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~~ISO/TC156 N7426~~

ISO/DTR 8547

~~2023-7-25~~

ISO/TC 156

Secretariat:- SAC

Date: 2023-09-21

Corrosion of metals and alloys—— — Exposure test results in the Asian Monsoon region

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This second/third/... edition cancels*metals* *and* replaces the first/second/... edition (ISO #####:####), which has been technically revised.

The main changes compared to the previous edition are as follows:

— xxx xxxxxxx xxx xxxx

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Introduction

At present, the mainstream method of classifying environmental corrosion is that specified in ISO 9223. This is a method in which the corrosion rates of various metals are classified in ~~6~~six levels based on the results of direct exposure tests conducted around the world. However, the exposure sites were located only in Japan for the exposure tests in Asian Monsoon region, in which East-Asia, South-Asia and East-South Asia are included and the climates are affected by monsoons. Thus, standardization of an evaluation/classification method suited to the Asian Monsoon region has been strongly desired. Therefore, exposure tests were conducted in three counties including Japan, ~~that is, Japan,~~ Vietnam and Thailand, under the "e-Asia Project".

This ~~report~~document summarizes the exposure test results for carbon steel and galvanized steel sheet.

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Corrosion of metals and alloys — Exposure test results in the Asian Monsoon region

1 Scope

This document provides the data of exposure test results for carbon steel and galvanized steel sheets in three countries, Japan, Vietnam and Thailand, under the "e-Asia Project" as valuable information on the corrosivity of atmospheres in the world.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

~~ISO 8407: 2009, *Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens*~~

~~ISO 9223:~~ ISO 9223:2012, *Corrosion of metals and alloys — Corrosivity of atmospheres — Classification, determination and estimation*

ISO 9225:2012, *Corrosion of metals and alloys — Corrosivity of atmospheres — Measurement of environmental parameters affecting corrosivity of atmospheres*

~~JIS 2382: 1998, *Determination of pollution for evaluation of corrosivity of atmospheres*~~

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3 Terms and definitions

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For the purposes of this document, the terms and definitions given in ISO 9223, and ISO 9225 ~~and the following~~ apply.

ISO and IEC maintain ~~terminological~~terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at ~~https://www.iso.org/obp~~https://www.iso.org/obp

— IEC Electropedia: available at ~~http://www.electropedia.org/~~https://www.electropedia.org/

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4 Exposure ~~Teststests~~

The coupons of carbon steel and galvanized steel sheet were exposed in outdoor environments at 16 exposure test sites in Japan, 13 sites in Vietnam and 7 sites in Thailand as shown in ~~Figure 1.~~Figure 1. Specimens of 3~~-~~mm thickness and are 70~~-~~mm ~~×~~× 150~~-~~mm of carbon steel and specimens of 1~~-~~mm thickness and 70~~-~~mm ~~×~~× 150~~-~~mm of galvanized steel sheet were used for exposure tests. The specimens of carbon steel were exposed both sides. For the specimens of galvanized steel sheet, the backside and cut edge of the coupons were covered by polyethylene sheet after degreasing the specimen in acetone. The exposed surfaces of specimens were exposed to skyward and groundward as shown in ~~Photo 1.~~Figure 2. The corrosion products on the exposed specimens were removed by using chemical solutions according to ISO 8407, and the weight losses were measured to determine the corrosion rate.

For the environmental factors, monthly amounts of airborne salinity and SO_2 were measured by "Dry gauze" and "PbO_2 cylinder", respectively, based on JIS Z 2382. The temperature, relative humidity, and ACM sensor output, I, were recorded in a microcomputer every 10~~-~~min.

For the annual average values of Cl^- deposition, S, and SO_2 deposition, P, those values based on JIS Z 2382, S(JIS) and P(JIS), respectively, ~~-~~were converted to S and P based on ISO 9225~~-(~~:2012, Annex~~-~~F~~):~~

S = 2~~.~~4 S(JIS)

P = 0~~.~~67P(JIS)

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~~Note 1:~~ NOTE Some of numerical data are available from data sources given in ~~Annex A (informative).~~Annex A.

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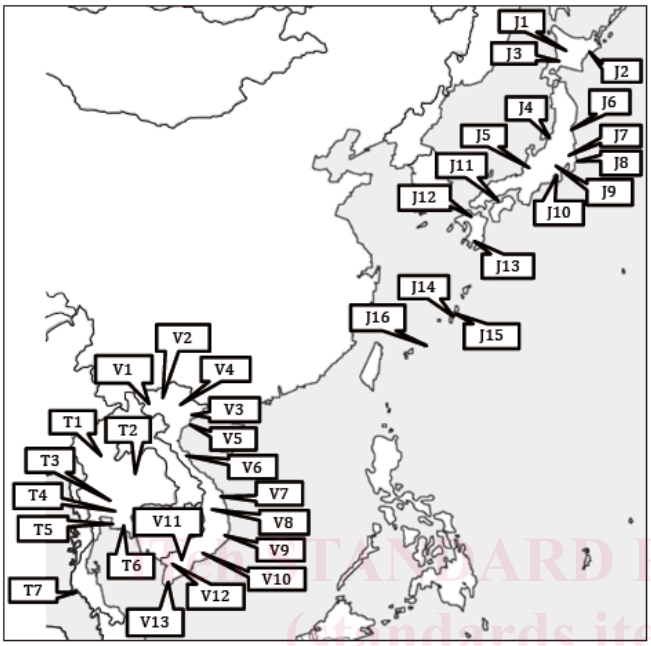

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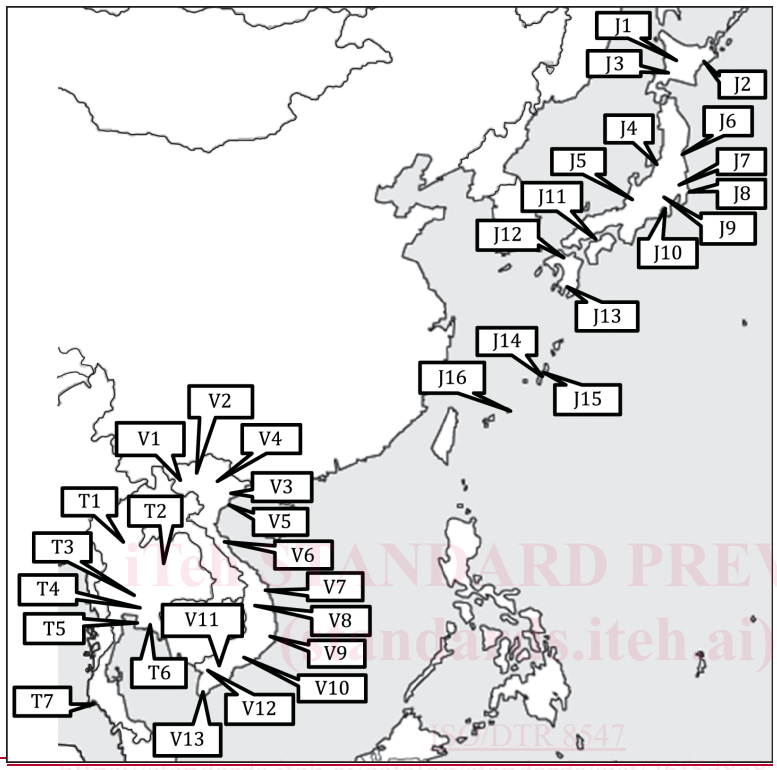

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Key

J1. Asahikawa	J14. Nishihara	V1. Son La	T1. Chaingmai
J2. Akkeshi	J15. Uruma,	V2. Yên Bai	T2. Khon Kaen
J3. Sapporo	J16. Miyakojima	V3. Cua Ong	T3. Pathumthani
J4. Niigata		V4. Hà Nội	T4. Bangkok
J5. Fukui		V5. Con Vanh	T5. Chon Buri
J6. Sendai		V6. Dong Hoi	T6. Rayong
J7. Tsukuba		V7. Dung Quat	T7. Phang Nga
J8. Choshi		V8. Pleiku	
J9. Yamanakako		V9. Phan Rang	
J10. Shimizu		V10. Bien Hoa	
J11. Fukuyama		V11. Can Tho	

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~~J12. Fukuoka~~ ~~V12. Rach Gia~~

~~J13. Kagoshima~~ ~~V13. Ca Mau~~

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J2	Akkeshi	J15	Uruma,	V2	Yên Bai	T2	Khon-Kaen
J3	Sapporo	J16	Miyakojima	V3	Cua Ong	T3	Pathumthani
J4	Niigata			V4	Hà Nội	T4	Bangkok
J5	Fukui			V5	Con Vanh	T5	Chon Buri
J6	Sendai			V6	Đong Hoi	T6	Rayong
J7	Tsukuba			V7	Dung Quat	T7	Phang Nga
J8	Choshi			V8	Pleiku		
J9	Yamanakako			V9	Phan Rang		
J10	Shimizu			V10	Bien Hoa		
J11	Fukuyama			V11	Can Tho		
J12	Fukuoka			V12	Rach Gia		
J13	Kagoshima			V13	Ca Mau		

Figure 1 — Exposure test sites in Japan, Vietnam and Thailand.

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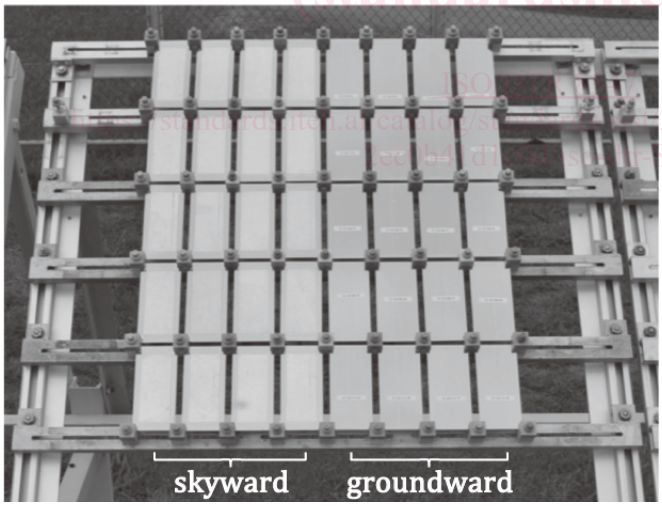

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