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

GB/T 30790.2-2014

**Paints and varnishes -- Corrosion protection of steel structures
by protective paint systems -- Part 2: Classification of
environments**

防护涂料体系对钢结构的防腐蚀保护 第2部分：环境分类

(English Translation)

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1 Scope

1.1

This Part of GB/T 30790 deals with the classification of the principal environments to which steel structures are exposed, and the corrosivity of these environments. It

-- defines atmosphere-corrosivity categories, based on mass loss (or thickness loss) by standard specimens, and describes typical natural atmospheric environments to which steel structures are exposed, giving advice on the estimation of the corrosivity;

-- describes different categories of environment for structures immersed in water or buried in soil;

-- gives information on some special corrosion stresses that may cause a significant increase in corrosion rate or place higher demands on the performance of the protective paint system.

The corrosion stresses associated with a particular environment or corrosivity category represent one essential parameter governing the selection of protective paint systems.

1.2

This Part does not deal with the classification of those environments that consist of special atmospheres (for example those in and around chemical and metallurgical plants).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition dated applies to this document. For undated references, the latest edition of the referenced documents (including all amendments) applies to this document.

GB/T 19292.1, Corrosion of metals and alloys - Corrosivity of atmospheres -

Classification (GB/T 19292.1-2003, ISO 9223:1992, IDT) dew point);

-- an increase in the amount of pollution in the atmosphere (the corrosive pollutants can react with the steel and may form deposits on the surface).

Experience has shown that significant corrosion is likely to take place if the relative humidity is above 80% and around the temperature above 0°C. However, if pollutants and/or hygroscopic salts are present, corrosion occurs at much lower humidity levels.

The atmospheric humidity and air temperature in a particular region of the world will depend on the climate prevailing in that part of the world. A brief description of the most important climates is given in Annex A.

The location of the constituent element of a structure also influences corrosion. Where structures are exposed to the open air, climatic parameters such as rain and sunshine and pollutants in the form of gases or aerosols affect corrosion. Under cover, the climatic influences are reduced. Indoors, the effect of atmospheric pollutants is reduced, although a locally high corrosion rate caused by poor ventilation, high humidity or condensation is possible.

For the estimation of the corrosion stresses, an appreciation of the local environment and the micro-environment is essential. Examples of decisive micro-environments are the underside of a bridge (particularly over water), the roof of an indoor swimming pool, and the sunny and shady sides of a building.

4.2 Corrosion in water and soil

Special care shall be taken when considering structures that are partly immersed in water or partly buried in soil. Corrosion under such conditions is often restricted to a small part of the structure where the corrosion rate can be high. Exposure tests for estimating the corrosivity of water or soil environments are not recommended.

However, different immersion/burial conditions can be described.

4.2.1 Structures immersed in water

The type of water - fresh, brackish or salt - has a significant influence on the corrosion of steel. Corrosivity is also influenced by the oxygen content of the water, the type and quantity of dissolved substances and the water temperature. Animal or vegetable growth can accelerate corrosion.

Three different zones for immersion in water can be defined:

- the underwater zone is the area which is permanently exposed to water;
- the intermediate (fluctuating level) zone is the area in which the water level changes due to natural or artificial effects, thus giving rise to increased corrosion

Annex B (Informative)

Special cases

B.1 Special situations

B.1.1 Corrosion inside buildings

Corrosion stresses on steel structures located inside buildings sheltered from the outside environment are generally insignificant.

If the interior of the building is only partly sheltered from the outside environment, the corrosion stresses may be assumed to be the same as those associated with the type of atmosphere surrounding the building.

The effect of corrosion stresses due to the climate inside the building can be considerably intensified by the use to which the building is put, and these stresses should be dealt with as special stresses (see Clause B.2). Such stresses may occur in indoor swimming pools with chlorinated water, livestock buildings and other special- purpose buildings.

Cooler areas on structures can be subjected to higher corrosion stresses as a result of seasonal formation of condensation.

In cases where surfaces are wetted by electrolytes, even if such wetting is only temporary (for example in the case of saturated building materials), particularly stringent corrosion requirements are necessary.

B.1.2 Corrosion in box members and hollow components

Hollow components that are hermitically sealed and thus inaccessible are not subjected to any internal corrosion, whereas tightly sealed casings which are opened occasionally are subject to small corrosion stresses.

The design of sealed hollow components and box members should ensure their airtightness (e.g. no discontinuous welds, tightly bolted joints). Otherwise - depending on

the outside temperature - moisture from precipitation or condensation may be drawn in and retained. If this is likely to happen, the internal surfaces have to be protected. Note that condensation is often observed even in boxes which have been designed with tightly sealed casings.

Corrosion must be expected inside box members and hollow components that are not c) severe: high mechanical stresses due, for example, to

- solid debris, sand, gravel, shingle or ice entrained in large quantities by fast-flowing water over horizontal or inclined surfaces,

- dense growth (animal or vegetable), particularly if, for operational reasons, it must be removed mechanically from time to time.

B.2.3 Stresses due to condensation

If the temperature at the surface of a structure remains below the dew point for several days, the condensation produced will represent a particularly high corrosion stress, especially if such condensation may be expected to recur at regular intervals (for example in water works, on cooling-water pipes).

B.2.4 Stresses due to medium or high temperatures

In this Part, medium temperatures are those between + 60°C and + 150°C, and high temperatures those between + 150°C and + 400°C. Temperatures of this magnitude only occur under special conditions during construction or operation (for example medium temperatures occur during the laying of asphalt on roads, and high temperatures occur in chimneys made of sheet steel, flue gas ducts, or gas off-take mains in coking works).

B.2.5 Increased corrosion due to combination of stresses

Corrosion may develop more quickly on surfaces exposed simultaneously to mechanical and chemical stresses. This applies particularly to steel structures near roads on which grit and salt have been spread. Passing vehicles will splash salty water and throw up grit on to parts of such structures. The surface is then exposed to corrosion stresses from the salt and at the same time to mechanical stresses due to the impact of grit.

Other parts of the structure will be wetted by salt spray. This affects, for example, the underside of flyovers above roads that have been salted. The spray zone is generally assumed to extend to a distance of 15 m from the road concerned.