JTG

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中华人民共和国行业标准

JTG D62-2004

Code for Design of Highway Reinforced Concrete and Prestressed Concrete Bridges and Culverts

公路钢筋混凝土及预应力混凝土桥涵设计规范

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Contents

1 General provision

1.0.1 This code is hereby formulated to enable the design of highway bridges and culverts to be technically advanced, safe and reliable, endurable and applicable and economically reasonable.

1.0.2 This code is applicable to the design of simple reinforced concrete and prestressed concrete structural members of highway bridges and culverts instead of the design of light aggregate concrete and other special concrete bridge and culvert structural members.

1.0.3 This code was formulated according to the design principle specified in the national standard *Unified Standard for Reliability Design of Highway Engineering Structures* (GB/T 50283-1999). The basic terms and symbols are adopted according to the regulations of the national standards *Basic Terms and General Symbols Used in Structural Design of Building and Civil Engineering* (GBJ 132-90) and *Standard for Terms Used in Road Engineering* (GBJ 124-88).

1.0.4 This code adopts the limit state design method based on probability theory and designs according to partial coefficient design expression.
The design reference period adopted in this code is 100 years.

1.0.5 The following two types of limit state design shall be carried out for highway bridges and culverts:

1 Bearing capacity limit state, corresponding to the state in which the bridge and culvert and its members reach the maximum bearing capacity or present the deformation or displacement unsuitable for load bearing.

2 Normal use limit state, corresponding to the state in which the bridge and culvert and its members reach a certain limit value of normal use or durability.

1.0.6 The following three design situations and their corresponding limit state design shall be taken into consideration for highway bridges and culverts:

1 Permanent situation, the situation of bearing the self weight and car load after the bridge and culvert has been built, which lasts for a long time.

2 Temporary situation, the situation of bearing temporary actions (or loads) in the construction process of the bridge and culvert. For the bridges and culverts in this situation, bearing capacity limit state design shall be carried out and normal use limit state design is only required when necessary.

3 Accidental situation, the situation that appears accidentally in the use process of the bridge and culvert, such as uncommon earthquake. For the bridges and culverts in this situation, only the bearing capacity limit state design shall be carried out.

1.0.7 Durability design shall be carried out for highway bridges and culverts according to the environmental condition. The basic requirements for the durability of structural concrete shall meet the regulations of Table 1.0.7.

Table 1.0.7 Basic requirements for the durability of structural concrete

Class of environment	Environmental condition	Maximum water cement ratio	Minimum cement content (kg/m^3)	Minimum strength grade of concrete	Maximum content of chlorine ion (%)	Maximum content of alkali (kg/m^3)
I	The air environments in warm or cold areas, the environments in contact with noncorrosive water or soil	0.55	275	C25	0.30	3.0
II	The air environments in freezing areas, the environments where de-icing salt is used, coastal environments	0.50	300	C30	0.15	3.0
III	Sea water environments	0.45	300	C35	0.10	3.0
IV	The environments subject to the influence of corrosive material	0.40	325	C35	0.10	3.0

Note:

(1) More detailed regulations concerning the maximum water cement ratio and minimum cement content of structural concrete in sea water environment (if there's any) specified in relevant current codes can be used as reference;

(2) The content of chlorine listed in this table means its percentage in relation to cement content;

(3) When actual engineering experiences are available, the minimum strength grade of the structural concrete in Class I environment can be one grade lower than that listed in the table;

(4) For prestressed concrete members, the maximum content of chlorine ion is 0.06%, the minimum cement content is $350kg/m^3$, the minimum strength grade of concrete is C40 or three grades higher than that specified in the table in Class I environment or two grades higher in other classes of environments;

(5) The maximum content of alkali in the cement of super major bridges and major bridges should be decreased to $1.8kg/m^3$. When situated in Class III or IV or coastal environments or the environments where de-icing salt is used, no alkaline active aggregate should be used. For the meaning of super major bridge and major bridge, please see the note of Table 5.1.2 of this code.

1.0.8 For the bridges in Class III or IV environments, the main tension bars should be epoxy resin coated steel bars and special protective measures shall be taken for the prestressed reinforcements, anchorages and connectors if required by the durability.

1.0.9 For the structural concretes with frost resistance requirement in water level fluctuation areas, the frost resistance grade shall not be lower than that specified in Table 1.0.9.

Table 1.0.9 Standard for selection of frost resistance grade of concretes in water level fluctuation area

Area where the bridge is located	Sea water environment	Fresh water environment
Seriously frozen area (the monthly average air temperature of the coldest month is lower than -8℃)	F350	F250

Frozen area (the monthly average air temperature of the coldest month is between -4℃~ -8℃)	F300	F200
Slightly frozen area (the monthly average air temperature of the coldest month is between 0℃~ -4℃)	F250	F150

Note:

(1) The frost resistance test method of concrete shall meet the regulations of the current standard *Testing Methods of Concrete for Highway Engineering* (JTJ 053-94);

(2) The next higher frost resistance grade than that listed in the table shall be selected for the concrete of pier and abutment body.

A proper amount of air-entraining agent shall be mixed into frost resistant concrete. The air content in the concrete mix shall be adopted according to the regulations of the current Technical Regulations for Construction of Highway Bridges and Culverts (JTJ 041-2000).

1.0.10 For the structural concretes with impermeability requirements, the impermeability grade shall meet the regulations of Table 1.0.10.

Table 1.0.10 Standard for selection of impermeability grade of structural concrete

Ratio between maximum acting head and wall thickness of concrete	Impermeability grade	Ratio between maximum acting head and wall thickness of concrete	Impermeability grade
＜5	W4	16—20	W10
5—10	W6	＞20	W12
11--15	W8		

Note: The test method for impermeability of concrete shall conform to the current standard *Testing Methods of Concrete for Highway Engineering* (JTJ 053-94).

1.0.11 The design and construction quality of bridge structure shall be managed and controlled strictly by stages. The use of bridge shall meet the service condition specified in the design. The transit of out-of-limit vehicles is strictly prohibited. The bridge shall be checked and maintained periodically in the service process.

1.0.12 When designing according to this code, the relevant actions (or loads) and their combinations shall meet the regulations of *General Code for Design of Highway Bridges and Culverts* (JTG D60-2004), the material and engineering quality shall conform to *Standard for Quality Inspection and Assessment of Highway Engineering* (JTJ 071-98) and *Technical Regulations for Construction of Highway Bridges and Culverts* (JTJ 041-2000), the structural aseismic design shall conform to *Code for Aseismic Design of Highway* (JTJ 004-89).

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