**Beijing Municipal Commission of Planning and Natural Resources**

**Inspection Points of Random Inspections and Prompt Release of Results for Survey and Design of Low-Risk Projects**

**(Trial)**

**April 2020**

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**Part I Low-Risk New Construction and Expansion Projects**

**Inspection Points for Low-Risk New Construction and Expansion Projects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of building** | **Type of issue** | **Profession** | **Number of provisions** | **Regulation and provision number** |
| Office | Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):5.5.15, 5.5.17, 5.5.21, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017:4.0.4 |
| Structure | 7 | *Load Code for the Design of Building Structures* GB 50009-2012: 5.1.1; *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010:3.4.1, 5.4.2, 6.3.3, 6.4.3, 8.3.6 |
| Water supply and drainage | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014: 5.1.12, 5.1.13, 5.2.6*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005:7.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1 |
| Structure | 2 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ 11-501-2009: 7.3.7, 7.4.3 |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014: 3.5.2, 7.4.7 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Design of Building Foundation* GB 50007-2011: 5.1.6 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Commercial use | Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):5.5.15, 5.5.17, 5.5.21, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017: 4.0.4 |
| Structure | 7 | *Load Code for the Design of Building Structures* GB 50009-2012: 5.1.1; *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010:3.4.1, 5.4.2, 6.3.3, 6.4.3, 8.3.6 |
| Water supply and drainage | 7 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):8.2.1, 8.3.4*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.12, 5.1.13, 5.2.6*Code for Design of Sprinkler Systems* GB 50084-2017:5.0.1*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005:7.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2 |
| Electric | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Articles 8.4.1 and 10.3.1*Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013:Article 3.2.4*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):6.4.1 |
| Structure | 2 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ 11-501-2009: 7.3.7, 7.4.3 |
|  |  | Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:3.5.2, 7.4.7 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| Public service facilities | General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Design of Building Foundation* GB 50007-2011: 5.1.6 |
| Water supply and drainage | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.4 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018: Article 3.2.9 |
| Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):5. 5. 15, 5. 5. 17, 5. 5. 21, 6. 2. 5, 6. 2. 6, 6. 2. 9, 6. 4. 5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017:4.0.4 |
| Structure | 7 | *Load Code for the Design of Building Structures* GB 50009-2012: 5.1.1; *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010:3. 4. 1, 5. 4. 2, 6. 3. 3, 6. 4. 3, 8. 3. 6 |
| Water supply and drainage | 7 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):8. 2. 1, 8.3.4*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014: 5.1.12, 5.1.13, 5.2.6*Code for Design of Sprinkler Systems* GB 50084-2017:5.0.1*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005: 7.1.3 |
| Heating and ventilation | 7 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.1, 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2; *Code for Seismic Design of Mechanical and Electrical Equipment* GB50981-2014: 5.1.4 |
|  |  | Electric | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Articles 8.4.1 and 10.3.1*Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013:Article 3.2.4*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1 |
| Structure | 2 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ11-501-2009: 7.3.7, 7.4.3 |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:3.5.2, 7.4.7 |
| Heating and ventilation | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 3.1.3, 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System*GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Design of Building Foundation* GB 50007-2011: 5.1.6 |
| Water supply and drainage | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.4 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Warehouse | Mandatory provisions | Architecture | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 3.8.2, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017: 4.0.4 |
| Structure | 7 | *Load Code for the Design of Building Structures* GB 50009-2012: 5.1.1,7.1.2, 8.1.2; *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010: 5.4.2, 8.3.6; *Technical Specification for High Strength Bolt Connections of Steel Structures* JGJ82-2011: 4.3.1 |
| Water supply and drainage | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.12, 5.1.13, 5.2.6*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005:7.1.3 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.2, 9.3.11 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1 |
| Structure | 1 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ11-501-2009: 7.3.7 |
| Water supply and drainage | 2 | 《 Technical Code for Fire Protection Water Supply and Hydrant Systems 》 GB 50974-20143.5.2, 7.4.7 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 2 | *Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Seismic Design of Buildings* GB 50011-2010: H.2.1 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Plant | Mandatory provisions | Architecture | 7 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 3.7.2, 3.7.3, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017: 4.0.4 |
|  |  | Structure | 5 | *Load Code for the Design of Building Structures* GB 50009-2012: 7.1.2, 8.1.2; *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010: 8.3.6; *Technical Specification for High Strength Bolt Connections of Steel Structures* JGJ 82-2011: 4.3.1 |
| Water supply and drainage | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014: 5.1.12, 5.1.13, 5.2.6*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005:7.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.2, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1 |
| Structure | 1 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ 11-501-2009: 7.3.7 |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:3.5.2, 7.4.7 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Seismic Design of Buildings* GB 50011-2010: H.2.1 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Residence (single-storey) | Mandatory provisions | Architecture | —— | —— |
| Structure | 1 | *Code for Seismic Design of Buildings* GB 50011-2010: 5.4.2 |
| Water supply and drainage | 1 | *Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005: 7.1.3 |
| Heating and ventilation | —— | —— |
| Electric | 1 | *Design Code for Residential Buildings* GB 50096-2011: Article 8.7.9 |
| General provisions that seriously affect safety | Architecture | —— | —— |
| Structure | 1 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ11-501-2009: 7.3.7 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | —— | —— |
| Electric | —— | —— |
| General provisions | Architecture | —— | —— |
| Structure | —— | —— |
| Water supply and drainage | —— | —— |
| Heating and ventilation | —— | —— |
| Electric | —— | —— |
| Residence (multiple storeys) | Mandatory provisions | Architecture | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 5.4.11, 5.5.29, 6.2.5, 6.2.9; *Design Code for Residential Buildings* GB 50096-2011: 5.4.4, 6.4.7 |
| Structure | 4 | *Code for Design of Building Foundation* GB 50007-2011: 3.0.2; *Code for Seismic Design of Buildings* GB 50011-2010: 3.4.1, 5.4.2; *Technical Specification for Precast Concrete Structures* JGJ 1-2014: 6.1.3 |
| Water supply and drainage | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version):8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.12, 5.1.13, 5.2.6*Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005:7.1.3 |
| Heating and ventilation | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): Articles 8.4.1 and 10.3.1*Design Code for Residential Buildings* GB 50096-2011:Article 8.7.9 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1 |
| Structure | 2 | *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ 11-501-2009: 7.3.7; *Design Specification for Precast Concrete Shear Wall Structure*DB11/1003-2013: 5.5.1 |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014: 3.5.2, 7.4.7 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 1 | *Code for Design of Automatic Fire Alarm System* GB 50116-2013: Article 10.1.5 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Structure | 1 | *Code for Design of Building Foundation* GB 50007-2011: 5.1.6 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | —— | —— |

1. **Architecture Profession**

**1.1 New and expansion projects -- plant and warehouse**

**1.1.1 Mandatory provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**3.7.2** The number of fire exits in each fire compartment or in each floor of a fire compartment shall be determined by calculation and shall not be less than two. When the following conditions are met, one safety exit can be set:

4. For Type IV and V plants, the floor area of each floor is no more than 400 m2, and the number of workers operating at the same time is no more than 30;

5. For underground or semi-underground plants (including basement or semi-basement), the floor area of each floor is no more than 50 m2, and the number of workers operating at the same time is no more than 15.

**3.7.3** For underground or semi-underground plants (including basement or semi-basement), when at least two fire compartments are set adjacent to each other and separated by fire walls, the Class A fire door in each fire wall that enables access to the adjacent fire compartment may be used as the second safety exit. However, each fire compartment must have at least one separate fire exit straightly leading to the outside.

**3.8.2** Each warehouse shall have no less than two security exits. When a warehouse covers a floor area of no more than 300 m2, one safety exit can be set. Each fire compartment in a warehouse shall have no less than two exits leading to the evacuation passageway, staircase or outside. When a fire compartment covers a floor area of no more than 100 m2, one safety exit can be set. Doors leading to evacuation passageways or staircases shall be Class B fire doors.

**1.1.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**3.7.5** The total net widths of evacuation staircases, passageways or doors in a plant shall be calculated according to the minimum net widths for evacuation for every 100 people evacuated, which shall not be lower than those in Table 3.7.5. However, the minimum net width of staircases for evacuation shall not be less than 1.10 m, the minimum net width of passageways for evacuation shall not be less than 1.40 m, and the minimum net width of doors for evacuation shall not be less than 0.90 m. When the number of evacuees on each floor is not the same, the total net width of staircases for evacuation shall be calculated by floors. The total net width of staircases on a floor shall be calculated according to the number of evacuees on this floor as well as the maximum number of evacuees on another floor above.

Table 3.7.5 Minimum net width of stairs, passageways and doors for evacuation in the plant for every 100 people evacuated

|  |  |  |  |
| --- | --- | --- | --- |
| Number of plant floors (storey) | 1~2 | 3 | ≥4 |
| Minimum net width for evacuation (m/100 people) | 0.60 | 0.80 | 1.00 |

**1.2 New construction and expansion projects -- civil buildings (office buildings, commercial buildings, public service facilities)**

**1.2.1 Mandatory provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**5.5.15** The number of evacuation doors for rooms in public buildings shall be calculated and shall not be less than two. Except for the rooms located at the end of passageways in nurseries, kindergartens, elderly care facilities, medical buildings and teaching buildings, one evacuation door can be installed in the rooms meeting one of the following conditions:

1. The room located between two safety exits or on either side of a pocket-shaped passageway, with a floor area of no more than 50 m2 for nurseries, kindergartens and elderly care facilities; no more than 75 m2 for medical buildings and teaching buildings; no more than 120 m2 for other buildings or places.

2. The room at the end of a passageway, with a floor area of less than 50 m2 and the net width of the evacuation door of no less than 0.90 m; or where the straight-line distance is no more than 15 m between any point in the room to the evacuation door, the room has a floor area of no more than 200 m2 and the net width of the evacuation door is no less than 1.40 m.

**5.5.17** The safe evacuation distance of public buildings shall meet the following requirements:

1. The straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest safety exit shall not be greater than that specified in Table 5.5.17.

2. The stairwell shall directly lead to the outside on the first floor. If it is difficult to do so, an enlarged enclosed stairwell or a smoke-proof front room in the stairwell may be used on the first floor. When there are no more than four floors and there is no enlarged enclosed stairwell or no smoke-proof front room in the stairwell, the door leading to the outside may be installed not more than 15 m away from the stairwell.

3. The straight-line distance from any point in the room to the home evacuation door directly leading to the evacuation passageway shall not be greater than the straight-line distance between the evacuation door on either side of or at the end of the pocket-shaped passageway and the nearest safety exit as specified in Table 5.5.17.

4. For any audience hall, exhibition hall, multi-function hall, restaurant or business hall with no less than two evacuation doors or safety exits in a building with Class I or II fire resistance rating, the straight-line distance from any point in the room to the nearest evacuation door or safety exit shall not be greater than 30 m. When the evacuation door cannot lead directly to the outdoor ground or the evacuation stairwell, an evacuation passageway of no more than 10 m in length shall be used to lead to the nearest safety exit. When a room is equipped with automatic sprinkler system, the safe evacuation distance from any point in the room to the nearest safety exit can be increased by 25%.

Table 5.5.17 Straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest safety exit (m)

|  |  |  |
| --- | --- | --- |
| Name | Evacuation door between two safety exits | Evacuation door located on either side of or at the end of the pocket-shaped passageway |
| Level I and Level II | Level III | Level IV | Level I and Level II | Level III | Level IV |
| Nursery and kindergartenElderly care facility | 25 | 20 | 15 | 20 | 15 | 10 |
| Places for singing, dancing, movie and entertainment | 25 | 20 | 15 | 9 | — | — |
| Medical buildings | Single-storey and multi-storey | 35 | 30 | 25 | 20 | 15 | 10 |
| High-rise | Ward | 24 | — | — | 12 | — | — |
| Other parts | 30 | — | — | 15 | — | — |
| Teaching buildings | Single-storey and multi-storey | 35 | 30 | 25 | 22 | 20 | 10 |
| High-rise | 30 | — |  | 15 | — |  |
| High-rise hotels and exhibition buildings | 30 | — | — | 15 |  | — |
| Other buildings | Single-storey and multi-storey | 40 | 35 | 25 | 22 | 20 | 15 |
| High-rise | 40 | — | — | 20 | — | — |

Note: 1. The straight-line distance from the room evacuation door in an open porch to the nearest safety exit can be increased by 5 m according to the provisions of this Table.

2. The straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest open stairwell shall be reduced by 5 m according to the provisions of this Table when the room is located between two stairwells, or reduced by 2 m according to the provisions of this Table when the room is located on either side of or at the end of the pocket-shaped passageway.

3. When the buildings are fully equipped with automatic sprinkler systems, the safe evacuation distance can be increased by 25% as stipulated in this Table.

**5.5.21** In other public buildings except theaters, cinemas, auditoriums and gymnasiums, the total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation staircases shall conform to the following provisions:

1. The total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation stairs on each floor shall be calculated according to the minimum net widths for evacuation for every 100 people evacuated, which shall not be less than those in Table 5.5.21-1. When the number of evacuees on each floor is not the same, the total net width of staircases for evacuation shall be calculated by floors. The total net width of the lower staircases in the aboveground buildings shall be calculated according to the number of evacuees on this floor as well as the maximum number of evacuees on another floor above; while the total net width of the upper staircases in the underground buildings shall be calculated according to the number of evacuees on this floor as well as the maximum number of evacuees on another floor below.

Table 5.5.21-1 Minimum total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation stairs on each floor for every 100 people evacuated (m/100 people)

|  |  |
| --- | --- |
| Building storeys | Fire resistance rating of buildings |
| Level I and Level II | Level III | Level IV |
| Aboveground floors | 1~2 floors | 0.65 | 0.75 | 1.00 |
| 3 floors | 0.75 | 1.00 |  |
| ≥4 floors | 1.00 | 1.25 |  |
| Underground floors | The height difference from the surface of the entrance and exit *△H*≤10m | 0.75 | — | — |
| The height difference from the surface of the entrance and exit *△H*>10m | 1.00 | — | — |

**1.2.2 General provisions that seriously affect safety**

See 1.4.2.

**1.3 New and expansion projects -- residential buildings**

**1.3.1 Mandatory provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**5.4.11** For residential buildings with commercial service outlets, the residential part and the commercial part shall be completely separated by fire partitions with fire-resistance duration of no less than 2.00h and without doors, windows or holes as well as by non-combustible floors with fire-resistance duration of no less than 1.50h. Safety exits and evacuation staircases for residential and commercial parts shall be set separately.

Separation units in commercial service outlets shall be separated by fire partitions with fire-resistance duration of no less than 2.00h and without doors, windows or holes. When the floor area of each separation unit on a floor is greater than 200 m2, two safety exits or evacuation doors shall be set on this floor. The straight-line distance from any point in a separation unit to the exit directly leading to the outside shall not be greater than the maximum straight-line distance between the evacuation door on either side of or at the end of the pocket-shaped passageway and the nearest safety exit as specified in Table **5.5.17** for other multi-storey buildings.

Note: The distance of indoor stair can be calculated by 1.50 times of its horizontal projection length.

**5.5.29** The safe evacuation distance of residential buildings shall meet the following requirements:

1. The straight-line distance between the home door directly leading to the evacuation passageway and the nearest safety exit shall not be greater than that specified in Table 5.5.29.

Table 5.5.29 Straight-line distance between the home door directly leading to the evacuation passageway and the nearest safety exit in a residential building

|  |  |  |
| --- | --- | --- |
| Type of residential building | Home door between two safety exits | Home door located on either side of or at the end of the pocket-shaped passageway |
| Level I and Level II | Level III | Level IV | Level I and Level II | Level III | Level IV |
| Single-storey and multi-storey | 40 | 35 | 25 | 22 | 20 | 15 |
| High-rise | 40 | — | — | 20 | — | — |

Notes: 1. The maximum straight-line distance from the home door of an open porch to the nearest safety exit can be increased by 5 m according to the provisions of this Table.

2. The straight-line distance between the home door directly leading to the evacuation passageway and the nearest open stairwell shall be reduced by 5 m according to the provisions of this Table when the room door is located between two stairwells, or reduced by 2 m according to the provisions of this Table when the room door is located on either side of or at the end of the pocket-shaped passageway.

3. When the residential buildings are fully equipped with automatic sprinkler systems, the safe evacuation distance can be increased by 25% as stipulated in this Table.

4. The distance from the home door to the nearest safety exit of a skip-floor residential building shall be calculated from the home door. The distance of a small staircase can be calculated by 1.50 times the length of its horizontal projection.

2. The stairwell shall directly lead to the outside on the first floor, or an enlarged enclosed stairwell or a smoke-proof front room in the stairwell may be used on the first floor. When there are no more than four floors, the door leading to the outside may be installed not more than 15 m away from the stairwell.

3. The straight-line distance from any point in the home to the home door directly leading to the evacuation passageway shall not be greater than the maximum straight-line distance between the evacuation door on either side of or at the end of the pocket-shaped passageway and the nearest safety exit as specified in Table 5.5.29.

Note: In a skip-floor residential building, the distance of indoor stair can be calculated by 1.50 times of its horizontal projection length.

**2) *Design Code for Residential Buildings* GB 50096-2011**

**5.4.4** The toilet shall not be set directly above the bedroom, living room, kitchen or dining room of the home on the lower floor.

**6.4.7** The elevator shall not be set next to the bedroom. When conditions do not permit and the elevator has to be set next to the bedroom, structural measures of sound insulation and vibration reduction shall be taken.

**1.3.2 General provisions that seriously affect safety**

See 1.4.2.

**1.4 Building structure, insulation, firefighting and rescue, fire facilities and others**

**1.4.1 Mandatory provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**6.2.5** Except as otherwise stipulated in this code, a solid wall with a height of no less than 1.2 m or a fire eave with a projecting width of no less than 1.0 m and a length of no less than the width of the opening shall be set between the upper and lower openings of the building external wall. When the indoor sprinkler system is installed, the height of the solid wall between the upper and lower openings shall not be less than 0.8 m. When it is really difficult to set solid walls between the upper and lower openings, fireproof glass walls can be set. The fireproof glass walls of high-rise buildings shall have fire integrity of no lower than 1.00 h, and the fireproof glass walls of multi-storey buildings shall have fire integrity of no lower than 0.50 h. The fire integrity of exterior windows shall not be lower than that of fireproof glass walls.

The width of walls between adjacent openings on the external wall of the residential building shall not be less than 1.0 m. When it is less than 1.0 m, a partition board that protrudes the external wall for no less than 0.6 m shall be set between the openings.

**6.2.6** The building curtain wall shall adopt fire prevention measures in accordance with Article 6.2.5 of this code at the outer edge of each floor slab. The gap between the curtain wall and the floor slab and partition wall of each floor shall be sealed with fireproof blocking materials.

**6.2.9** The elevator shafts in the building shall meet the following requirements:

1. The elevator shaft shall be set independently. It is forbidden to lay pipelines of combustible gas as well as Type A, B and C liquids in the shaft. Cables and wires not related to the elevator shall not be laid. The wall of the elevator shaft shall not have any other openings except for the elevator door, safety escape door and ventilation hole.

2. Cable shafts, pipe shafts, smoke vents, exhaust ducts, garbage chutes and other vertical shafts shall be set separately. The fire resistance duration of shaft wall shall not be lower than 1.00 h, and the inspection door on shaft wall shall adopt Class C fire door.

3. On floor slabs of each floor, cable shafts and pipe shafts in the building shall be sealed with non-combustible materials or fireproof blocking materials with fire resistance duration not lower than that of floor slabs.

The holes in cable shafts and pipe shafts that connect rooms and passageways shall be sealed with fireproof blocking materials.

**6.4.5** Outdoor evacuation staircases shall meet the following requirements:

1. The height of handrails shall not be less than 1.10 m and the net width of stairs shall not be less than 0.90 m.

2. The tilt angle shall not be greater than 45°.

3. Staircase and platform shall be made of non-combustible materials. The fire resistance duration of the platform shall not be lower than 1.00 h, and the fire resistance duration of the staircase shall not be lower than 0.25 h.

4. The door that leads to external stairway shall use Class B fire door and open outwards.

5. Doors, windows or holes shall not be set on the walls within 2 m around the stairs, except for evacuation doors. An evacuation door shall not be directly opposite the staircase.

**2) *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017**

**4.0.4** For horizontal evacuation passageways and foyers of safety exits in aboveground buildings, the ceilings shall use Grade A decoration materials, while other parts shall use decoration materials with Grade B1 or above. For evacuation passageways and foyers of safety exits in underground buildings, the ceilings, walls and grounds shall all use Grade A decoration materials.

**1.4.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**6.4.1** Evacuation stairwells shall meet the following requirements:

1. Stairwells shall have natural lighting and natural ventilation, and shall be set against external walls. When a stairwell is set against the external wall, the horizontal distance between the windows on the walls of the stairwell, the front room and the shared front room and the nearest edge of the door, window and hole on both sides shall not be less than 1.0 m.

**1.4.3 General provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**6.7.7** Except as provided in Article 6.7.3 of this code, when the external insulation system of the building external wall adopts the insulation materials with the combustion performance of Class B1 and B2 according to the provisions of this section, it shall comply with the following provisions:

2. Horizontal fire barriers shall be set in the insulation system of each floor. The fire barrier shall be made of materials with Class A combustion performance, and the height of the fire barrier shall not be less than 300 mm.

1. **Structure Profession**

For the construction drawing design documents (including calculations and drawings) of low-risk projects, the designers shall fully implement the relevant provisions of the construction standards and regulations. The inspection of construction drawings focuses on the implementation of design standards such as load and seismic action, as well as the key parts that seriously affect the safety of foundations and main structures.

In recent years, the new construction projects submitted by Beijing for inspection are mainly ordinary reinforced concrete multi-storey structures. The warehouses and plants are mostly portal frame light-weight steel structures, which are basically based on natural foundations. As a result, provisions related the structure profession mainly pertain to common violations found in the inspection of these types of structures and natural foundations. The provisions listed and other mandatory provisions as well as the general provisions that seriously affect the safety of foundation and main structure constitute the major points of inspection. The same shall apply to other types of structures and foundations.

**2.1 Mandatory provisions:**

**1) *Load Code for the Design of Building Structures* GB 50009-2012**

**5.1.1** The nominal values and its coefficients for combination values, frequent values and quasi-permanent values of uniform live loads on the civil building floors shall not be less than those stipulated in Table 5.1.1. (See the code for details of Table 5.1.1)

**7.1.2** The reference snow pressure shall be the snow pressure for a 50-year recurrence period determined by the method prescribed in this code. For structures sensitive to snow load, the snow pressure for a 100-year recurrence period shall be used.

**8.1.2** The reference wind pressure shall be the wind pressure for a 50-year recurrence period determined by the method specified in this code, but shall not be less than 0.3 kN/m2. For other structures which are more sensitive to wind load, the reference wind pressure shall be appropriately increased, and shall comply with the relevant structural design specifications.

**2) *Code for Design of Building Foundation* GB 50007-2011**

**3.0.2** According to the design grade of building foundation and the influence of foundation deformation on the superstructure under long-term load, the design of foundation shall meet the following requirements:

1. The foundation calculation of all buildings shall meet the requirements for bearing capacity calculation.

3. A building of design grade C shall be checked for deformation under any of the following conditions:

1. The characteristic value of foundation bearing capacity is less than 130 kPa, and the building has a complex shape;
2. There is a large difference in ground load or adjacent foundation load on and around the foundation, which may cause excessive uneven settlement of the foundation;
3. The building on weak foundation has eccentric load;
4. Adjacent buildings are close to each other and may lean;
5. The foundation is filled with soil with large thickness or uneven thickness, and its self-weight consolidation is not completed.
6. In case of floating in the basement of a building, anti-floating checking shall be carried out.

**3) *Code for Seismic Design of Buildings* GB 50011-2010 (2016 Version)**

**3.4.1** According to the requirements of seismic conceptual design, architectural design shall define the regularity of architectural forms. Irregular buildings shall be strengthened according to regulations. Particularly irregular buildings shall be studied and demonstrated with special reinforcement measures. Seriously irregular buildings shall not be used.

**5.4.2** The following design expression shall be used for seismic checking of cross sections of structural members:



**6.3.3** The steel bar configuration of beams shall meet the following requirements:

2. The ratio of the quantity of reinforcement at the bottom and top of the beam end section shall not be less than 0.5 for Level I and 0.3 for Level II and Level III, in addition to the calculation.

3. When the reinforcement ratio of longitudinal tensile reinforcement at beam ends is more than 2%, the value of stirrup minimum diameter in the Table shall be increased by 2 mm.

**6.4.3** The reinforcing bars vertically and horizontally distributed in the seismic wall shall meet the following requirements:

1. The minimum reinforcement ratio of vertically and horizontally distributed reinforcing bars shall not be less than 0.25% in Level I, II and III seismic walls and 0.20% in Level IV seismic walls.

2. The reinforcement ratio of vertically and horizontally distributed reinforcing bars shall not be less than 0.3% in the bottom reinforced parts of floor seismic walls in partial frame-supported seismic wall structures.

**8.3.6** When the beam is rigidly connected with the column, the column shall be within the range of 500 mm above and below the beam flange, and the connection weld between the column flange and the column web or the box column siding shall adopt the full-penetration groove weld.

**4) *Technical Specification for Precast Concrete Structures* JGJ 1-2014**

**6.1.3** The seismic design of assembled integral structural members shall adopt different seismic grades according to the type of fortification, intensity, structure type and building height, and shall meet the corresponding requirements of calculation and construction measures. The seismic grades of Class C assembled integral structures shall be determined according to Table 6.1.3.

**Table 6.1.3 Seismic grades of Class C assembled integral structures**

|  |  |
| --- | --- |
| Structure type | Fortification intensity |
| 7 | 8 |
| Assembled integral frame structure | Height (m) | ≤24 | ≤24 |
| Frame | III | II |
| Long-span frame | II | I |
| Assembled integral frame -- cast-in-situ shear wall structure | Height (m) | ≤24 | ≤24 |
| Frame | IV | III |
| Seismic wall | III | II |
| Assembled integral shear wall structure | Height (m) | ≤24 | ≤24 |
| Shear wall | IV | III |
| Assembled integral partial frame-supported seismic wall structure | Height (m) | ≤24 | ≤24 |
| Cast-in-situ frame-supported structure | II | I |
| Shear wall at bottom reinforcement | III | II |
| Shear walls in other areas | IV | III |

**5) *Technical Specification for High Strength Bolt Connections of Steel Structures* JGJ82-2011**

**4.3.1** The number of high-strength bolts shall not be less than two for each member bar at the end of high-strength bolt joint and splice joint.

**2.2 General provisions that seriously affect safety:**

**1) *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ 11-501-2009 (2016 Version)**

**7.3.7** The standard value of foundation bearing capacity *fa* after the correction of depth and width can be calculated as follows:



**7.4.3** The allowable foundation deformation of the building shall be determined according to the superstructure, foundation type, the adaptability to foundation deformation and the use requirements. For general multi-storey buildings with no significant uneven load distribution, when the foundation is placed on a basically uniform soil layer with the same genetic age, the allowable foundation deformation is represented by the maximum long-term settlement of the building Smax, and it shall meet the requirements of Table **7.4.3**.

**Table 7.4.3 Allowable foundation deformation of multi-storey buildings**

|  |  |  |  |
| --- | --- | --- | --- |
| Structure type | Foundation type | Subsoil type | Maximum long-term settlement Smax (mm) |
| Frame structure, framed bent structure, masonry bearing structure | Independent foundation, strip foundation | General quaternary sandy silt and silty-fine sand, recently deposited sandy silt and silty-fine sand | 30 |
| General quaternary clay and clayey silt | 50 |
| Uniform general quaternary clay and clayey silt, medium-dense recently deposited clayey and clayey silt | 80 |
| Uniform recently deposited soft clay | 120 |

**2) *Design Specification for Precast Concrete Shear Wall Structure* DB11/1003-2013**

**5.5.1** The bearing capacity of the joints of precast wall panels shall be checked according to the following requirements:

1. Permanent design status and temporary design status: *γjγo*Sd≤Rjd(5.5.1-1)

2. Seismic design status: *γj*Sd≤Rjd/*γ*RE(5.5.1-2)

3. Bottom reinforcement area; RjdE≥ηjRm(5.5.1-3)

**2.3 General provisions:**

**1) *Code for Seismic Design of Buildings* GB 50011-2010 (2016 Version)**

**H.2.1** This section is applicable to multi-storey plants with steel frame, braced frame, frame bent structure and other structural systems. If no provisions are made in this section, Chapter 8 of this code may apply to multi-storey buildings, and the height boundary of its seismic grade shall be reduced by 10 m compared with that specified in Article 8.1 of this code. Article 9.2 of this code may apply to single-storey buildings.

**2) *Code for Design of Building Foundation* GB 50007-2011**

**5.1.6** When there are adjacent buildings, the embedded depth of foundation of new buildings shall not be greater than that of the original building foundation. When the embedded depth is greater than that of the original building foundation, a certain net distance shall be maintained between the two foundations, and its value shall be determined according to the building load, foundation form and soil conditions.

1. **Water Supply and Drainage Profession**

**3.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**8.2.1** The indoor hydrant systems shall be installed in the following buildings or places:

1. The plants and warehouses with a floor area of more than 300 m2;

2. The residences with a building height of more than 21 m;

3. The store buildings, hotel buildings, medical buildings, library buildings and other single or multi-storey buildings with a volume of more than 5,000 m3;

5. The office buildings, teaching buildings and other single or multi-storey civil buildings with a building height of more than 15 m or a volume of more than 10,000 m3.

**8.3.4** Except as otherwise stipulated in this Code and the places that are not suitable to use water to protect from or extinguish fire, the following single or multi-storey civil buildings or places shall be equipped with automatic fire extinguishing systems, and are suitable for applying automatic sprinkler systems:

2. The exhibition, store, catering and hotel buildings with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, as well as the ward buildings, outpatient buildings and operation department with the same building scale in the hospital;

**2) *Technical Code for Firefighting Water Supply and Hydrant Systems* GB 50974-2014**

**5.1.12** The suction of fire pump shall meet the following requirements:

1. The fire pump shall adopt the method of self fill-up suction;

2. When the fire pump is pumped directly from the municipal pipe network, a backflow preventer with air isolating function shall be installed on the outlet pipe of the fire pump;

**5.1.13** The suction pipe, outlet pipe and valve of the fire pump shall meet the following requirements:

1. There shall not be less than two suction pipes in a set of fire pumps. When one in damage or maintenance status, the other suction pipes shall still be able to supply all the fire water design flow;

2. The setting of fire pump suction pipe shall avoid the formation of airbags;

3. There shall not be less than two feeder main pipes in a set of fire pumps to connect with the fire water loop pipe network. When one in maintenance status, the other feeder pipes shall still be able to supply all the fire water design flow;

4. The submerged depth of the water inlet of the fire pump shall meet the requirements of safe operation of fire pump at the minimum water level. The submerged depth of the suction pipe socket at the minimum effective water level of fire pool shall be determined according to the water flow velocity and hydraulic conditions of the suction pipe socket, yet it shall not be less than 600 mm. When cyclone preventer is used, the submerged depth shall not be less than 200 mm;

**5.2.6** The high-place fire tank shall meet the following requirements:

1. The effective volume, outlet water, drainage and water level of the high-place fire tank shall comply with the provisions of Articles 4.3.8 and 4.3.9 of this Code;

2. The minimum effective water level of the high-place fire tank shall be determined according to the submerged depth of the suction pipe socket and cyclone preventer. When suction pipe socket is used, it shall comply with Article 5.1.13 (4) of this Code; when the cyclone preventer is used, it shall be determined according to the product, and shall not be less than 150 mm of protection height;

**3) *Code of Design for Automatic Sprinkler Systems* GB 50084-2017**

**5.0.1** The basic design parameters of wet pipe system applied by the civil buildings and plants shall not lower than the requirements in Table 5.0.1.

**4) *Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005**

**7.1.3** The location and quantity of fire extinguishers shall be determined according to the maximum protection distance of the fire extinguisher. And the most unfavorable location shall be within the protection range of at least 1 fire extinguisher.

**3.2 General provisions that seriously affect safety**

**1) *Technical Code for Firefighting Water Supply and Hydrant Systems* GB 50974-2014**

**3.5.2** The indoor hydrant design flow in the buildings shall not be less than that specified in Table 3.5.2.

**7.4.7** The location of indoor hydrants in the buildings shall meet the fire fighting requirements and shall comply with the following provisions:

1. The indoor hydrant shall be equipped in the obviously easy-to-access places such as stairwell, rest platform, front room, walkway, etc. as well as the locations convenient for fire fighting;

**3.3 General Provisions**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**8.2.4** For the densely populated public buildings and commercial service facilities with a floor area of more than 200 m2, it shall be equipped with fire hose reels or portable hose assemblies.

1. **Heating and Ventilation Profession**

**4.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**8.5.2** The smoke exhaust facilities shall be set in the following places or parts of the plants or warehouses:

1. The type C production sites with lots of people and combustible materials. The aboveground rooms with a floor area of more than 300 m2 and with lots of people or combustible materials in the Type C plants;

2. The Type D workshops with a floor area of more than 5,000 m2;

**8.5.3** The smoke exhaust facilities shall be set in the following places or parts of the civil buildings:

1. The places for singing, dancing, movie and entertainment set in the first, second and third floors with a floor area of more than 100 m2; the places for singing, dancing, movie and entertainment set in the fourth floor and above, underground or semi-underground;

3. The aboveground rooms with a floor area of more than 100 m2 with lots of people in the public buildings;

4. The aboveground rooms with a floor area of more than 300 m2 with lots of combustible materials in the public buildings;

5. The evacuation walkway with a height of more than 20 m in the buildings.

**8.5.4** The smoke exhaust facilities shall be set in the underground or semi-underground buildings (rooms) and the windowless rooms in aboveground buildings with a total floor area of more than 200 m2 or a room floor area of more than 50 m2 and with lots of people or combustible materials.

**9.3.11** The fire valves with nominal operating temperature of 70°C shall be installed at the following locations for the air ducts of ventilation and air conditioning systems:

1. Across the fire compartments;

2. Across the room partitions and floorslabs of ventilation and air conditioning rooms;

3. Across the room partitions and floorslabs in important or fire hazard locations;

4. Across both sides of the deformation joint in the fire compartments;

5. The horizontal pipe section where vertical air duct is connected with horizontal air duct on each floor;

Note: When the ventilation and air conditioning systems of each fire compartment in the buildings are set independently, the junction of the horizontal air ducts and the vertical main pipes may not set fire facilities.

**2) *Technical Standards for Building Smoke Control and Exhaust Systems* GB 51251-2017**

**4.4.10** The smoke exhaust fire valve shall be set in the following places:

1. The horizontal pipe section where vertical air duct is connected with horizontal air duct on each floor;

2. The smoke exhaust branch pipe where a smoke exhaust system covers multiple smoke control compartments;

3. The entrance of smoke exhaust fans.

**5.2.2** The control mode of smoke exhaust fans and air feed fans shall meet the following requirements:

1. Manually start on site;

2. Automatically start the automatic fire alarm system;

3. Manually start the fire control room;

4. When any smoke exhaust valve or vent in the system is open, the smoke exhaust fan and air feed fan start automatically;

5. The smoke exhaust fire valve shall be automatically shut down at 280°C, and the smoke exhaust fan and air feed fan shall be shut down in correlation.

**4.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**9.3.14** Except in the following cases, the air duct of ventilation and air conditioning system shall apply incombustible materials:

1. The air ducts and flexible joints in contact with corrosive media can apply fire retardant materials;

2. When the fire compartment is not crossed and fire valve is set across the room partitions, the air ducts of ventilation and air conditioning system in the stadiums, exhibition halls, airport (cars, boats) buildings (halls) and other large space buildings, single or multi-storey office buildings and Type C, D, E plants can apply fire retardant materials.

**2) *Technical Standards for Building Smoke Control and Exhaust Systems* GB 51251-2017**

**4.4.8** The installation and the fire endurance of smoke exhaust pipes shall comply with the following requirements:

1. The smoke exhaust pipes and its connecting parts shall be able to ensure their structural integrity at 280°C for continuous 30 minutes;

2. The vertical installed smoke exhaust pipes shall be set in an independent pipe well, and the fire endurance of the smoke exhaust pipes shall not be lower than 0.5 h;

3 The horizontal installed smoke exhaust pipes shall be set in the ceiling with its fire endurance not lower than 0.50 h; when being really hard to realize, it can be directly installed indoors yet with its fire endurance not be less than 1.00 h;

4 The fire endurance of the smoke exhaust pipes installed in the ceiling of the walkway and the smoke exhaust pipes crossing the fire compartments, shall not be less than 1.00 h. However, the fire endurance of the smoke exhaust pipes in the equipment rooms and garages can be no less than 0.50 h.

**4.3 General Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**9.3.12** For the vertical exhaust ducts in the bathrooms, toilets and kitchens in the public buildings, anti-backflow measures shall be taken and the fire valve with nominal operating temperature of 70°C shall be set on the branch pipe.

The smoke exhaust pipes of the kitchens in the public buildings shall be set according to the fire compartments. And the fire valve with nominal operating temperature of 150°C shall be set on the branch pipe in connection with the vertical exhaust ducts.

**2) *Technical Standards for Building Smoke Control and Exhaust Systems* GB 51251-2017**

**4.4.12** The installation of the smoke outlet shall be calculated and determined according to Article 4.6.3 of this Standard. And the horizontal distance between any point in the smoke control compartment and the nearest smoke outlet shall not be greater than 30 m.

5. The smoke outlet shall be set in such a way that the smoke plume direction is opposite to the evacuation direction. And the horizontal distance between the smoke outlet and the adjacent edge of the nearby safety exit shall not be less than 1.5 m.

1. **Electronics Profession**

**5.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**8.4.1** The automatic fire alarm systems shall be installed in the following buildings or places:

1. The plants for the production of shoes, clothing, toys, electronics and other similar purposes with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2;

2. Each warehouse for storing cotton, wool, silk, hemp, chemical fiber and their products with an area of more than 1,000 m2, and the cigarette warehouse with a floor area of more than 500 m2 or the total floor area is more than 1,000 m2;

3. The buildings for stores, exhibitions, trade finance, passenger and freight service and other similar purposes with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, and the underground or semi-underground stores with a total floor area of more than 500 m2;

7. The places of children rooms in large and medium kindergartens, the elderly care facilities, the ward building of sanatorium, the hotel buildings and other children activity places with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, as well as the outpatient buildings, ward buildings and operation department in the hospital with no less than 200 beds;

8. The places for singing, dancing, movie and entertainment.

9. The technical interlayer with more combustibles and with a net height of more than 2.6 m, and the plenum or ceiling with combustibles available and with a net height of more than 0.8 m;

13. The places or parts in need of installing mechanical smoke exhaust and smoke control system, rain or pre-action automatic sprinkler system, fixed fire monitor firefighting system, gas firefighting system etc. to interconnect with automatic fire alarm system.

**10.3.1** Except for residential buildings with building height less than 27 m, the following parts of civil buildings, plants and Type C warehouses shall be equipped with evacuation lighting:

1. The enclosed stairwell, smoke-proof stairwell and its front room, the front room or the combined front room in the fire elevator, the refuge walkway and the refuge storey (rooms);

2. The audience hall, exhibition hall, multi-function hall and the densely populated places of with service hall, restaurant, studios with a floor area of more than 200 m2;

3. The underground or semi-underground public places with a floor area of more than 100 m2;

4. The evacuation walkway in the buildings;

5. The production sites and evacuation walkways in densely populated plants.

**2) *Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013**

**3.2.4** The following buildings or places shall add fire evacuation diversion signs on the evacuation walkways and main evacuation routes:

3. The underground or semi-underground public stores with a total floor area of more than 500 m2;

4. The places for singing, dancing, movie and entertainment.

**3) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.3.2** The residual current action protectors shall not be installed in the emergency lighting distribution box or the input and output circuits of the centralized power supply. And the output circuits shall not be connected to switch devices, sockets and other loads outside the system.

**4) *Design Code for Residential Buildings* GB 50096-2011**

**8.7.9** In case of fire alarm, the access control on the evacuation walkway and the exit shall be able to be unlocked centrally or manually from the inside.

**5.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**10.3.5** The public buildings, residential buildings with building height of more than 54 m, the high-rise plants (warehouses) and Type A, B, C single and multi-storey plants, shall be equipped with light evacuation indicator signs and shall comply with the following provisions:

1. It shall be set in the safety exit and densely populated places above the evacuation door.

**2) *Code for Design of Automatic Fire Alarm System* GB 50116-2013**

**10.1.5** The output power of the emergency power supply of fire fighting equipment shall be greater than 120% of the full load power of the automatic fire alarm and linkage control system. The capacity of the battery group shall ensure that the automatic fire alarm and linkage control system can work continuously for more than 3 h in working load status and in fire situation.

**3) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.2.1** The light fitting shall meet the following requirements:

5. The material of the light fitting panel or lampshade shall meet the following requirements:

1) Except the panel of the marker light that is installed on the ground can use the tempered glass with thickness of 4 mm and above, the panel or the lampshade of the marker light that is installed at a distance of 1 m or less to the ground shall not use fragile material or glass material;

2) The panel or lampshade of light fitting installed above the ceiling and evacuation path shall not use glass material.

**5.3 General Provisions**

**1) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.2.9** The direction marker lights shall meet the following requirements:

1. The evacuation walkways and staircases with maintenance structures shall meet the following requirements:

1. It shall be installed on the wall and cylinder on both sides of the walkway and staircase with less than 1 m from the ground and the height of the staircase;
2. When the safety exit or evacuation door is on the side of the evacuation walkways, the direction marker lights that point to the safety exit or evacuation door shall be installed above the evacuation walkways;
3. When the marker plane of the direction marker light is perpendicular to the evacuation direction, the spacing of the light fitting shall not be more than 20 m; when the marker plane of the direction light is parallel to the evacuation direction, the spacing of the light fitting shall not be greater than 10 m.

**Part II Low-risk Internal Renovation Projects**

**Inspection Points of Low-risk Internal Renovation Projects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of building** | **Type of issue** | **Profession** | **Number of provisions** | **Regulation and provision number** |
| Office | Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 5.5.15, 5.5.17, 5.5.21, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017 4.0.4 |
| Water supply and drainage | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version) 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2; |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| Serious Impact | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.67.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| SafetyGeneral Provisions | Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013:Article 10.1. 5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7, |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Commercial use | Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 5.5.15, 5.5.17, 5.5.21, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017 4.0.4 |
| Water supply and drainage | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)8.2.1 8.4.3*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Sprinkler Systems* GB 50084-20175.0.1*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2; |
| Electric | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Articles 8.4.1 and 10.3.1*Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013:Article 3.2.4*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.6 7.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Article 10.3.5《 Code for Design of Automatic Fire Alarm System 》GB 50116-2013Article 10.1.5《 Technical Standard for Fire Emergency Lighting and Evacuate Indicating System 》GB 51309-2018Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7, |
| Water supply and drainage | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.4; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Public service facilities | Mandatory provisions | Architecture | 8 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 5.5.15, 5.5.17, 5.5.21, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017 4.0.4 |
| Water supply and drainage | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)8.2.1 8.4.3*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Sprinkler Systems* GB 50084-20175.0.1*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version) 8.5.3, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10, 5.2.2; |
| Electric | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Articles 8.4.1 and 10.3.1*Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013:Article 3.2.4*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.6 7.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013Article 10.1.5《 Technical Standard for Fire Emergency Lighting and Evacuate Indicating System 》GB 51309-2018Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7, |
| Water supply and drainage | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.4; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.12;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Warehouse | Mandatory provisions | Architecture | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 3.8.2, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017 4.0.4 |
| Water supply and drainage | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version) 8.5.2, 9.3.11 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.6 7.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| General Provisions | Electric | 2 | *Code for Design of Automatic Fire Alarm System* GB 50116-2013Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5. |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Plant | Mandatory provisions | Architecture | 7 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 3.7.2, 3.7.3, 6.2.5, 6.2.6, 6.2.9, 6.4.5; *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017 4.0.4, |
| Water supply and drainage | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 5 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version) 8.5.2, 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings*GB 51251-2017: 4.4.10, 5.2.2; |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Articles 8.4.1 and 10.3.1*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.3.2 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.6 7.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)Article 10.3.5*Code for Design of Automatic Fire Alarm System* GB 50116-2013Article 10.1.5*Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.1 |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5 |
| Electric | 1 | *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018:Article 3.2.9 |
| Residence (single-storey) | Mandatory provisions | Architecture | —— | —— |
| Water supply and drainage | 1 | *Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005 7.1.3 |
| Heating and ventilation | —— | —— |
| Electric | 1 | *Design Code for Residential Buildings* GB 50096-2011Article 8.7.9 |
| General provisions that seriously affect safety | Architecture | —— | —— |
| Water supply and drainage | —— | —— |
| Heating and ventilation | —— | —— |
| Electric | —— | —— |
| General provisions | Architecture | —— | —— |
| Water supply and drainage | —— | —— |
| Heating and ventilation | —— | —— |
| Electric | —— | —— |
| Residence (multiple storeys) | Mandatory provisions | Architecture | 6 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 5.4.11, 5.5.29, 6.2.5, 6.2.9; *Design Code for Residential Buildings* GB 50096-2011 5.4.4, 6.4.7, |
|  |  | Water supply and drainage | 4 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 8.2.1*Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:5.1.13 5.2.4,*Code for Design of Extinguisher Distribution in Buildings* GB 50140-20057.1.3 |
| Heating and ventilation | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version) 8.5.4, 9.3.11; *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.10; |
| Electric | 3 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): Articles 8.4.1 and 10.3.1*Design Code for Residential Buildings* GB50096-2011Article 8.7.9 |
| General provisions that seriously affect safety | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.4.1, |
| Water supply and drainage | 2 | *Technical Code for Fire Protection Water Supply and Hydrant Systems* GB 50974-2014:7.4.67.4.7; |
| Heating and ventilation | 2 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 9.3.14;*Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.8 |
| Electric | 1 | *Code for Design of Automatic Fire Alarm System* GB 50116-2013: Article 10.1.5. |
| General provisions | Architecture | 1 | *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version): 6.7.7 |
| Water supply and drainage | —— | —— |
| Heating and ventilation | 1 | *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017: 4.4.12-5. |
| Electric | —— | —— |

1. **Architecture Profession**

**1.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**5.5.15** The number of evacuation doors for rooms in public buildings shall be determined through calculation and shall not be less than two. Except for the rooms located at the end of passageways in nurseries, kindergartens, elderly care facilities, medical buildings and teaching buildings, one evacuation door can be installed in the rooms meeting one of the following conditions:

1. The room located between two safety exits or on either side of a pocket-shaped walkway, with a floor area of no more than 50 m2 for nurseries, kindergartens and elderly care facilities; no more than 75 m2 for medical buildings and teaching buildings; no more than 120 m2 for other buildings or places.

2 The room at the end of the walkway with a floor area of less than 50 m2 and the net width of the evacuation door with no less than 0.90 m; or the room with straight-line distance of no more than 15 m from any point in the room to the evacuation door and with a floor area of no more than 200 m2 and the net width of the evacuation door with no less than 1.40 m.

3 The hall or room with a floor area of no more than 50 m2 and with regular people of no more than 15 in the places for singing, dancing, movie and entertainment.

**5.5.17** The safe evacuation distance of public buildings shall meet the following requirements:

1. The straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest safety exit shall not be greater than that specified in Table 5.5.17.

2. The stairwell shall directly lead to the outside on the first floor. If it is difficult to do so, an enlarged enclosed stairwell or a smoke-proof front room in the stairwell may be used on the first floor. When there are no more than four floors and there is no enlarged enclosed stairwell or no smoke-proof front room in the stairwell, the door leading to the outside may be installed not more than 15 m away from the stairwell.

3. The straight-line distance from any point in the room to the home evacuation door directly leading to the evacuation passageway shall not be greater than the straight-line distance between the evacuation door on either side of or at the end of the pocket-shaped passageway and the nearest safety exit as specified in Table 5.5.17.

4. For any audience hall, exhibition hall, multi-function hall, restaurant or business hall with no less than two evacuation doors or safety exits in a building with Class I or II fire resistance rating, the straight-line distance from any point in the room to the nearest evacuation door or safety exit shall not be greater than 30 m. When the evacuation door cannot lead directly to the outdoor ground or the evacuation stairwell, an evacuation passageway of no more than 10 m in length shall be used to lead to the nearest safety exit. When a room is equipped with automatic sprinkler system, the safe evacuation distance from any point in the room to the nearest safety exit can be increased by 25%.

Table 5.5.17 Straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest safety exit (m)

|  |  |  |
| --- | --- | --- |
| Name | Evacuation door between two safety exits | Evacuation door located on either side of or at the end of the pocket-shaped passageway |
| Level I and Level II | Level III | Level IV | Level I and Level II | Level III | Level IV |
| Nursery and kindergartenElderly care facility | 25 | 20 | 15 | 20 | 15 | 10 |
| Places for singing, dancing, movie and entertainment | 25 | 20 | 15 | 9 | — | — |
| Medical buildings | Single-storey and multi-storey | 35 | 30 | 25 | 20 | 15 | 10 |
| High-rise | Ward | 24 | - | — | 12 | — | — |
| Other parts | 30 | - | — | 15 | — | — |
| Teaching buildings | Single-storey and multi-storey | 30 | 30 | 25 | 22 | 20 | 10 |
| High-rise | 30 | — | — | 15 | — | — |
| High-rise hotels and exhibition buildings | 30 | — | — | 15 | — | — |
| Other buildings | Single-storey and multi-storey | 40 | 35 | 25 | 22 | 20 | 15 |
| High-rise | 40 | — | — | 20 | — | — |

Note: 1. The straight-line distance from the room evacuation door in an open porch to the nearest safety exit can be increased by 5 m according to the provisions of this Table.

2. The straight-line distance between the room evacuation door directly leading to the evacuation passageway and the nearest open stairwell shall be reduced by 5 m according to the provisions of this Table when the room is located between two stairwells, or reduced by 2 m according to the provisions of this Table when the room is located on either side of or at the end of the pocket-shaped passageway.

3. When the buildings are fully equipped with automatic sprinkler systems, the safe evacuation distance can be increased by 25% as stipulated in this Table.

**5.5.21** In other public buildings except theaters, cinemas, auditoriums and gymnasiums, the total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation staircases shall conform to the following provisions:

1. The total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation stairs on each floor shall be calculated according to the minimum net widths for evacuation for every 100 people evacuated, which shall not be less than those in Table 5.5.21-1. When the number of evacuees on each floor is not the same, the total net width of staircases for evacuation shall be calculated by floors. The total net width of the lower staircases in the aboveground buildings shall be calculated according to the number of evacuees on this floor as well as the maximum number of evacuees on another floor above; while the total net width of the upper staircases in the underground buildings shall be calculated according to the number of evacuees on this floor as well as the maximum number of evacuees on another floor below.

Table 5.5.21-1 Minimum total net widths of room evacuation doors, safety exits, evacuation passageways and evacuation stairs on each floor for every 100 people evacuated (m/100 people)

|  |  |
| --- | --- |
| Building storeys | Fire resistance rating of buildings |
| Level I and Level II | Level III | Level IV |
| Aboveground floors | 1~2 floors | 0.65 | 0.75 | 1.00 |
| 3 floors | 0.75 | 1.00 | — |
| ≥4 floors | 1.00 | 1.25 | — |
| Underground floors | The height difference from the surface of the entrance and exit *△H*≤10m | 0.75 | — | — |
| The height difference from the surface of the entrance and exit *△H*>10m | 1.00 | — | — |

**2) *Code for Fire Prevention in Design of Interior Decoration of Buildings* GB 50222-2017**

See Part I 1.4.1 for the content of Chapter IV Mandatory Provisions.

**1.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**6.4.1** Evacuation stairwells shall meet the following requirements:

1. Stairwells shall have natural lighting and natural ventilation, and shall be set against external walls. When a stairwell is set against the external wall, the horizontal distance between the windows on the walls of the stairwell, the front room and the shared front room and the nearest edge of the door, window and hole on both sides shall not be less than 1.0 m.

**1.3 General Provisions**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**6.7.7** In addition to the conditions stipulated in Article 6.7.3 of this Code, when the external insulation system of the external wall of the building adopts the thermal insulation materials with the combustion performance of class B1 and B2 according to the provisions of this section, it shall comply with the following provisions:

2. Horizontal fire barriers shall be set in the insulation system of each floor. The fire barrier shall be made of materials with Class A combustion performance, and the height of the fire barrier shall not be less than 300 mm.

1. **Water Supply and Drainage Profession**

**2.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**8.2.1** The indoor hydrant systems shall be installed in the following buildings or places:

1. The plants and warehouses with a floor area of more than 300 m2;

2. The residences with a building height of more than 21 m;

3. The store buildings, hotel buildings, medical buildings, library buildings and other single or multi-storey buildings with a volume of more than 5,000 m3;

5. The office buildings, teaching buildings and other single or multi-storey civil buildings with a building height of more than 15 m or a volume of more than 10,000 m3.

**8.3.4** Except as otherwise stipulated in this Code and the places that are not suitable to use water to protect from or extinguish fire, the following single or multi-storey civil buildings or places shall be equipped with automatic fire extinguishing systems, and are suitable for applying automatic sprinkler systems:

2. The exhibition, store, catering and hotel buildings with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, as well as the ward buildings, outpatient buildings and operation department with the same building scale in the hospital;

**2) *Technical Code for Firefighting Water Supply and Hydrant Systems* GB 50974-2014**

**5.1.13** The suction pipe, outlet pipe and valve of the fire pump shall meet the following requirements:

1. There shall not be less than two suction pipes in a set of fire pumps. When one in damage or maintenance status, the other suction pipes shall still be able to supply all the fire water design flow;

2. The setting of fire pump suction pipe shall avoid the formation of airbags;

3. There shall not be less than two feeder main pipes in a set of fire pumps to connect with the fire water loop pipe network. When one in maintenance status, the other feeder pipes shall still be able to supply all the fire water design flow;

**5.2.4** The installation of high-place fire tank shall meet the following requirements:

1. When the high-place fire tank is installed on the roof, the manhole of the water tank and the valve of the inlet and outlet pipes shall be protected by the lock or valve box

**3) *Code of Design for Automatic Sprinkler Systems* GB 50084-2017**

**5.0.1** The basic design parameters of wet pipe system applied by the civil buildings and plants shall not lower than the requirements in Table 5.0.1.

**4) *Code for Design of Extinguisher Distribution in Buildings* GB 50140-2005**

**7.1.3** The location and quantity of fire extinguishers shall be determined according to the maximum protection distance of the fire extinguisher. And the most unfavorable location shall be within the protection range of at least 1 fire extinguisher.

**2.2 General provisions that seriously affect safety**

**1) *Technical Code for Firefighting Water Supply and Hydrant Systems* GB 50974-2014**

**7.4.6** The installation of indoor hydrant shall meet the requirements of that there are 2 full water columns from 2 fire branches on the same plane to reach any part in the room at the same time. However, for the multi-storey warehouse with building height less than or equal to 24.0 m and volume less than or equal to 5,000 m3 as well as the places where one fire branch can be used as stipulated in Table 3.5.2 of this Code, one full water column from one fire branch can be used to reach any part in the room.

**7.4.7** The location of indoor hydrants in the buildings shall meet the fire fighting requirements and shall comply with the following provisions:

1. The indoor hydrant shall be equipped in the obviously easy-to-access places such as stairwell, rest platform, front room, walkway, etc. as well as the locations convenient for fire fighting;

**2.3 General Provisions**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**8.2.4** For the densely populated public buildings and commercial service facilities with a floor area of more than 200 m2, it shall be equipped with fire hose reels or portable hose assemblies.

1. **Heating and Ventilation Profession**

**3.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**8.5.2** The smoke exhaust facilities shall be set in the following places or parts of the plants or warehouses:

1. The Type C production sites with lots of people and combustible materials. The aboveground rooms with a floor area of more than 300 m2 and with lots of people or combustible materials in the Type C plants;

2. The Type D workshops with a floor area of more than 5,000 m2;

**8.5.3** The smoke exhaust facilities shall be set in the following places or parts of the civil buildings:

1. The places for singing, dancing, movie and entertainment set in the first, second and third floors with a floor area of more than 100 m2; the places for singing, dancing, movie and entertainment set in the fourth floor and above, underground or semi-underground;

3. The aboveground rooms with a floor area of more than 100 m2 with lots of people in the public buildings;

4. The aboveground rooms with a floor area of more than 300 m2 with lots of combustible materials in the public buildings;

5. The evacuation walkway with a height of more than 20 m in the buildings.

**8.5.4** The smoke exhaust facilities shall be set in the underground or semi-underground buildings (rooms) and the windowless rooms in aboveground buildings with a total floor area of more than 200 m2 or a room floor area of more than 50 m2 and with lots of people or combustible materials.

**9.3.11** The fire valves with nominal operating temperature of 70°C shall be installed at the following locations for the air ducts of ventilation and air conditioning systems:

1. Across the fire compartments;

2. Across the room partitions and floorslabs of ventilation and air conditioning rooms;

3. Across the room partitions and floorslabs in important or fire hazard locations;

4. Across both sides of the deformation joint in the fire compartments;

5. The horizontal pipe section where vertical air duct is connected with horizontal air duct on each floor;

Note: When the ventilation and air conditioning systems of each fire compartment in the buildings are set independently, the junction of the horizontal air ducts and the vertical main pipes may not set fire facilities.

**2) *Technical Standards for Building Smoke Control and Exhaust Systems* GB 51251-2017**

**4.4.10** The smoke exhaust fire valve shall be set in the following places:

1. The horizontal pipe section where vertical air duct is connected with horizontal air duct on each floor;

2. The smoke exhaust branch pipe where a smoke exhaust system covers multiple smoke control compartments;

3. The entrance of smoke exhausts fans.

4. Across the fire compartments

**5.2.2** The control mode of smoke exhaust fans and air feed fans shall meet the following requirements:

1. Manually start on site;

2. Automatically start the automatic fire alarm system;

3. Manually start the fire control room;

4. When any smoke exhaust valve or vent in the system is open, the smoke exhaust fan and air feed fan start automatically;

5. The smoke exhaust fire valve shall be automatically shut down at 280°C, and the smoke exhaust fan and air feed fan shall be shut down in correlation.

**3.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB50016-2014 (2018 Version)**

**9.3.14** Except in the following cases, the air duct of ventilation and air conditioning system shall apply incombustible materials:

1. The air ducts and flexible joints in contact with corrosive media can apply fire retardant materials;

2. When the fire compartment is not crossed and fire valve is set across the room partitions, the air ducts of ventilation and air conditioning system in the stadiums, exhibition halls, airport (cars, boats) buildings (halls) and other large space buildings, single or multi-storey office buildings and Type C, D, E plants can apply fire retardant materials.

**2) *Technical Standard for Smoke Management Systems in Buildings* GB 51251-2017**

**4.4.8** The installation and the fire endurance of smoke exhaust pipes shall comply with the following requirements:

1. The smoke exhaust pipes and its connecting parts shall be able to ensure their structural integrity at 280°C for continuous 30 minutes;

2. The vertical installed smoke exhaust pipes shall be set in an independent pipe well, and the fire endurance of the smoke exhaust pipes shall not be lower than 0.5 h;

3. The horizontal installed smoke exhaust pipes shall be set in the ceiling with its fire endurance not lower than 0.50 h; when being really hard to realize, it can be directly installed indoors yet with its fire endurance not be less than 1.00 h;

4 The fire endurance of the smoke exhaust pipes installed in the ceiling of the walkway and the smoke exhaust pipes crossing the fire compartments, shall not be less than 1.00 h. However, the fire endurance of the smoke exhaust pipes in the equipment rooms and garages can be no less than 0.50 h.

**3.3 General Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**9.3.12** For the vertical exhaust ducts in the bathrooms, toilets and kitchens in the public buildings, anti-backflow measures shall be taken and the fire valve with nominal operating temperature of 70°C shall be set on the branch pipe.

The smoke exhaust pipes of the kitchens in the public buildings shall be set according to the fire compartments. And the fire valve with nominal operating temperature of 150°C shall be set on the branch pipe in connection with the vertical exhaust ducts.

**2) *Technical Standards for Building Smoke Control and Exhaust Systems* GB 51251-2017**

**4.4.12** The installation of the smoke outlet shall be calculated and determined according to Article 4.6.3 of this Standard. And the horizontal distance between any point in the smoke control compartment and the nearest smoke outlet shall not be greater than 30 m.

5. The smoke outlet shall be set in such a way that the smoke plume direction is opposite to the evacuation direction. And the horizontal distance between the smoke outlet and the adjacent edge of the nearby safety exit shall not be less than 1.5 m.

1. **Electronics Profession**

**4.1 Mandatory Provisions**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**8.4.1** The automatic fire alarm systems shall be installed in the following buildings or places:

1. The plants for the production of shoes, clothing, toys, electronics and other similar purposes with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2;

2. Each warehouse for storing cotton, wool, silk, hemp, chemical fiber and their products with an area of more than 1,000 m2, and the cigarette warehouse with a floor area of more than 500 m2 or the total floor area is more than 1,000 m2;

3. The buildings for stores, exhibitions, trade finance, passenger and freight service and other similar purposes with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, and the underground or semi-underground stores with a total floor area of more than 500 m2;

7. The places of children rooms in large and medium kindergartens, the elderly care facilities, the ward building of sanatorium, the hotel buildings and other children activity places with any floor area of more than 1,500 m2 or a total floor area of more than 3,000 m2, as well as the outpatient buildings, ward buildings and operation department in the hospital with no less than 200 beds;

8. The places for singing, dancing, movie and entertainment.

9. The technical interlayer with more combustibles and with a net height of more than 2.6 m, and the plenum or ceiling with combustibles available and with a net height of more than 0.8 m;

13. The places or locations in need of installing mechanical smoke exhaust and smoke control system, rain or pre-action automatic sprinkler system, fixed fire monitor firefighting system, gas firefighting system etc. to interconnect with automatic fire alarm system.

**10.3.1** Except for residential buildings with building height less than 27 m, the following parts of civil buildings, plants and Type C warehouses shall be equipped with evacuation lighting:

1. The enclosed stairwell, smoke-proof stairwell and its front room, the front room or the combined front room in the fire elevator, the refuge walkway and the refuge storey (rooms);

2. The audience hall, exhibition hall, multi-function hall and the densely populated places of with service hall, restaurant, studios with a floor area of more than 200 m2;

3. The underground or semi-underground public places with a floor area of more than 100 m2;

4. The evacuation walkway in the buildings;

5. The production sites and evacuation walkways in densely populated plants.

**2) *Standard on Fire Safety Evacuation Signs Installation* DB11/1024-2013**

**3.2.4** The following buildings or places shall add fire evacuation diversion signs on the evacuation walkways and main evacuation routes:

3. The underground or semi-underground public stores with a total floor area of more than 500 m2;

4. The places for singing, dancing, movie and entertainment.

**3) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.3.2** The residual current action protectors shall not be installed in the emergency lighting distribution box or the input and output circuits of the centralized power supply. And the output circuits shall not be connected to switch devices, sockets and other loads outside the system.

**4) *Design Code for Residential Buildings* GB 50096-2011**

**8.7.9** In case of fire alarm, the access control on the evacuation walkway and the exit shall be able to be unlocked centrally or manually from the inside.

**4.2 General provisions that seriously affect safety**

**1) *Code for Fire Protection Design of Buildings* GB 50016-2014 (2018 Version)**

**10.3.5** The public buildings, residential buildings with building height of more than 54 m, the high-rise plants (warehouses) and Type A, B, C single and multi-storey plants, shall be equipped with light evacuation indicator signs and shall comply with the following provisions:

1. It shall be set in the safety exit and densely populated places above the evacuation door.

**2) *Code for Design of Automatic Fire Alarm System* GB 50116-2013**

**10.1.5** The output power of the emergency power supply of fire fighting equipment shall be greater than 120% of the full load power of the automatic fire alarm and linkage control system. The capacity of the battery group shall ensure that the automatic fire alarm and linkage control system can work continuously for more than 3 h in working load status and in fire situation.

**3) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.2.1** The light fitting shall meet the following requirements:

5. The material of the light fitting panel or lampshade shall meet the following requirements:

1. Except the panel of the marker light that is installed on the ground can use the tempered glass with thickness of 4 mm and above, the panel or the lampshade of the marker light that is installed at a distance of 1 m or less to the ground shall not use fragile material or glass material;
2. The panel or lampshade of light fitting installed above the ceiling and evacuation path shall not use glass material.

**4.3 General Provisions**

**1) *Technical Standard for Fire Emergency Lighting and Evacuate Indicating System* GB 51309-2018**

**3.2.9** The direction marker lights shall meet the following requirements:

1. The evacuation walkways and staircases with maintenance structures shall meet the following requirements:

1) It shall be installed on the wall and cylinder on both sides of the walkway and staircase with less than 1 m from the ground and the height of the staircase;

2) When the safety exit or evacuation door is on the side of the evacuation walkways, the direction marker lights that point to the safety exit or evacuation door shall be installed above the evacuation walkways;

3) When the marker plane of the direction marker light is perpendicular to the evacuation direction, the spacing of the light fitting shall not be more than 20 m; when the marker plane of the direction light is parallel to the evacuation direction, the spacing of the light fitting shall not be greater than 10 m.

**Part III Inspection Points of Low-risk Survey Documents**

1. **Mandatory Provisions**

**1.1 Code for Investigation of Geotechnical Engineering GB50021-2001 (2009 Version)**

**4.1.11** For a detailed survey, the surveyor shall provide detailed geotechnical engineering data and design as well as detailed geotechnical parameters required for construction based on a single building or building complex, and give suggestions pertaining to foundation type, foundation form, foundation treatment, foundation pit support, engineering rainfall, prevention of bad geological effect and other aspects. The surveyor shall mainly do the following work:

1. Collect the general ichnographic map of the building indicating coordinates and terrains; leveled floor elevation of the site; nature, size, load and structural characteristics of the buildings; form and burying depth of the foundation; and allowable deformation of the foundation;

2. Survey the type, cause, scope of distribution, development trend and extent of hazard in relation to bad geological effect, and submit a recommended treatment solution;

3. Survey the type, depth, distribution and engineering attribute of the geotechnical stratum in the scope of building, and analyze and assess the stability, evenness and load of the foundation;

4. Provide the calculation factor of foundation deformation and forecast deformational characteristics of the building if it is necessary to calculate the settlement of the building;

5. Survey buried river courses, groves, tombs, bomb shelters and other buried objects that are bad to the engineering;

6. Survey burying conditions of underground water, and provide the underground water level and its range of variation;

7. Provide the standard earth freezing depth of the site if the region has seasonal frozen earth;

8. Judge the corrosiveness of water and earth to building materials.

**4.1.18** The prospecting depth of the detailed survey shall start with the bottom surface of the foundation and comply with the following provisions:

1. The prospecting hole depth shall be capable to control the major loading stratum of the foundation. When the bottom width of the foundation is no bigger than 5 m, the depth of the prospecting hole shall be no smaller than 3 times the bottom width of the foundation in case of a strip foundation, and in case of a separate pile foundation, the depth shall be no smaller than 1.5 times the bottom width and 5 m;

2. In case of a high-rise building and a foundation that demands the deformation test, the depth of the controlling prospecting hole shall be greater than the calculated deformation depth of the foundation. The general prospecting hole of a high-rise building shall be 0.5-1.0 time the foundation width of the foundation bottom and be deep into the stable distribution stratum;

3. When a building only with the basement or a skirt building a high-rise building fails to meet the anti-uplift designing requirement and makes it necessary to set an anti-uplift pile or anchorage rod, the prospecting hole depth shall meet the uplift bearing capacity requirement;

4. When there is a ground pile load covering a large area or a weak underlying stratum, the depth of the controlling prospecting hole shall be moderately increased;

5. The prospecting hole depth can be moderately adjusted in case of a bedrock, thick gravelly soil layer or other stable stratums within the aforesaid depth.

**4.1.20** The earth sampling and in-situ testing in the detailed survey shall meet geotechnical engineering assessment requirements and comply with the following requirements:

1. The number of prospecting holes used to collect soil samples and perform the in-situ testing shall be determined in line with the stratum structure, evenness of foundation soil and engineering characteristics, and be no less than half of the total number of prospecting holes, and the number of the holes to collect soil samples shall be no less than 1/3 of the total number of prospecting holes;

2. There shall be no less than 6 (groups) in-situ soil samples or in-situ testing data for every major soil layer in every site. When the static sounding or dynamic sounding that features continuous record is used as the major survey method, there shall be at least 3 holes for every site;

3. The surveyor shall collect soil samples or perform the in-situ testing for an interlayer or lenticular body above 0.5 m in thickness within the major loading stratum of the foundation;

4. When the soil stratum is uneven in nature, the surveyor shall increase the number of soil samples or in-situ testing operations.

**4.9.1** The geotechnical survey of pile foundations shall contain the following contents:

1. Survey the type, depth, distribution, engineering attribute and change trend of geotechnical stratums in the site;

2. When using the bedrock as the bearing stratum of piles, the surveyor shall survey the lithology, structure, rock surface change and weathering degree of the bedrock, determine its rigidity, integrity and basic quality level, and judge whether there are caves, free faces, fractured rock masses or weak rock stratums;

3. Survey hydrologic and geological conditions, assess the impact of underground water on pile design and construction and judge the corrosiveness of water quality to construction materials;

4. Identify bad geological effect, distribution of liquefiable soil stratums, special rock and special soil as well as the extent of their damage to pile foundations, and recommend preventive measures;

5. Assess the feasibility of pile formation and demonstrate the construction condition of piles and its environmental impact.

**5.7.2** The surveyor shall determine the site type when performing a survey in the region with the seismic fortification intensity at 6 magnitudes or above. When the site is located in a seismic risk section, the surveyor shall recommend special study in line with the requirement of the current national standard *Code for Seismic Design of Buildings* GB 50011.

**5.7.8** Further judgment of seismic liquefaction shall be performed to the extent of 15 m under the ground, and the judged depth shall be increased to 20 m in case of pile foundations and natural foundations with the underlying burying depth above 5 m. At least 3 prospecting sites shall be arranged to judge liquefaction, and the prospecting hole depth shall be bigger than the liquefaction judgment depth.

**5.7.10** If a site is judged as liquefiable, the surveyor shall determine its liquefaction index and liquefaction level in line with the provisions of the current national standard *Code for Seismic Design of Buildings* (GB50011).

The survey report shall determine the liquefaction level of the site based on liquefaction indexes of different holes, in addition to specifying the liquefaction indexes of liquefiable soil stratums and different holes.

**14.3.3** The geotechnical engineering survey report shall be prepared in line with the task requirement, survey stage, engineering characteristic, geological condition and other concrete factors and include the following contents:

1. Survey purpose, task requirement and technical standard serving as the basis;

2. Profile of the proposed project;

3. Survey method and arrangement of survey work;

4. Terrain, landform, soil stratum, geological structure, geotechnical nature and evenness of the site;

5. Various geotechnical nature indicators as well as recommended values of intensity parameter, deformation parameter and foundation bearing force of geotechnical stratums;

6. Burying condition, type and level of underground water level as well as its change;

7. Corrosiveness of water and earth to building materials;

8. Description of bad geological effect that may affect engineering stability and assessment of its extent of damage to the project;

9. Site stability and suitability assessment

**1.2 Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area DBJ11-501-2009 (2016 Version)**

**5.2.1** The measurement of the underground water level shall comply with the following provisions:

1. The water level shall be measured in case of underground water.

2. (This item is deleted)

3. The water levels of multiple underground water stratums that affect the project shall be measured by stratum.

**7.1.2** The survey and assessment of natural foundations shall include the following work:

1. Provide the recommended bearing force value of the foundation based on conditions of the foundation and building, and analyze and assess the deformation and stability of the foundation if the foundation needs deformation calculation and the building requires the stability calculation of the foundation;

2. When the foundation is uneven or the superstructure involves a big differential load, the surveyor shall analyze the impact of the uneven settlement of the foundation on the foundation base and the superstructure, and provide the foundation scheme and suggestions;

3. The surveyor shall analyze and forecast geotechnical issues that may happen in the basic design, construction and use of the foundation, and provide preventive measures and suggestions;

4. Assess seismic engineering characteristics of the site and foundation soil, including section division of the site, site type, liquefaction of soil and seismic stability of the site;

5. Assess the anti-uplift stability of the building.

**10.1.1** The surveyor shall investigate the following issues when performing the survey and design of building foundations in the mountainous region:

1. Whether the building site and perimeter have bad geological effects, including fracture, landslide, dangerous rock, collapse, debris flow, goaf, subsidence and karst;

1A. Uneven foundation or unstable slide slope caused by existing excavation and filling works;

2. (This item is deleted)

3. Probability to suffer a flood threat;

4. (This item is deleted)

5. Type and unevenness of foundation soil;

6. Distribution trend and nature of special rock and soil stratums.

**1.3 Code for Seismic Design of Buildings GB 50011-2010 (2016 Version)**

**4.1.6** Building sites shall be divided into four types in terms of the equivalent shear wave velocity of the soil stratum and the covering layer thickness of the site according to Table 4.1.6. In particular, type I is divided into 10 and 11 subtypes. When a reliable shear wave velocity and covering layer thickness are available and their values fall near a boundary line of two site types listed in Table 4.1.6, the survey shall allow the use of the interpolation method to determine the characteristic cycle used to calculate the seismic effect.

Table 4.1.6 Covering layer thicknesses of various construction sites (m)

|  |  |
| --- | --- |
| Shear wave velocity of rocks or equivalent shear wave velocity of soil (m/s) | Site type |
| I0 | I1 | II | III | IV |
| υs>800 | 0 |  |  |  |  |
| 800≥υs>500 |  | 0 |  |  |  |
| 500≥υs>250 |  | <5 | ≥5 |  |  |
| 250≥υs>150 |  | <3 | 3〜50 | >50 |  |
| υs≤150 |  | <3 | 3〜15 | 15〜80 | >80 |

**4.1.9** When performing the geotechnical survey on the site, the surveyor shall classify sections that are favorable to the building, ordinary, unfavorable and dangerous, provide the assessment data pertaining to the site type of the building and geotechnical seismic stability (including landslide, collapse, liquefaction and seismic subsidence characteristics), and if it is necessary to perform a supplementary calculation with the time-history analysis method for the building, the surveyor shall also provide the soil layer profile, covering layer thickness of the site and related dynamic parameters in line with designing requirements.

**4.3.2** The surveyor shall perform the liquefaction judgment, when there are saturated sandy soil and saturated powdery soil below the ground, except for 6 magnitudes. If the foundation has a liquefiable soil layer, the surveyor shall take corresponding measures based on concrete situation according to the seismic fortification intensity classification and liquefaction level of the foundation.

Note: The liquefaction judgment of saturated soil in this Article shall exclude loess and powdery clay.

1. **General provisions that seriously affect safety**

**2.1 *Code for Investigation of Geotechnical Engineering* GB 50021-2001 (2009 Version)**

**1.0.3A** When performing the geotechnical engineering survey, the surveyor shall correctly reflect geological conditions of the project, investigate bad geological effects and geological disasters, conduct thorough survey and thorough analysis, and submit a survey report with integral data and correct assessment based on the requirements of different survey tasks.

**4.1.19** The prospecting hole depth of the detailed survey shall comply with the following provisions, in addition to meeting the requirements set out in Article 4.1.18:

1. The depth for the deformational calculation of the foundation can be defined as the depth when the supplementary pressure is equal to 20% of the effective deadweight pressure of the overlaying soil stratum in case of medium and low-compressibility soil or 10% of the effective deadweight pressure of the overlaying soil stratum in case of medium and low-compressibility soil;

2. The depth of the controlling prospecting hole can be moderately reduced but shall be deep into the stable distribution stratum for the skirt building in the general layout plan of the building or when the building only has the basement (or when the supplementary pressure of the foundation bottom p0<0). Moreover, the depth shall be no less than 0.5-1.0 time the foundation width, depending on the load and soil condition;

3. When it is necessary to evaluate the overall stability of the foundation, the depth of the controlling prospecting hole shall meet evaluation requirements, depending on concrete situation.

4. When it is necessary to determine the seismic fortification intensity of the site but there is no reliable covering layer thickness data in the perimeter, a wave velocity testing hole shall be arranged with the depth meeting the requirement to determine the covering layer thickness;

5. In case of large-sized equipment, the depth of the prospecting hole shall be no less than twice the bottom width of the foundation;

6. When it is necessary to perform the foundation treatment, the depth of the prospecting hole shall meet the treatment design and construction requirements for the foundation. When a pile foundation is adopted, the depth of the prospecting hole shall satisfy the requirements set out in Section 4.9 of the Code.

**4.10.1** The geotechnical engineering survey for foundation treatment shall satisfy the following requirements:

1. Provide geotechnical attribute parameters required for the design and construction of foundation treatment based on the foundation treatment solution that may be used;

2. Forecast the impact of the selected foundation treatment solution on the environment and adjacent buildings;

3. Provide the recommended foundation treatment solution;

4. When the site involves complex conditions and there are no successful experiences, the surveyor shall perform a test or comparative test against the proposed solution on the construction site and check the design parameters and treatment effect of the solution;

5. When implementing the foundation treatment, the surveyor shall monitor the construction quality and the impact of the construction work on the ambient environment and adjacent engineering facilities.

**4.10.5** The geotechnical survey of pile-soil composite foundations shall contain the following contents:

1. Investigate the distributions and burying depths of concealed ponds, concealed rivers, concealed groves and caves;

2. Investigate the component, distribution, physical properties, mechanical properties of the soil together with the thickness and burying depth of weak soil to serve as the burying depth of the relative hard stratum for the loading stratum of the pile foundation;

3. Forecast the feasibility of the pile formation operation (whether there are underground barriers, underground waves, underground pipe lines and electric cables) and the impact of the pile formation process on adjacent soil mass, adjacent buildings, engineering facilities and environment (noise, vibration, lateral compaction, ground subsidence or lumping) and the interaction between the pile body and soil (corrosiveness of underground water to pile materials and pollution of pile materials to the ambient soil environment);

4. Assess the loading force of the soil between piles and estimate the loading force of single pile and that of the composite foundation;

5. Assess the compressibility of the soil stratum within the scope of deformation calculation depth of the soil between piles, pile body, composite foundation and below the pile end, and estimate the settlement volume of the composite foundation;

6. Provide shear strengths of the soil between piles and the pile body if the project needs to examine the stability of the composite foundation;

7. Where necessary, the surveyor shall test the loads of the soil between piles, single pile and composite foundation and check the loading force of the composite foundation according to the design for the pile-soil composite foundation.

**5.7.1** If the area involves a seismic fortification intensity at 6 magnitudes or above, the surveyor shall perform the geotechnical engineering survey on the seismic effects of the site and the foundation，and provide the seismic fortification intensity, designed basic seismic acceleration and designed seismic grouping of the surveyed site in line with the seismic dynamic parameter division and related codes approved by the state.

**12.1.2** Water samples and soil samples shall be collected subject to the following provisions:

1. When the concrete structure is located above the underground water level, soil samples shall be collected to perform the corrosiveness test on the soil;

2. When the concrete structure is located in the underground water or surface water, water samples shall be collected to perform the corrosiveness test on the water;

3. When the concrete structure is located above and below the underground water level in part, soil samples and water samples shall be collected respectively to perform the corrosiveness test;

**12.2.3** When the corrosiveness levels rated in line with Table 12.2.1 and Table 12.2.2 are different, the level shall be rated in consideration of the following provisions:

1. If the corrosiveness level only contains weak corrosiveness without medium corrosiveness or strong corrosiveness, the comprehensive rating level shall be weak corrosiveness;

2. If the corrosiveness level contains no strong corrosiveness and the highest level is medium corrosiveness, the comprehensive rating level shall be medium corrosiveness;

3. If one or more corrosiveness levels contain strong corrosiveness the comprehensive rating level shall be strong corrosiveness.

**2.2 *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ11-501-2009 (2016 Version)**

**7.6.1** Stove ash with deterioration and plain fill that can serve as the building foundation can be used for artificial filling in the urban area. When the compactness and thickness of the soil stratum are basically even and the modulus of compressibility Es is no lower than 1.5MPa, or the specific penetration resistance ps is no lower than 0.5MPa, or the blow count of dynamic sounding with light-duty circular cone N10 is no lower than 5, the soil stratum can serve as a natural foundation for a masonry structure or a mixed structure with no more than 6 stories and a regular frame structure building with no more than 3 stories.

**9.2.1** The vertical loading force of a single pile shall be determined in line with the following provisions:

2. If the basic design level of the foundation is level 2 or 3 for a building, the surveyor can estimate the typical value of the vertical loading force of a single pile based on the in-situ testing result and empirical relation.

**10.1.3** The building site shall avoid the section involving bad geological effects like big landslide, dangerous rock, collapse, debris flow, goaf, subsidence and karst that affect the stability of the site as well as the flood. When it is truly necessary to use such section for the building, reliable treatment measures shall be taken.

**2.3 *Code for Seismic Design of Buildings* GB 50011-2010 (2016 Version)**

**4.1.2** Building sites shall be classified in terms of the equivalent shear wave velocity of the soil stratum and the covering layer thickness of the site.

**4.3.4** When thinking it necessary to perform the liquefaction judgment of the saturated sandy soil and powdery soil, the surveyor shall judge the liquefaction of the soil to the extent of 20 m under the ground with the standard penetration test and judgment method. Nevertheless, if Article 4.2.1 of the Code specifies that various buildings may perform no seismic loading force calculation of the natural foundation and foundation, the surveyor can judge the liquefaction of the soil to the extent of 15 m under the ground. When the blow count of standard penetration into the saturated soil (without correction with the rod length) is smaller than or equal to the critical value for the blow count of standard liquefaction judgment, the soil shall be judged as liquefiable soil. When there is mature experience, other judgment methods can be employed.

The critical value for the blow count of standard liquefaction judgment can be calculated with the following formula to the extent of 20 m under the ground:



In the formula in (4.3.4), Ncr -- critical value for the blow count of standard liquefaction judgment;

N0 - Benchmark value for the blow count of standard liquefaction judgment shall be adopted in line with Table 4.3.4;

ds - Depth of standard penetration point into saturated soil (m);

dw - Underground water level (m);

ρc - Percentage of clay fraction content. When it is smaller than 3 or the soil is sandy soil, 3 shall be used;

β - Regulating factor. It shall be 0.80 for the first seismic design group, 0.95 for the second group and 1.05 for the third group.

Table 4.3.4 Benchmark value for the blow count of standard liquefaction judgment N0

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Designed basic seismic acceleration (g) | 0.10 | 0.15 | 0.20 | 0.30 | 0.40 |
| Benchmark value for the blow count of standard liquefaction judgment | 7 | 10 | 12 | 16 | 19 |

**2.4 *Code for Design of Building Foundation* GB 50007-2011**

**5.4.2** The building situated at the top of a stable soil slope shall be subject to the following provisions:

1. In case of a strip foundation or rectangular foundation, when the edge length of the foundation bottom vertical to the edge line of the slope top is no bigger than 3 m, the horizontal distance between the outer edge line of the foundation bottom and the slope top (figure omitted) shall meet the requirement set forth in the formula below, and shall not be less than 2.5 m (formula omitted).

2. When the horizontal distance between the outer edge line of the foundation bottom and the slope top fails to meet the requirements set forth in formulas (5.4.2-1) and (5.4.2-2), the surveyor can use formula (5.4.1) to determine the distance between the foundation and the edge of the slope top as well as the burying depth of the foundation according to the average pressure of the foundation bottom.

3. When the angle of the slope is above 45° and the slope height is above 8 m, the stability of the slope body shall be examined in line with formula (5.4.1).

**2.5 *Provisions Concerning Preparation Depth of Survey Document for House Construction and Municipal Infrastructure Projects* (2010 Version)**

**4.3.3** The description of the underground water and surface water on the site shall contain the following contents:

1. Underground water level, type of underground water and its range of dynamic variation at survey;

2. Supply, runoff and drainage conditions of underground water; supply-drainage relationship between underground water and surface water; and whether there are sources polluting the underground water and surface water as well as existence and extent of pollution;

3. Necessary hydrological and geological experiment results as well as hydrological and geological parameters;

4. Describe multiple underground water stratums by stratum, and describe whether there is a hydraulic contact between water-bearing stratums;

5. Information on the surface water that affects the project;

6. Historical high water level and survey results on the highest underground water level over past 3-5 years;

**4.5.1** The survey report shall perform geotechnical analysis and assessment and provide geotechnical parameters required for design and construction in line with characteristics and requirements of the project on top of geological survey, prospecting, testing and collected existing data;

**4.5.4** The underground water and surface water assessment shall contain the following contents:

1. Analyze and assess the corrosiveness of underground water (soil) and surface water to building materials;

2. Analyze the impact of underground water on the construction project, provide hydrological and geological parameters and recommend corresponding underground water control measures;

3. Assess the interaction between surface water and underground water and the impact of the surface water on project construction, perform the anti-uplift assessment when the anti-uplift issue exists, and give corresponding technical control measures and suggestions;

4. Assess the impact of project construction on original hydrological and geological conditions (changes in the runoff condition of surface water and underground water) when the project needs;

5. When the hydrological and geological conditions on the site are complex and deliver a material impact on foundation assessment, anti-uplift design of the foundation and underground water control and normal geotechnical engineering survey is hard to meet design and construction requirements, the surveyor shall suggest performing special hydrological and geological survey.

**4.5.7** The assessment of natural foundations shall include the following contents:

1. Feasibility to use the natural foundation;

2. Evenness assessment of the natural foundation;

3. Recommend the loading stratum of the natural foundation;

4. Provide the loading force of the foundation;

5. Provide the parameters used to calculate the weak underlying stratum when it exists, and test the strength of the underlying stratum when necessary;

6. Provide parameters used to calculate the deformation if it is necessary to calculate the deformation of the foundation.

**4.5.10** The analysis and assessment of the foundation pit work shall include the following contents:

1. Describe geotechnical conditions around the foundation pit, general ambient environment and safety level of the foundation pit;

2. Provide the weight level and shear strength indicator of the rock and soil stratums, and specify the method used to test the shear strength;

3. Analyze the mutual impact between the construction of the foundation pit and the ambient environment;

4. Recommend the solution for foundation pit excavation and support;

5. Provide hydrological and geological parameters required for underground water control and recommend preventive measures when it is necessary to perform the underground water control during the excavation of the foundation pit;

6. Recommend environmental protection and monitoring measures at the construction stage.

**9.1.3** Drawings in the survey report shall have legends, drawings and charts shall specify the drawing/chart name and project name, drawings shall use appropriate scales, and ichnographic map shall identify the direction.

**9.1.5** The survey report shall contain the following drawings and charts:

1. Planar location map of the prospecting point;

2. Geological cutaway view of the project;

3. In-situ testing result drawing and chart;

4. Indoor testing result drawing and chart;

5. Presentation drawing of the prospecting well (prospecting grove);

6. Statistical table on physical and mechanical testing indicators.

1. **General Provisions**

**3.1 *Code for Investigation of Geotechnical Engineering* GB 50021-2001 (2009 Version)**

**4.1.16** The prospecting point arrangement of the detailed survey shall comply with the following provisions:

1. Prospecting points shall be arranged in terms of the peripheral line and angular point of the building, and arranged to the extent of the building or building complex, if other buildings involve no special requirements;

2. If the major loading stratum or the influential underlying stratum within the scope of one building involves a significant rise and fall, the surveyor shall set more prospecting points to identify its change;

3. Prospecting points shall be separately arranged for the foundation of material equipment, and there shall be no less than 3 prospecting points for the foundation of material power machinery and lofty structures;

4. Survey methods shall combine drilling and sounding and an appropriate number of prospecting wells shall be arranged in the area with complex geological condition, collapsible soil, expansive rock and soil, weathered rock and residual soil.

**4.8.11** The part of the geotechnical engineering survey report related to the foundation pit shall contain the following contents:

1. Site conditions, geological conditions and engineering conditions related to the excavation of the foundation pit;

2. Recommended treatment method, calculation parameter and selection of the support structure;

3. Recommended underground water control method, calculation parameter and construction control;

4. Recommended measures that address possible problems arising in construction methods and construction;

5. Recommendenvironmental protection and monitoring measures at the construction stage.

**4.11.1** The geotechnical engineering survey for the load increase and protection of an existing building shall comply with the following requirements:

1. Collect the load, structural characteristic, functional characteristic and integrity data of the building; collect the data on foundation type, burying depth, planar location, pressure at the foundation bottom and deformation monitoring; collect the data on the underground water exploitation history of the site and its region; and collect the data on drawdown and draw velocity of the water level, settlement and deformation of the ground, and occurrence and development of the ground fracture;

2. When assessing the impact of the floor increase and load increase of the building as well as the impact of the large-area pile load in the adjacent site on the building, the surveyor shall investigate the loading force of the foundation soil as well as possible additional settlement and differential settlement after the load increase. Besides, if the building is built on a slope, the surveyor shall also perform the stability testing;

3. If a building is expanded or a new building is built in its close affinity, the surveyor shall analyze the change in the stress state in the foundation of the existing building derived from the new building and its impact;

4. When assessing the impact of the pumping depression of underground water on the building, the surveyor shall analyze the impact of the solidification, ground subsidence, ground inclination, flexure or crack on the existing building, and forecast its development trend;

5. When assessing the impact of the excavation of the foundation pit on the existing building, the surveyor shall analyze the shear and upheaval at the bottom of the foundation pit derived from the unload after excavation, piping derived from water head differences outside and inside the pit, deformation, displacement or instability of the soil body of the pit wall. Moreover, the surveyor shall also analyze the bad environmental effect of the uneven ground settlement caused by the rainfall in the foundation pit;

6. When assessing the construction of underground works on the existing building, the surveyor shall analyze the impact of the ground subsidence, flexure, deformation or crack after the stress redistribution inside the rock and soil mass as well as the environmental effect from the rainfall in construction. Moreover, the surveyor shall analyze the impact of the excessive deformation or collapse of the surrounding rock stratum on the existing building.

**6.3.7** The geotechnical survey of weak soil shall contain the following contents:

1. Judge the possibility of instability and uneven deformation of the foundation, and when the project is situated near a pond, river bank or slope, the surveyor shall analyze its stability;

2. The loading force of the weak soil foundation shall be determined in line with the indoor testing, in-situ testing, local experience and the following factors:

1) Formation condition, stress history, structural attribute, sensitivity and other mechanical attributes of the weak soil as well as drainage conditions;

2) Type, rigidity, load nature and distribution of the superstructure as well as its sensitivity to the uneven settlement;

3) Type, dimension, burying depth and rigidity of the foundation;

4) Construction method and procedure.

3. When the load difference between a tall storey and a low storey of the building is significant, the surveyor shall analyze the differential deformation and mutual effect, and when there is a pile load covering a large area on the ground, the surveyor shall analyze its adverse impact on the adjacent building;

4. The surveyor can adopt the layerwise summation method or the stress history method of soil, and correct the result based on local experience. Where necessary, the surveyor shall consider the secondary solidification effect of the weak soil;

5. Recommend the form and loading stratum of the foundation, and verify the underlying stratum if the dual-layer soil foundation consists of an upper hard soil stratum and a lower weak soil layer.

**6.5.5** The geotechnical survey of fill shall comply with the following requirements:

1. State the component, distribution and piling time of the fill, judge the evenness, compressibility and compactness of the foundation, and perform stratum classification or zone-based assessment in terms of thickness, strength and deformational characteristic layering;

2. The miscellaneous fill consisting of plain fill with a long piling time, hydraulic fill and building waste or industrial waste with stable performance can serve as the natural foundation if it is relatively even and compact. Yet, the miscellaneous fill consisting of domestic garbage with a high content of organic matters and industrial waste that is corrosive to the foundation shall not serve as the natural foundation;

3. The loading force of the fill foundation shall be determined in line with the factors stated in Article 4.1.24 of the Code;

4. When the natural slope of the fill bottom is above 20%, its stability shall be verified.

**11.1.1** The interior testing items and methods for geotechnical attributes shall conform to the provisions in this chapter, and concrete operation and testing instruments shall comply with the provisions set forth by the national *Standard for Soil Test Method* (GB/T50123) and the national *Standard for Test Method of Engineering Rock Masses* (GB/T50266). Parameter values selected to perform the geotechnical engineering assessment shall be compared to the in-situ testing results or reverse analysis results of prototype observation and then determined after correction.

**11.1.2** Testing items and testing methods shall be determined in line with engineering requirements and geotechnical properties.

**12.1.2** Water samples and soil samples shall be collected subject to the following provisions:

4. Water samples and soil samples shall be collected in the depth of the concrete structure, and at least 2 samples shall be collected on every site. When salt component and content are uneven in the soil, the surveyor shall collect samples by area and by stratum, and collect at least 2 samples for every stratum and area respectively.

**14.3.2** The geotechnical engineering survey report shall be integral in material, accurate, authentic, correct in data, clear in drawing and chart, justifiable in conclusion, reasonable in suggestion, easy to use and suitable for long-term storage. Moreover, the report shall highlight major points and target the project specifically based on local conditions.

**3.2 *Code for Geotechnical Investigation and Design of Building Foundations in Beijing Area* DBJ11-501-2009 (2016 Version)**

**5.1.1** When performing the geotechnical engineering survey, the surveyor shall, in line with site characteristics and engineering requirements, investigate the following hydrological and geological conditions and provide corresponding engineering suggestions through data collection and survey:

1. Type and reserve status of underground water;

2. Spatial distribution and lithological characteristics of major water-bearing stratums;

3. Regional climate data such as annual rainfall, annual evaporation as well as their rules of change and impact on underground water;

4. Supply and drainage conditions of underground water, supply-drainage relationship between underground water and surface water as well as its impact on the underground water level;

5. Underground water level at survey, maximum underground water level over past 3~5 years, and it is recommended to describe annual maximum underground water levels, change trend of water levels and major influencing factors;

6. When the site has multiple underground water stratums that affect the project, the surveyor shall investigate every underground water stratum in respect of type, level, annual rule of change and possible impact of distribution characteristics of underground water on foundation assessment and construction;

7. The surveyor shall recommend underground water control measures when underground water may affect the excavation of the foundation pit;

8. When the underground water level may be higher than the burying depth of the foundation, the surveyor shall analyze the anti-uplift water level;

8A. Water quality of multiple underground water stratums that affect the project;

9. Survey whether there are pollution sources that pollute the underground water and surface water on the site and in the perimeter, assess its possible extent of pollution, and recommend corresponding engineering measures.

**6.2.1** The space and number of prospecting points shall be determined in line with the characteristics of the building and the geotechnical conditions of the site and comply with the following provisions:

1. The space between prospecting points shall be determined according to the complexity of the building site:

It shall be 30-50 m for a simple site, 15-30 m for a medium-complexity site and 10-15 m for a complex site.

2. It is recommended to arrange prospecting points along major bearing walls, axial lines of columns and core tubes. Prospecting points shall be moderately arranged in the parts with sudden change of load and building type.

3. The number of controlling prospecting points shall be determined in line with the geotechnical complexity of the foundation, account for 1/3-1/2 of total prospecting points, and be no less than 2 for every important building.

4. For a detached structure with high center of gravity, such as chimney and water tower, there shall be at least 3 prospecting points, including at least 2 controlling prospecting points.

5. A detached high-rise building shall have at least 4 prospecting points, which shall contain at least 2 controlling prospecting points, and the intensive high-rise building complex in a uniform community shall assure every high-rise building has at least 1 controlling prospecting point. Prospecting points shall be moderately increased in the area with complex stratum changes and the area where ancient river courses are buried.

6. If the major loading stratum or the influential underlying stratum within the scope of one building involves a significant rise and fall, the surveyor shall set more prospecting points to identify its change, and assure the height difference of two adjacent prospecting points is no smaller than 1 m at the stratum top or the space between two adjacent prospecting points is 10 m.

7. The space between prospecting points under the pile foundation scheme shall be 12-24 m for the end bearing pile, and the height difference between two adjacent prospecting points at the loading stratum top shall be controlled at no bigger than 1 m or reinforced to a space of 10 m in case of end bearing piles, controlled at 1-2 m in case of end bearing grouted pile, and the space between prospecting points shall be 20-35 m in case of friction pile. Prospecting points shall be moderately increased when complex geological conditions affect pile formation or there are special design requirements.

8. A prospecting point shall be arranged for every column in case of a complex foundation or the “one column and one pile” work that involves a big load.

**3.3 *Provisions Concerning Preparation Depth of Survey Document for House Construction and Municipal Infrastructure Projects* (2010 Version)**

**2.0.5** The signature and sealing of the survey report shall comply with the following requirements:

1. The survey report shall have the common seal of the institution that completes the report and seals of the legal representative and the technical officer of the institution as well as names (printed) and signatures/seals of the project manager, reviewer and other responsible persons. It shall also bear the registration seal in line with the practice standard for certified surveyors;

2. Drawings and charts shall have the signatures of the persons who complete, check or review the work;

3. Various interior testing and in-situ test documents shall have the signatures of the persons who complete, check or review the work;

4. When the testing and detection work is outsourced to other institutions, the deliverables submitted by the outsourcing service provider shall also bear the seal of the provider and the seal/signature of the responsible person;

5. Other seal management requirements.

**4.2.3** Survey purpose, task requirement and technical standard serving as the basis shall be based on current technical standards and satisfy the requirements set out by the survey task order or survey contract.