



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 51249-2017

Code for fire safety of steel structures in buildings

Issued on: July 31, 2017

Implemented on: April 1, 2018

**Issued by: Ministry of Housing and Urban-Rural Development of the
People's Republic of China;
General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China**

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1 General

1.0.1 This specification is formulated for the purpose of reasonably carrying out the fire protection design of building steel structures, ensuring construction quality, standardizing acceptance and maintenance management, reducing fire hazards, and protecting personal and property safety.

1.0.2 This code is applicable to the fire protection design and fire protection construction and acceptance of steel structures in industrial and civil buildings, as well as steel pipe concrete columns, profiled steel plate-concrete composite floors, steel and concrete composite beams and other composite structures. Not suitable for built-in steel-concrete composite structures.

1.0.3 The fire protection design of building steel structures and the construction and acceptance of fire protection shall not only comply with the provisions of this code, but also comply with the relevant current national standards.

2.1.1 fire-resistant steel fire-resistant steel

The steel whose yield strength at 600°C is not less than 2/3 of its normal temperature yield strength.

2.1.2 concrete-filled steel tubular column

It is a structural member formed by filling concrete in steel pipes and the steel pipes and their core concrete can jointly bear external loads.

2.1.3 composite steel and concrete beam

A beam that is composed of concrete wing plates and steel beams through shear connectors and can be stressed as a whole.

2.1.4 steel deck-concrete composite slab

The concrete is poured on the profiled steel plate, and the floor slab can bear the force together.

2.1.5 section factor section factor

The ratio of the exposed surface area of a steel member to its corresponding volume.

2.1.6 standard fire temperature-time curve standard fire temperature-time curve

In the standard refractory test, the average temperature of the air in the refractory test furnace changes with time.

2.1.7 Standard fire standard fire

The fire whose hot smoke temperature is determined according to the standard fire heating curve.

2.1.8 Equivalent time of fire exposure equivalent time of fire exposure

The time for the temperature of the steel member to reach the same temperature after being exposed to the standard fire and to reach the same temperature when subjected to the actual fire.

2.1.9 temperature effects temperature effects on structural behavior

The structural internal force and deformation of a structure (member) due to its temperature change.

2.1.10 fire limit state fire limit state

The structure or member is affected by fire and reaches a state of deformation that cannot withstand external actions or is not suitable for continued load bearing.

2.1.11 load ratio

The ratio of the load effect design value of a structure or component under fire to its bearing

capacity design value at normal temperature.

2.1.12 critical temperature

The temperature at which a steel member reaches the limit state of its fire resistance bearing capacity under the action of fire.

2.2.1 Material properties

C_c - specific heat capacity of concrete;

C_i - the specific heat capacity of the fire protection layer;

C_s - specific heat capacity of steel;

E_c - modulus of elasticity of concrete at room temperature;

E_{cT} - elastic modulus of concrete at high temperature;

E_s --Elastic modulus of steel at room temperature;

E_{sT} --Elastic modulus of steel at high temperature;

f - design value of steel strength at room temperature;

f_c --design value of axial compressive strength of concrete at room temperature;

f_{ck} --standard value of axial compressive strength of concrete at room temperature;

f_t --Design value of tensile strength of concrete at room temperature;

f_T --Design value of steel strength at high temperature;

R_i - the equivalent thermal resistance of the protective layer;

α_{phac} - thermal expansion coefficient of concrete;

α_{phas} - thermal expansion coefficient of steel;

λ_{bdac} - the thermal conductivity of concrete;

λ_{bdas} - thermal conductivity of steel;

ρ_{hoi} --the density of the fire protection material;

ρ_{hos} - density of steel;

ρ_{hoc} is the density of concrete.

2.2.2 Action, effect, resistance

M_p --plastic bending moment;

M_u --Design value of flexural bearing capacity of CFST under pure bending at room

temperature;

N_u --the design value of the compressive bearing capacity of the short concrete-filled steel tube column under axial compression at room temperature;

N^* --Design value of compressive bearing capacity of CFST column at room temperature;

R_d --design value of structural member resistance;

S_{GK} --the load effect value calculated according to the standard value of permanent load;

S_m --the design value of load (action) effect combination;

S_{QK} --the load effect value calculated according to the standard value of floor or roof live load;

S_{Tk} --the action effect value calculated according to the temperature standard value of the structure under fire;

S_{Wk} --the load effect value calculated according to the wind load standard value.

2.2.3 Geometric parameters

A_c --the cross-sectional area of concrete in the CFST column;

A_s --the cross-sectional area of the steel pipe in the CFST column;

C - section perimeter;

D - section height of concrete filled steel tube column;

d_i --thickness of fire protection layer;

F --the fire-receiving surface area of the unit length member;

F_i --the fire-receiving surface area per unit length of the steel member with fire protection;

h_{c1} --thickness of the concrete wing;

h_{c2} - the height of the profiled steel plate;

h_{cb} --the equivalent thickness of the concrete wing;

h_s - the height of the steel beam;

h_w --height of steel girder web;

l - length or span;

l_0 - calculation length;

t_{tf} --thickness of the upper flange of the steel beam;

t_w --thickness of steel girder web;