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Code for design of high-rising structures

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1 General

1.0.1 This standard is formulated in order to achieve safety and applicability, advanced technology, economical rationality, quality assurance, and environmental protection in the design of high-rise structures.

1.0.2 This standard is applicable to tall steel and reinforced concrete structures, including broadcasting and television towers, tourist towers, communication towers, navigation towers, power transmission towers, petrochemical towers, atmospheric monitoring towers, chimneys, exhaust towers, water towers, mines Frames, observation towers, wind power towers, etc.

1.0.3 The design of high-rise structures should comprehensively consider issues such as fabrication, protection, transportation, on-site construction, and environmental impact and maintenance after completion.

1.0.4 The design of high-rise structures shall not only comply with the provisions of this standard, but also meet the provisions of the relevant current national standards.

2.1.1 High-rising structure

Tall and slender structure.

2.1.2 steel tower

Self-supporting frame towering steel structure.

2.1.3 steel mast guyed steel mast

A towering steel structure made of columns and cables.

2.1.4 reinforced concrete cylindrical tower reinforced concrete cylindrical tower

It is a self-supporting high-rise structure with a cylindrical cross-section and reinforced concrete material.

2.1.5 prestressed anchor bolt prestressed anchor bolt

Anchored in the foundation through the anchor plate, it is used to connect the non-bonded prestressed anchor bolts of the superstructure.

2.1.6 Prestressed anchor rod in rock

A prestressed rock bolt consisting of a free section and an anchor section.

2.1.7 progressive collapse

Initial localized failure, which propagates from member to member, eventually leading to the collapse of the entire structure or of a portion of it disproportionate to the cause.

2.2.1 Action and action effect.

Af-horizontal dynamic displacement amplitude of the tower under the action of wind pressure frequency;

b-basic ice thickness;

N--The design value of the tension force of the fiber rope;

q--the distributed gravity of the tower line;

qa--icing load per unit area;

ql--icing load per unit length;

l/rc-the bending deformation curvature at the representative section of the tower;

l/rdc--the seismic bending deformation curvature at the representative section of the tower;

SA--downwind wind load effect corresponding to the calculation of the critical wind speed in the across wind direction;

SL-wind vibration effect in the cross wind direction;

Swk-the effect of standard value of wind load;

delta u'-horizontal displacement difference between fiber rope layers;

Ve - the sum of the vertical components of the shear resistance on the sliding surface of the soil;

upsiloncr--critical wind speed;

omega0--Basic wind pressure;

omegal-standard value of insulator string wind load;

omegak-the standard value of wind load acting on the unit projected area at the z height of the towering structure;

omega0, R-corresponding to the representative value of wind pressure with return period R;

omegax-standard value of horizontal wind load perpendicular to the direction of conductor and ground wire;

gamma--Icing severity.

2.2.2 Calculation indicators.

C--corresponding limit value specified for deformation and cracks in towering structure design;

fw--design value of steel wire rope or steel strand strength;

fu - the minimum tensile strength of the anchor bolt after heat treatment;

Rt-the characteristic value of the pull-out bearing capacity of a single anchor;

sigmacrt-the local stability critical stress of the cylinder wall.

2.2.3 Geometric parameters.

A--The cross-sectional area of the component, the cross-sectional area of the steel wire rope or steel strand of the fiber rope, the cross-sectional area of the tower tube, and the area of the bottom surface of the foundation;

A1--calculated value of insulator string bearing wind pressure area;

d--the outer diameter of the conductor or ground wire or the calculated outer diameter when covered with ice, the diameter of circular section members, stay ropes, cables, and overhead lines, the outer diameter of the calculated section of the tower, and the diameter of the circular plate (ring)-shaped foundation bottom plate Outer diameter, bolt diameter;

d0 - the inner diameter of the petrochemical tower;

H-total height of towering structure;

h--the distance between fiber ropes and the height of ribs;

H1--the initial height of resonance critical wind speed;

hcr-critical depth calculated by soil weight method;

ht--uplifting depth on foundation;

l0--the calculated length of the shaft between the elastic support points;

rc-the average radius of the bottom section of the cylinder;

rco--section core distance (radius);

t - the thickness of the connecting piece, the thickness of the cylinder wall;

alpha0--uplift resistance angle calculated by soil weight;

theta-the angle between the wind direction and the direction of the conductor or ground wire (°), the angle between the tower column and the vertical line;

lambda0--Converted slenderness ratio of the shaft between the elastic support points;

f-half angle of the compression zone of the section.

2.2.4 Calculation coefficient and others.

A0-converted cross-sectional area of the horizontal section of the tower;

B1-wind load increase coefficient when icing;

B2--Wind load increase coefficient when the transmission tower components are covered with ice;

fR - the maximum rotation frequency of the wind rotor within the normal operating range;

fR, m-passage frequency of m wind rotor blades;

f0, n - the nth order natural frequency of the tower (in the state of the complete machine);

f0,1--the first-order natural frequency of the tower (in the state of the complete machine);

g-crest factor;

I10--10m high turbulent flow;

Re - Reynolds number;

St - Stroller number;

a1--the correction coefficient of ice coating thickness related to the member diameter;

a2-height increment coefficient of ice thickness;

at--half-angle coefficient of tensile reinforcement;

betaz--wind vibration coefficient at height z, wind vibration coefficient of high transmission tower;

gamma0--Importance coefficient of towering structure;

gammaR1--uplift stability coefficient of soil weight;