>Residential buildings $\geq 6\%$;</p> <p>Office buildings $\geq 2\%$;</p> <p>Hotel buildings $\geq 10\%$</p>	<p>Applicable to the residential, office and hotel projects of new cities and center cities, and the similar projects of old cities refer to this standard</p>
P12	Resource Utilization	Average daily rated water consumption	Average daily water consumption index for the project	<p>The average daily water consumption for residential buildings is $\leq 110\text{L}/(\text{capita} \cdot \text{d})$, and the water consumption for other buildings is the median according to the requirement of the standard GB 50555 <i>Standard for Water Saving Design in Civil Building</i></p>	<p>Applicable to various projects of new cities, center cities and old cities</p>
P13		Classified collection rate of domestic waste	<p>The percentage of domestic waste amount realizing classified collection in total domestic waste output in the area, or the ratio of inhabitants implementing separate waste collection to total inhabitants in the target area</p>	$\geq 90\%$	<p>Applicable to various projects of new cities, center cities and old cities</p>

No.	Classification	Content	Definition and Calculation Method	Recommended Value	Remarks
P14	Eco-environment	Rainwater runoff discharge	The runoff of rainwater discharged to urban municipal rainwater pipe network or natural water in the site	The total rainwater discharge in the site after development is equal to or less than that before development	Applicable to various projects of new cities, center cities and old cities
P15		Ratio of sunken green space	<p>1) The percentage of sunken green space area in total green space area (excluding the green spaces above the underground space with an overburden soil layer of less than 1.5m) in the site.</p> <p>2) The sunken green space refers to the green space 5cm ~ 10cm lower than the surrounding road or ground surface. The construction of sunken green space also includes tree pools, rain gardens, grass swales, dry ponds, wet ponds, etc</p>	$\geq 50\%$	Applicable to various projects of new cities, center cities and old cities
P16		Permeable pavement rate	<p>1) The percentage of permeable pavement area in rigid pavement area (including various roads, squares, parking lot, excluding the fire fighting access and ground above the underground space with an overburden soil layer of less than 1.5m) in this area.</p> <p>2) The permeable pavement shall meet the associated requirements of the product standard JC/T 945 <i>Water Permeable Brick</i>. The hollowed-out pavement with a hollowed-out rate equal to or greater than 40% will not be included into the permeable pavement or rigid pavement.</p> <p>3) The base course of the permeable pavement shall meet the associated requirements of GB 50400 <i>Engineering Technical Code for Rain Utilization in Building and Sub-district</i> and DB11/T 686 <i>Specification for Construction and Acceptance of Water Permeable Brick Pavement</i></p>	$\geq 70\%$	Applicable to various projects of new cities, center cities and old cities