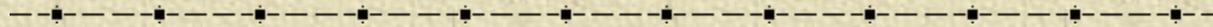


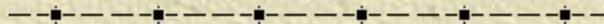


China building fireproof standard system and building performance fireproof design



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Mainly content

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Olympic games will be held in china, world trading fair and Weston development in china are stimulating the Chinese building market which china and the whole world are giving great attention. So many new buildings with definite function will be built, which should show the modernization of china and the science and technology of comparable developments with the world. The construct of these buildings raise requirement to our country existing building code system, so we should face this situation actively. These buildings are usually with multifunction, especially crowd, so fire safety is a more important subject.



All of the worlds are never stopping the research work on building fire. Through much more research of this field, varieties of fireproof testing methods and the construction fireproof standards are developed. As the building fire bring great personnel casualty and properties loss every year in China, our government and society now are paying more and more attention to building fireproof. We unceasingly strengthen the building fire research work, at the same time the government organize relative exports to establish and modify the building fireproof standard system time after time.

1 Existing building fireproof standard systems of china

1.1 Code for building design fireproof

1.2 Professional design code

1.3 Code for fire extinguishing system design

1.4 Building material and product standards

1.5 Construction and acceptance code

1.1 Code for building design fireproof

✦ GBJ16-87 < Code for fire protection design of buildings > and GBJ 0045-95< Code for fire protection design of high raise buildings> are the core code of our country building fireproof. These two codes present definite demand to the building fireproof and design of the architecture system, which involved building materials, building structure and element, personnel evacuation, prevent and exhaust smoke, fire alarm, fire extinguishing system. The government inspected the building fire designed also according to these tow codes.

1.2 Professional design code

On the basis of the < code for fire protection design of buildings > and < code for fire protection design of high raise buildings > the architecture related fields fined the design requirement, and now existing codes are as follows:

- ✦ Code for fire protection design of building inside decoration GB 50222-95
- ✦ Code for fire automatic alarm system design GB50116 - 98
- ✦ Code for auto water-jet fire extinguishing system GB50084 - 2001

1.3 Code for fire extinguishing system design

Because of the difference of fire extinction mode and material of fire extinction the form of fire extinction is various. The government established codes to face this situation:

- ✦ Code for alkyl halide 1211 fire extinguishing system design. GBJ110-87
- ✦ Code for low multiple foam extinguishing system design. GB50151-92
- ✦ Code for alkyl halide 1301 fire extinguishing system design. GB50193-93
- ✦ Code for high and medium multiple-foam extinguishing system design GB50196-93
- ✦ Code for water spraying fire extinguishing system design system GB 50219-95

1.4 Building material and product standards

Every kinds of building materials and products should meet to the building fireproof requirement before entered the building market. There are many standards and testing methods for these materials and products mainly contents are as follows:

- ✦ Building material burning performance grade method GB8624 - 1997 , which classify building materials as four grades . In building engineering the materials and products can be used in building based on the grade.

✦ Kinds of fireproof materials and products standards are as follows.

- ✦ GB 14907-2002 fire resistive coating for steel structures
- ✦ GB 15442.1 - 1995 classification and test methods for fire retardancy of finishing fire retardant paints classification for fire retardancy
- ✦ GB 15930-1995 fire dampers tests
- ✦ GB 16807-1997 fire intumescent seals
- ✦ GB 12955 - 1991 general technical conditions for steel fire door
- ✦ GB 14101 - 1993 wood fire door general technical conditions

1.5 Construction and acceptance code

On the basis of above codes and the practical construction experience we defined the specification of construction, and regulated check construction quality standards after engineering finished.

- ✦ Building inside decoration fireproof construction and acceptance code (in the course of establish)
- ✦ GB50166 - 92 Fire automatic alarm system construction and acceptance design code
- ✦ GB 50261 - 96 Auto water-jet fire extinguishing system construction and acceptance code
- ✦ GB 50263 - 97 Gas fire extinguishing system construction and acceptance code
- ✦ GB 50281 - 98 Foam fire extinguishing system construction and acceptance code
- ✦ Other codes for construction and acceptance are in the course of establishing.



2 Building fireproof performance design

2.1 The contents of performance design

2.2 Step of performance design

2.3 Proceeding fireproof performance design

2.1 The contents of performance design

From above building fireproof standard system we can draw a conclusion that the building fireproof standard system generally conformed to relative fireproof code strictly, which called “prescription” or “instruction” usually. But as the development of building technology building design is more characterized with individuation. These designs usually exceeded the requirement of existing codes in certain aspect or involved some contents not be contained in exist code. This phenomenon may lead the fireproof safety to without guarantee which building have to achieve, and on the other hand although these individual design of these buildings will not induce danger to fireproof safety but which must be modified because of the requirement of existing code not be met. All these make the requirement of building proprietor and projector no way to be satisfied and hampered the development of building market to certain extent. In some special cases that the “prescription” could not be carried out usually we have to hold an export demonstration conference. Some experts make decision through experience eventually form an exports’ opinion as a reference of design.



Now there is a popular tendency turned from instruction fireproof design to performance fireproof design. Some country has promulgated performance fireproof design code and was used in practical building design with indigenous instruction design method to solute the design problem which instruction code could not solute. Performance fireproof design method is a new building fireproof design method based on fireproof safety engineering. It uses the principle and method of fireproof safety engineering. In the first way it makes sure the safety object and every plant to achieve the safety goal and then take quantitative forecast and assessment based on the building structure, use, combustible material property and distribution. Performance fireproof design accounts the fire extension and control, smoke extension and control, fire detecting and warning, initiative and passive fire extinction measure, personnel evacuation and so on. So it can draw an economical and reasonable fireproof design scheme. The performance fireproof method is a consequent tendency of world fireproof design development. The proceeding performance design contents included: reasonable organization evacuation and succor; single layer area larger enough to fireproof division and evacuation difficulty; smoke exhaust design; structure fireproof; fire extension and fireproof separation problem.

2.2 Step of performance design

Performance analysis assessment is very important to performance design, which verify the achievement of requirement level of the old fireproof design scheme and raise improvement suggestion on the basis of fireproof safety engineering.

Simply performance analysis assessment steps

- ✦ Collect engineering related data
- ✦ Determinate the fireproof safety goal
- ✦ Define safety performance aim
- ✦ Fire model design
- ✦ Assessment design scheme
- ✦ Report assessment result



✦ Collect engineering related data

The detailed design drawing list and any complementary material relative to fireproof system that conclude the proper quality of building, building operation quality, user specificity. Such as whether there have special or individual work field, the use or storage of dangerous substance, rare equipment field; whether elder, children, handicapped or other men who need others help existed; man in the soberness or in sleep and so on.



Determinate the fireproof safety goal



The requirement of the building self-safety quality, the requirement of protect personal security, the requirement of protect functions of use. Such as ensure man not to be damaged by smoke; protect handicapped with safe asylum; protect the building structure not to be destroyed.



✦ Define safety performance aim

We should achieve the safety aim according to the practical situation. Such as the visibility, thermal radiation intensity, smoke temperature and toxicity gas strength should be under the extent of safety in the environment which all people stayed before they go to safety field to ensure the safety evacuation of people.



Fire model design

On different assessment goal and building concrete circumstance and correlated statistics data we analyze the fire happened position, fire property, fire scale, state of fire-protection service, finally we determine the most disadvantageous fire circumstance.



Assessment design scheme

Establish the analytic model of fire development, extension, smoke temperature, flow, personnel evacuation, fireproof ambulance and analyze whether the scheme achieved design goals and modifications needed on design such as: increase smoke detector or auto-sprinkler facility, modification of aeration characteristics, change building material, interior decoration and layout of building interior.

✦ Report assessment result

Illustration the assessment method and the source, restriction, reliability of adoption tool, then give an assessment outcome and suggestion.

✦ Because our country has not related code of building fireproof performance design we usually refer international universal design method and related techniques and incorporate the domestic practical situation. The different project possibly need different performance design and assess content but the work procedure is identical elementally as followed diagram. (fig.1)

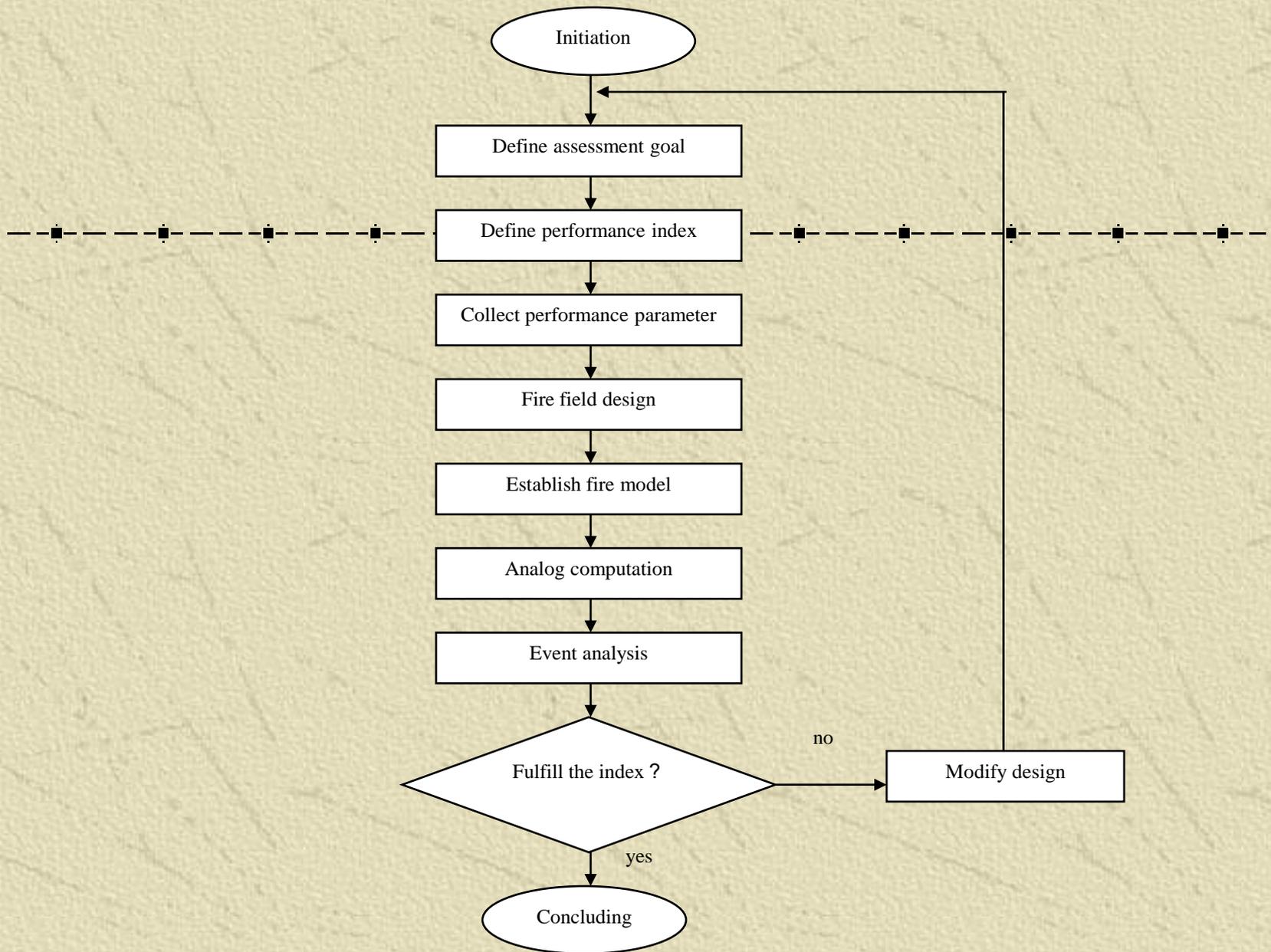


FIG.1 Performance assessment flow diagram

2.3 Proceeding fireproof performance design

According to characteristic of Olympic gymnasium and some modern building engineering we conducted fire performance design as follows:

- ✦ National Olympic gymnasium fireproof performance design(almost finished)
- ✦ Beijing Wukesong physical education culture center fireproof performance design(almost finished)
- ✦ Capital airport 3# flight station fireproof performance design inspected assessment(almost finished)
- ✦ Olympic meeting center fireproof performance inspected assessment (under way)
- ✦ National Olympic bicycle gymnasium fireproof performance design (under way)

3 conclusions

At present the process of building fireproof performance design should be granted by local government include: choice of performance design range, definition of design goal, committed step and so on. Performance design is in the starting phase so we should confer overseas mature experience. We hope we can gain more support from our government; as well we should do more research work on the field to perfect the building fireproof performance design.