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**Technical requirements for noise reduction materials
and noise reduction devices of substations**

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Introduction

This document is drafted according to the specifications in GB/T 1.1-2020 Directions for standardization— Part 1: Rules for the structure and drafting of standardizing documents.

This document is proposed by China Electricity Council.

This document shall be under the jurisdiction of the National Technical Committee on Electromagnetic Compatibility of Standardization Administration of China (SAC/TC 246).

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Any comments or suggestions arising from the implementation of this document can be submitted to the Standardization Management Center of the China Electricity Council (No. 1 Second Lane of Baiguang Road, Beijing, 100761).

Technical requirements for noise reduction materials and noise reduction devices of substations

1 Scope

This document specifies the identifications, technical requirements, testing methods, inspection, product markings, and packaging, transport and storage of noise reduction materials and devices at the substations.

This document applies to noise reduction materials and devices at the substations. The standards for noise reduction materials and devices at the converter stations, switching stations, and electricity distribution rooms can also be developed based on this document.

2 Cited Normative Documents

The following cited normative documents are indispensable in this document. For dated references, only the edition cited applies. For undated references, the latest edition of the normative documents (including any amendments) applies.

GB/T 191 Packaging – Pictorial marking for the handling of goods

GB/T 1094.10 Power transformers -- Part 10: Determination of sound levels

GB/T 2423.37 Environmental testing for electric and electronic products - Part 2: Test methods - Test L: Dust and sand

GB/T 2423.38 Environmental testing for electric and electronic products - Part 2: Test methods - Test R: Water test method and guidance

GB/T 3098.1 Mechanical properties of fasteners -- Bolts, screws and studs

GB/T 3098.2 Mechanical properties of fasteners--Nuts

GB/T 4760 Acoustics--Measurement procedure for silencers

GB/T 5486 Test methods for inorganic rigid thermal insulation

GB 8624 Classification for burning behavior of building materials and products

GB/T 9914.1 Test method for reinforcement products -- Part 1: Determination of moisture content

GB/T 10125 Corrosion tests in artificial atmospheres -- Salt spray tests

GB/T 18696.1 Acoustics -- Determination of sound absorption coefficient and impedance in impedance tubes -- Part 1: Method using standing wave ratio

GB/T 18696.2 Acoustics -- Determination of sound absorption coefficient and impedance in impedance tubes -- Part 2: Transfer function method

GB/T 19889.3 Acoustics -- Measurement of sound insulation in buildings and building elements -- Part 3: Laboratory measurements of airborne sound insulation of building elements

GB/T 20247 Acoustics -- Measurement of sound absorption in a reverberation room

GB 50205 Standard for acceptance of construction quality of steel structures

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DL/T 5218 Technical code for the design of 220kV-750kV substation

HJ/T 17 Windows for sound insulation

HJ/T 90 Norm on acoustical design and measurement of noise barriers

HJ/T 379 Technical requirement for environmental protection product. Sound-proof door

HJ 2523 Technical requirement for environmental protection product. Silencers for ventilation

JB/T 6891 Silencer of the fan. Technical specification

JC/T 469 Glass wool products for sound absorption

JC/T 566 Perforated fiber-cement sheet for absorbing sound

JC/T 803 Perforated gypsum boards for acoustic use

JC/T 903 Granulated wool for acoustic ceiling

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1

Sound absorption coefficient

Under the given frequency and conditions, it is the ratio of the sound energy absorbed by the separating surface plus the sound energy transmitted by the separating surface (wall or dividing wall) to the energy incident upon its surface. Explanations shall be provided for its measurement conditions and frequency. Sound absorption coefficient is the sum of the loss coefficient and transmission coefficient.

[Source: GB/T 3947-1996, 12.38]

3.2

Noise reduction coefficient

It is the average taken over the sound absorption coefficients measured at 250, 500, 1000 and 2000 Hz and rounded to two decimal places. The last digit after the decimal point is 0 or 5.

[Source: GB/T 3947-1996, 12.43]

3.3

Weighted sound reduction index

It is a single-value quantity characterizing the airborne sound insulation performance of the sound insulation materials, elements, or devices.

[Source: GB 50118-2010, 2.1.6, with some modifications]

3.4

Acoustic performance of the rain influence

It is defined as the resistance of acoustic performance to rain influence.

3.5

Acoustic performance of the dust influence

It is defined as the resistance of acoustic performance to dust influence.

3.6

Retention rate of property

It is defined as the percentage of the material property retained after environment and time changes to that before the changes.

3.7

Estimated noise insulation due to the enclosure

It is defined as the difference in A-weighted sound level between the power equipment itself and at a distance of 1 m and a height of 1.2 m from the acoustic enclosure covering the same equipment.

3.8

Structural material

It is a material used to manufacture load-bearing members based on its mechanical performance.

3.9

Sound absorption material

It is a material that can absorb the incident sound energy due to porosity.

3.10

Sound absorption construction

It is a material that can absorb the incident sound energy due to the thin-film membrane or resonance.

3.11

Sound absorption element

It is an element composed of sound-absorbing material alone or of both sound absorption construction and structure material.

3.12

Sound insulation material

It is a material with a blocking effect for airborne transmission of the sound energy so that the sound energy cannot pass through it.

3.13

Sound insulation element

It is an element composed of sound insulation material and structure material and intended to block the sound energy.

3.14

Noise reduction material

It is an acoustic material intended for noise reduction. Depending on its acoustic purposes, the material is divided into sound absorption material/ construction and sound insulation material.

3.15

Noise reduction device

It is a device composed of acoustic damping material and structural material to reduce noise impact. It is classified into sound absorption element, sound insulation element, acoustic enclosure, silencer, acoustic barrier, sound insulation door, sound insulation window and so on.

4 Markings

4.1 Classification of markings

4.1.1 Classification of markings for noise reduction materials

The noise reduction material is divided into sound absorption material/construction and sound insulation material, with a classification code of XS and GS, respectively.

4.1.2 Classification of markings for noise reduction devices

The noise reduction device can be classified into the sound absorption board, sound insulation board, sound absorption and insulation board (composite board), acoustic barrier, sound insulation door, sound insulation window, acoustic enclosure, silencer, and any sound absorption element, sound insulation element with one or multiple functions, or noise reduction device capable of sound elimination. Their classification codes are shown in Table 1.

Table 1 Classification codes of noise reduction devices

Name of the noise reduction device	Sound absorption board	Sound insulation board	Sound absorption and insulation board	Sound barrier	Sound insulation door	Sound insulation window	Acoustic enclosure	Silencer
Classification code	XSB	GSB	XGSB	GSPZ	GSM	GSC	GSZ	XSQ

4.2 Marking method

4.2.1 Marking method for noise reduction materials

Noise reduction materials are marked by the material classification code, material density, and maximum material size sequentially, as shown in Fig. 1.

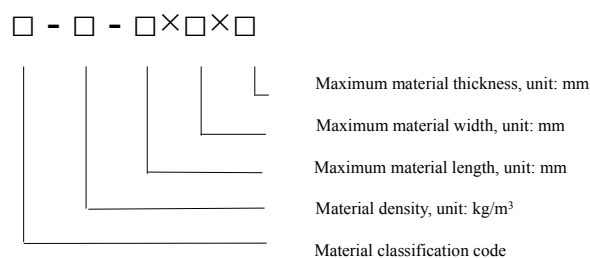


Fig. 1 Marking method for noise reduction materials

Example: Consider a sound absorption material having a density of 32 kg/m³ and a maximum length, width and thickness of 1200 mm, 600 mm and 500 mm, respectively. The material is marked as XS-32-1200×600×50.

4.2.2 Marking method for noise reduction devices

The noise reduction device are marked by the device classification code and maximum material size sequentially, as shown in Fig. 2.

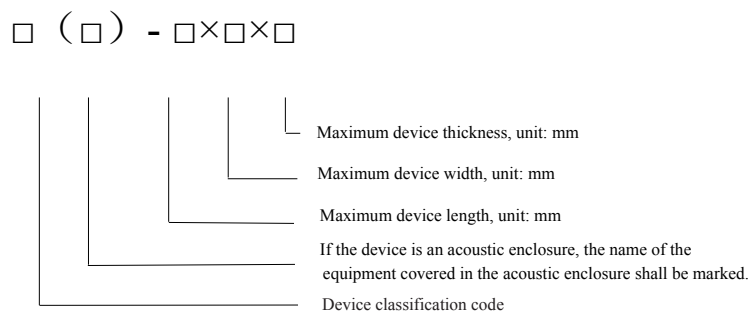


Fig. 2 Marking method for noise reduction devices

Example 1: Consider a sound insulation board having the maximum length, width, and thickness of 1200 mm, 600 mm and 50 mm, respectively. The material is marked as GSB-1200×600×50.

Example 2: Consider an acoustic enclosure for an oil-immersed shunt reactor having the maximum length, width and thickness of 12,000 mm, 10,000 mm and 6000 mm, respectively. The product is marked as GSZ (oil-immersed shunt reactor)—12 000×10 000×6000.

5 Technical Requirements for Noise Reduction Materials

5.1 General specifications

5.1.1 The raw materials used to manufacture the noise reduction material shall conform to relevant national or industry standards for the model, specification, and type.

5.1.2 The noise reduction materials shall have a stable performance and a resistance to corrosion, fire, and water without causing environmental hazards.

5.2 Appearance

The noise reduction materials shall have a regular, uniform shape without such defects as stripping and rusting. Spalling or cracking of the materials is unacceptable during the installation.

5.3 Corrosion resistance

5.3.1 If the corrosion-resistant coating for the metal part in the exposed noise reduction material is a hot-dip zinc coating, the maximum coating thickness shall conform to the requirements in Table 2. During the neutral salt spray test, the time of the appearance of the first rust spot shall be longer than 120 h. A comparison with the reference material not subject to the neutral salt spray test shall reveal no apparent signs of discoloration, spalling or cracking.

5.3.2 If the corrosion-resistant coating for the metal part in the exposed noise reduction material is an organic protective coating, the classification of corrosive environment in atmospheric zones can be found in Appendix A. The requirements for the thickness of different coating systems can be found in Appendix B.

Table 2 Technical requirements for coating thickness

Thickness or diameter of component mm	Local coating thickness μm	Average coating thickness μm
Minimum coating thickness without centrifugal treatment		

Metal material thickness	$d \geq 6$	70	85
	$3 \leq d < 6$	55	70
	$1.5 \leq d < 3$	45	55
Minimum coating thickness with centrifugal treatment			
Threaded part	Diameter $\phi \geq 6$	40	50
	Diameter $\phi < 6$	20	25
Other components	$d \geq 3$	45	55
	$d < 3$	35	45

5.4 Fireproof performance

The fireproof performance class of the noise reduction materials and other auxiliary materials shall not be lower than class B1 (B) in GB 8624.

5.5 Moisture content

The moisture content of the noise reduction materials shall satisfy the requirements in Table 3.

Table 3 Technical requirements for moisture content of the noise reduction materials

Noise reduction materials	Moisture content
Perforated gypsum board	Average: $\leq 2.5\%$; maximum: $\leq 3.0\%$
Glass wool	$\leq 1.0\%$
Perforated fiber cement board	$\leq 13.0\%$
Carbon fiber products	$\leq 10.0\%$
Aramid fiber products	$\leq 7.0\%$
Granular cotton	$\leq 0.2\%$
Metal fiber products	$\leq 1.0\%$
Resonance absorber	$\leq 1.0\%$
Sandstone/microparticle plate	$\leq 1.0\%$

5.6 Sound absorption performance

5.6.1 The noise reduction coefficient of the sound absorption material/construction shall not be lower than 0.60 when its thickness (back cavity included) is not above 120 mm.

5.6.2 The sound absorption performance of the sound absorption material/ construction shall satisfy all of the requirements for the sound absorption coefficient at the three octave bands (125 Hz, 250 Hz, 500 Hz) when its thickness (back cavity included) is not above 120 mm, as shown in Table 4.

Table 4 Requirements for sound absorption coefficients of the sound absorption material/ construction in the octave bands

Frequency Hz	125	250	500
Sound absorption coefficient	≥ 0.25	≥ 0.50	≥ 0.60

5.7 Sound insulation performance

The sound insulation performance of the sound insulation materials shall be determined according to the actual need for noise control. The weighted sound reduction index shall not be lower than 25 dB.

5.8 Acoustic performance of the rain influence

The retention rate of acoustic property of the noise reduction material shall not be lower than 85% after the 1-h rain test.

5.9 Acoustic performance of the dust influence

The retention rate of acoustic property of the noise reduction material shall not be lower than 85% after the 720-h dust and sand test.

6 Technical requirements for noise reduction devices

6.1 Appearance

The raw materials of noise reduction devices shall have a regular, uniform shape without such defects as stripping and rusting. Spalling or cracking of the materials is unacceptable during the installation.

6.2 Corrosion resistance

6.2.1 If the corrosion-resistant coating for the metal part in the exposed noise reduction device is a hot-dip zinc coating, the maximum coating thickness shall conform to the requirements in Table 2. During the neutral salt spray test, the time to the appearance of the first rust spot should be longer than 120 h. A comparison with the reference material not subject to the neutral salt spray test shall reveal no apparent signs of discoloration, spalling or cracking.

6.2.2 If the corrosion-resistant coating for the metal part in the exposed noise reduction device is an organic protective coating, the classification of corrosive environments in atmospheric zones can be found in Appendix A. The requirements for the thickness of different coating systems can be found in Appendix B.

6.3 Fireproof performance

The fireproof performance class of the noise reduction device and other auxiliary materials shall not be lower than class B1 (B) in GB 8624. The design and structure of acoustic enclosure shall not interfere with the firefighting in the event of a fire.

6.4 Processing requirements

6.4.1 The construction quality of the steel structures encased in the noise reduction device shall conform to the requirements in GB 50205.

6.4.2 The performance of fasteners used in the noise reduction device shall conform to the

requirements in GB/T 3098.1 and GB/T 3098.2.

6.4.3 The processing, welding and riveting of silencers shall conform to the requirements in JB/T 6891.

6.5 Mechanical performance

The mechanical performance of the independently installed noise reduction device shall conform to the requirements in DL/T 5218.

6.6 Sound absorption performance

The noise reduction coefficient of the sound absorption element or the noise reduction device with sound absorption function shall not be lower than 0.60.

6.7 Sound insulation performance

6.7.1 The weighted sound reduction index of the sound insulation door shall be determined based on the actual noise control need according to the sound insulation performance rating for the sound insulation door in HJ/T 379.

6.7.2 The weighted sound reduction index of the sound insulation window shall be determined based on the actual noise control need according to the sound insulation performance rating for the sound insulation window in HJ/T 17.

6.7.3 The weighted sound reduction index of the acoustic barrier shall be determined according to the actual need for noise control using the design method described in HJ/T 90. The weighted sound reduction index of the main sound insulation element shall not be lower than 25 dB.

6.7.4 The weighted sound reduction index of the main sound insulation element in the acoustic enclosure shall be determined according to the actual need for noise control. The weighted sound reduction index shall not be lower than the requirement in Table 5.

Table 5 Weighted sound reduction index rating for the main sound insulation elements of the acoustic enclosure

Rating	Lowest requirement for the weighted sound reduction index dB	Recommended voltage grade
I	35	Transformers and oil-immersed reactors at substations and converter stations with a voltage of 750 kV and above
II	30	Transformers and oil-immersed reactors at 220 kV-750 kV substations
III	25	Transformers at 110 kV (66 kV) substations
IV	25	Other power equipment

6.7.5 After the assembly of the acoustic enclosure, the estimated noise insulation due to the enclosure shall not be lower than the requirement in Table 6.

Table 6 Rating of the estimated noise insulation due to the enclosure

Rating	Lowest requirement for estimated noise insulation due to the enclosure dB	Recommended voltage grade
I	23	Transformers and oil-immersed reactors at substations and converter stations with a voltage of 750 kV and above
II	20	Transformers and oil-immersed reactors at 220 kV-750 kV substations
III	17	Transformers at 110 kV (66 kV) substations
IV	10	Other power equipment

6.8 Sound elimination performance

As for silencers or noise reduction devices with sound elimination function, the sound elimination performance is estimated by introducing the arithmetic mean of the octave band insertion loss as specified in HJ 2523 according to the actual noise control need.

7 Testing method

7.1 Appearance inspection

The test sample shall be subject to visual inspection piece by piece under a bright illumination at a distance of 0.5 m.

7.2 Neutral salt spray test

The neutral salt spray test for the noise reduction materials and the noise reduction devices shall be conducted according to the requirements in GB/T 10125.

7.3 Fireproof performance test

The fireproof performance test for the noise reduction materials and the noise reduction devices shall be conducted according to the requirements in GB 8624.

7.4 Moisture content test

7.4.1 The moisture content test for the perforated gypsum board shall be conducted according to the requirements in JC/T 803.

7.4.2 The moisture content test for glass wool shall be conducted according to the requirements in JC/T 469.

7.4.3 The moisture content test for the perforated fiber cement board shall be conducted according to the requirements in JC/T 566.

7.4.4 The moisture content test for carbon fibers and aramid fibers shall be conducted according to the requirements in JC/T 9914.1.

7.4.5 The moisture content test for granulated cotton shall be conducted according to the requirements in JC/T 903.

7.4.6 The moisture content test for other materials should be performed according to the requirements in GB/T 5486.

7.5 Sound absorption performance test

7.5.1 For samples used for sound absorption performance tests, the thickness shall not be above 120 mm. During the inspection, the total thickness of the test sample and the back cavity shall not

be above 120 mm if the the test sample need the back cavity to to augment the sound absorption effect.

7.5.2 The sound absorption performance test for the sound absorption materials/construction shall be conducted according to the requirements in GB/T 18696.1 if the standing wave method is used for the test or according to the requirements in GB/T 18696.2 if the transfer function method is used.

7.5.3 The sound absorption performance test for sound absorption elements or noise reduction devices with the sound absorption function shall be conducted according to the requirements in GB/T 20247.

7.6 Sound insulation performance test

7.6.1 The sound insulation performance test for the sound insulation materials, sound insulation elements, and noise reduction devices with sound insulation function shall be conducted according to the requirements in GB/T 19889.3.

7.6.2 The sound insulation performance of the acoustic enclosure shall be tested using the method described in Table 7.

Table 7 Inspection method for sound insulation performance of the acoustic enclosure

Serial No.	Applicable conditions	Sound source	Inspection method
1	Laboratory measurement	Artificial sound source	The inspection shall be performed according to the requirements in GB/T 19889.3.
2	On-site measurement	Actual sound source	A-weighted sound level of the sound source equipment without acoustic enclosure shall be measured according to the requirements in GB/T 1094.10. After the acoustic enclosure is installed, the A-weighted sound level shall be measured at a distance of 1 m and a height of 1.2 m outside the acoustic enclosure under the same working and operating conditions of the sound source equipment. The difference in the A-weighted sound levels measured with and without acoustic enclosure is the estimated noise insulation due to the enclosure.

7.7 Sound elimination performance test

Sound elimination performance test for the silencers and the noise reduction devices with sound elimination function shall be conducted according to the requirements in GB/T 4760.

7.8 Rain test

The rain test for the noise reduction materials shall be conducted according to the requirements of *Method Ra 2: Drip box* in GB/T 2423.38. The rainfall intensity is chosen as 60 mm/h-90 mm/h, with a duration of 1 h.

7.9 Dust and sand test

The dust and sand test for the noise reduction materials shall be conducted according to the requirements of *Method Lb: free settling dust* in GB/T 2423.37. The settling velocity is chosen as $5 \text{ g}/(\text{m}^2 \cdot \text{d})$, with a duration of 1 h.

8 Inspections

8.1 General specifications

8.1.1 Type test

The type test shall be performed according to the product model. Type test shall be performed according to the requirements in Table 8 if any of the following situations occurs:

- a) For type identification of the new product before the production;
- b) In case of any influence of material or process changes on product performance;
- c) For restarting the production after a suspended production for six months and above;
- e) After five years since the last type test;
- f) Upon users' requests.

The type test is performed in products that have passed the ex-factory inspections by sampling. If the product fails to pass any one inspection item, the product is judged as unqualified.

8.1.2 Ex-factory inspections

When the suppliers provide the products, ex-factory inspections shall be performed for the products in batches according to the requirements in Table 8. The products are not allowed to leave the factory unless they pass the inspections.

a) Fireproof performance: From each batch of the noise reduction material and noise reduction device, three groups of samples are chosen randomly, with five samples in each group. If all of these samples meet the standards, this batch is considered qualified. If fewer than three samples fail to meet the standards, another three groups of samples will be chosen randomly, then if all samples meet the standards, this batch is judged as qualified. Otherwise, the batch is judged as unqualified.

b) Other inspection items:

1) Noise reduction materials. From each batch of the sound absorption material/construction and the sound insulation materials, one group of samples is chosen randomly for the inspection. Each group consists of 5 parallel samples. If the qualification rate of products in this batch is not below 80%, this batch is judged as qualified. If the qualification rate is 50%-80%, another group of samples need be chosen randomly for the inspection, then if the qualification rate of products in this batch is not below 80%, this batch is still judged as qualified. If the qualification rate is below 50%, this batch is judged as unqualified.

2) Noise reduction devices. From each batch of the noise reduction element, silencer and other noise reduction device, one group of samples is chosen randomly for the inspection. Each group consists of three parallel samples. If all of the samples meet the standard, this batch is judged as qualified. If fewer than 2 samples are unqualified, another group of sample will be chosen randomly, then if all of the samples meet the standard, this batch is still judged as qualified. Otherwise, the batch is judged as unqualified. Large-scale silences can be measured on site as needed.

Table 8 Inspection items

Inspection item	Noise reduction materials		Noise reduction devices		Technical requirements	Inspection method
	Indoors	Outdoors	Indoors	Outdoors		
Appearance inspection	▲●	▲●	▲●	▲●	5.2/6.1	7.1
Neutral salt spray test	—	▲	—	▲	5.3/6.2	7.2
Fireproof performance test	▲●	▲●	▲●	▲●	5.4/6.3	7.3
Moisture content test	▲●	▲●	—	—	5.5	7.4
Acoustic performance test(Sound absorption/sound insulation/sound elimination)	▲●	▲●	▲●	▲●	5.6/5.7/6.6/ 6.7/6.8	7.5/7.6/7.7
Rain test	—	▲	—	—	5.8	7.8
Dust and sand test	—	▲	—	—	5.9	7.9

Note: "▲" indicates the item of type test; "●" indicates the item of ex-factory inspection.

8.2 Batch

8.2.1 Noise reduction materials

Each batch of noise reduction material is inspected with the area of 500 m². If the area is less than 500 m², all noise reduction material available constitutes one batch. Each batch consists of the noise reduction material of the same model, specification, and type.

8.2.2 Noise reduction devices

Each batch of acoustic barrier is inspected with the area of 500 m². If the area is less than 500 m², all noise reduction devices available constitute one batch. For other noise reduction devices, 50 pieces constitute a batch. Each batch consists of the noise reduction devices of the same model, specification, and type.

9 Product markings

9.1 The noise reduction materials and the noise reduction devices shall be attached in conspicuous positions with tags carrying the ID information.

9.2 The contents specified in the tag include but are not confined to the following:

- a) Name of the noise reduction material and the noise reduction device;
- b) Product model;
- c) Product marking;
- d) Manufacturer name;
- e) Manufacture date;
- f) Acoustic performance;
- g) Mass (unit: kg)

10 Packaging, transportation and storage

10.1 The noise reduction materials and noise reduction devices that pass the inspections shall be timely packaged.

10.2 Protective and preventive measures shall be taken during the transport of noise reduction materials and noise reduction devices.

10.3 Clearly legible pictorial markings for the package, storage and transport shall be attached to the packaging boxes of noise reduction materials and noise reduction devices according to the requirements in GB/T 191.

10.4 The noise reduction materials and noise reduction devices shall be stored in dry, clean, and well-ventilated places. Preventive measures against rain, snow, and sandstorms shall be taken for outdoor storage.

10.5 The noise reduction materials and noise reduction devices shall not be placed directly on the ground for storage. Instead, moisture-proof measures shall be taken. The noise reduction materials and noise reduction devices shall be kept in good order by model, specification, and type.

Appendix A
(informative)

Categories of corrosive environment in atmospheric zones

The categories of corrosive environment in atmospheric zones are shown in Table A.1.

Table A.1 Categories of corrosive environment in atmospheric zones

Category of corrosion	Mass loss per unit area/thickness loss (1-year solarization)				Typical examples of the environment in mild climate	
	Low carbon steel		Zinc		External	Internal
	Mass loss g/m ²	Thickness loss μm	Mass loss g/m ²	Thickness loss μm		
C1 Very low	≤10	≤1.3	≤0.7	≤0.1		Interior of a heated building, where the air is usually clean, such as offices, shops, schools and hotels
C2 Low	10-200	1.3-25	0.7-5	0.1-0.7	Low pollution environments, mostly in rural areas	Non-heated places, where condensation is more likely to happen, such as warehouses and gyms.
C3 Intermediate	200-400	25-50	5-15	0.7-2.1	Urban and industrial atmosphere polluted by sulfur dioxide to an intermediate level, typically in the low-salinity coastal area	Production workshops with high humidity and a certain level of air pollution, such as food factories, laundry, brewhouse, and dairy farms
C4 High	400-650	50-80	15-30	2.1-4.2	Industrial and coastal zones with intermediate salinity	Chemical plants, swimming pools, and coasting vessels and shipyards
C5-I Very high (industrial)	650-1500	80-200	30-60	4.2-8.4	Industrial zones with high humidity and corrosive atmosphere	Buildings and areas where condensation and severe pollutions are common
C5-M Very high (marine)	650-1500	80-200	30-60	4.2-8.4	Coastal and offshore areas with high salinity	Buildings and areas where condensation and severe pollutions are common

Note: In the hot and humid regions of coastal areas, the quality and thickness losses may exceed the limit for category C5-M.

Appendix B
(informative)
Commonly Used Protective Coating Systems

When the corrosion-resistant coating is an organic protective coating, the commonly used coating systems can be found in Table B.1 and Table B.2.

Table B.1 Type I protective coating systems (applicable to C1-C3 corrosive environments)

No.	Coating system	Number of coats	Thickness of each coat μm	Expected durability ^a
1	Primer for rusty surface	1	50	Low
	Chlorinated rubber finish coat	2	40	
2	Primer for rusty surface	2	50	Intermediate
	Acrylic acid finish coat	2	40	
3	Epoxy primer	2	50	Intermediate
	Acrylic acid finish coat	2	40	
4	Cold sprayed zinc primer	2	≥40	Intermediate
	Cold sprayed zinc finish coat	2	≥40	
5	Ethylene chloride primer	1	80	Intermediate
	Ethylene chloride finish coat	2	80	
6	Acrylic acid primer	2	40	Intermediate
	Acrylic acid finish coat	2	60	
7	Waterborne epoxy primer for rusty surface	2	40	Intermediate
	Polyurethane finish coat	2	40	
8	Epoxy seal coat	2	50	High
	Polyurethane acrylate finish coat	2-3	40	
9	Primer for rusty surface	1	45	High
	Phenol formaldehyde-type micaceous iron oxide intermediate coat	2	50	
	Polyurethane finish coat	2	30	

^a Durability is divided into low (2-5 years), intermediate (5-15 years) and high (above 15 years) levels. The coating system's durability is related to the intensity of attachment of the coating to the substrate.

Table B.2 Type II protective coating systems (applicable to C4-C5 corrosive environments)

No.	Coating system	Number of coats	Thickness of each coat μm	Expected durability ^a
1	Epoxy primer	2	40	Low
	Aliphatic polyurethane finish coat	2	40	
2	Waterborne epoxy primer for rusty surface	2	50	Intermediate
	Epoxy intermediate coat	1	60	
	Polyurethane acrylate finish coat	2	35	
3	Epoxy primer for rusty surface	2	45	Intermediate
	Polyurethane intermediate coat	1	80	

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	Aliphatic polyurethane finish coat	2	40	
4	Primer for rusty surface	2	50	Intermediate
	Epoxy intermediate coat	1	80	
	Fluorosilicate modified acrylic resin finish coat	2	40	
5	Epoxy primer	2	40	High
	Epoxy intermediate coat	1	80	
	Polyurethane acrylate finish coat	2-3	40	
6	Epoxy primer for rusty surface	2	40	High
	Epoxy intermediate coat	1	100	
	Fluorosilicate modified acrylic resin finish coat	2-3	40	
7	Epoxy primer for rusty surface	2	40	High
	Epoxy intermediate coat	1	100	
	Fluorine carbon corrosion-resistant finish coat	2-3	40	

Note: Along with developments of coating materials, some novel coats that are not confined to those specified above may appear. The use of coats examined in the above tests is allowable.

^a Durability is divided into low (2-5 years), intermediate (5-15 years) and high (above 15 years) levels. The coating system's durability is related to the intensity of attachment of the coating to the substrate.

References

- [1] GB/T 3947—1996 Acoustical terminology
 - [2] GB/T 13912 Metallic coatings--Hot dip galvanized coatings on fabricated iron and steel articles--Specifications and test methods
 - [3] GB/T 16731 The gradation of sound absorption property for absorbent products
 - [4] GB 50016 Code for fire protection design of buildings
 - [5] GB 50118—2010 Code for design of sound insulation of civil buildings
 - [6] GJB 3552 General specification for sound absorption materials for naval ships
 - [7] JT/T 646.4 Highway noise barriers—Part 4: Technical requirements and examining methods of acoustics materials
 - [8] TB/T 3122 Acoustic elements of railway sound barrier
 - [9] JIS A6301 Sound absorbing materials
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