P2351177

Report of Testing

Issued date	:	November 20, 2023
Objective	:	Testing of Corrosion Resistance of Electrical Parts by Salt Spray Technique
Customer	:	UI TRUNKING & METAL WORK CO., LTD. 939 Moo 15 Theparak Industrial Estate, Theparak Rd, T.Bangsaothong, A.Bangsaothong, Samutprakarn 10570
Serviced by	:	Smart Manufacturing and Maintenance Technology Research Team Rail and Modern Transports Technology Research Center (RMT) National Science and Technology Development Agency
Received date	:	September 28, 2023
Tested date	:	October 2 – 3, 2023
Sample	:	Electrical conduit fitting
Samples Identification:		- DEVICE BOX FOR DUOBLE GANG TYPE - F.S 4"x4", - F.S BOX4"x4" - DEVICE BOX FOR SINGLE GANG TYPE - F.S. 2"x4" - DEVICE BOX FOR SINGLE GANG TYPE - F.S.W 2"x4" - DEVICE BOX FOR SINGLE GANG TYPE - B.S3.½"x 3.½" - F.S. BOX2"x4", F.S.W BOX2"x4", B.S BOX 3.½"x 3.½" - CONDUIT OUTLET BOX AND COVER, CONDUIT BODY-L.B ¾" - CONDUIT BODY-L.R ¾", CONDUIT BODY-L.L¾" - HANDY BOX-DEEP (NO KNOCK OUT) - OCTAGON BOX-DEEP (NO KNOCK OUT), - SQUARE BOX-SHALLOW (NO KNOCK OUT) - SQUARE BOX-DEEP (NO KNOCK OUT) - SQUARE BOX-SHALLOW (EXTENSION RING) - EUROPA BOX-DEEP (NO KNOCK OUT) - EUROPA BOX-DEEP (EXTENSION RING) - MK BOX-DEEP (NO KNOCK OUT), COVER FOR OCTAGON BOX - COVER FOR SQUARE BOX - COVER FOR EUROPA BOX, COVER FOR HANDY BOX

สถานทางานพัฒนาวิทยาศาสตร์และเทคโนโลยีแห่งชาติ National Science and Technology Development Agency
๑๑๑ อุทยานวิทยาศาสตร์ประเทศไทย ถนนพหลโยธิน ตำบลคลองหนึ่ง อำเภอคลองหลวง จังหวัดปทุมธานี ๑๒๑๒๐
โทรศัพท์ ๐ ๒๕๖๔ ๗๐๐๐ โทรสาร ๐ ๒๕๖๔ ๗๐๐๑
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- BEAM CLAMP UB, IMC COUPLING1", IMC COUPLING¾",
- CHASE NIPPLE1", CHASE NIPPLE¾"
- INSULATED GROUNDING BUSHING1"
- INSULATED GROUNDING BUSHING¾", BUSHING1", BUSHING¾"
- LOCK NUT1", LOCK NUT¾", BEAM CLAMP, IMC STARP 2 HOLES1.¼"
- IMC STARP 2 HOLES1", IMC CONDUIT CLAMP1"
- IMC CONDUIT CLAMP¾", C-CHANAL-DEEP, C-CHANAL-SHALLOW

Tested method : -Salt Spray (Fog) Test according to ISO 9227

Tested instrument : -Salt Spray (Fog) Chamber (Q-FOG-CCT1100)

-Digital Camera (Nikon D7500)

1. Background Information

UI TRUNKING & METAL WORK CO., LTD., is a manufacturer and distributor of wire way, cable tray, cable ladder, floor trunking, electrical conduit pipes, electrical conduit joints lightning protection and lighting coated steel pipe products, electrical conduit pipes, and electrical conduit joints under the UI trademark. In service, these products must be exposed to the general atmosphere. There may be different corrosion resistances in different areas. Therefore, it is often tested to evaluate its ability to resist corrosion. The test that is commonly used is the salt fog test. This is an accelerated corrosion testing method. Its purpose is to evaluate the material's ability to resist corrosion by simulating actual use conditions in the field and testing them in the laboratory. It is a method that allows scientists and engineers to develop new products in a short period of time: for example, the development of coated steel sheet products, finding a new type of coating, etc.

Therefore, the company has sent these products, as shown in **Fig. 1,** to the Smart Manufacturing and Maintenance Technology Research Team, the Rail and Modern Transports Technology Research Center (RMT), National Science and Technology Development Agency, which performed according to ISO 9227 standards for 24 hours to evaluate corrosion resistance using the salt spray technique in order to use the information to improve the design process and the production process for a longer lifespan.

Fig. 1: Samples of electrical conduit fitting used to test corrosion resistance by the salt spray technique.

2. Testing Methods

2.1 Salt Spray Test

2.1.1 Testing apparatus and spraying system

- Q-FOG Model CCT-1100

2.1.2 Sample preparation

- Samples were prepared according to the company's specification.

2.1.3 Surface cleaning and preparation

2.1.3.1Surface cleaning before testing:

- None

2.1.3.2 Surface cleaning after testing:

- Remove excessive salts with flowing tap water, but do not remove corrosion products, and then the surfaces were photographed.

2.1.4 Testing conditions

2.1.4.1Testing standard: ***ISO 9227***

-Type of testing: Neutral salt spray test -Grade of NaCl: ***AR grade 99.5%***

-Type of solvent: ***Deionized water***

-Concentration of solution: ***5 ± 1 wt. % of NaCl***

-pH of solution: ***6.85***

-Conductivity: ***62 mS/cm²***

4.2 Temperature around the samples during testing: ***35 ±2 oC***

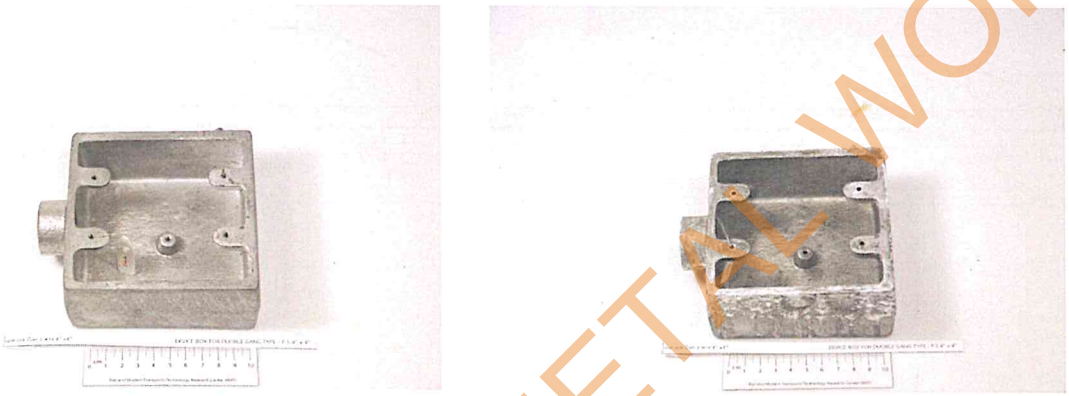
2.1.4.2 Orientation of samples: ***Horizontal***

2.1.4.3 Testing period: ***24 hours***

2.1.4.5 Interruption during testing: ***Non***

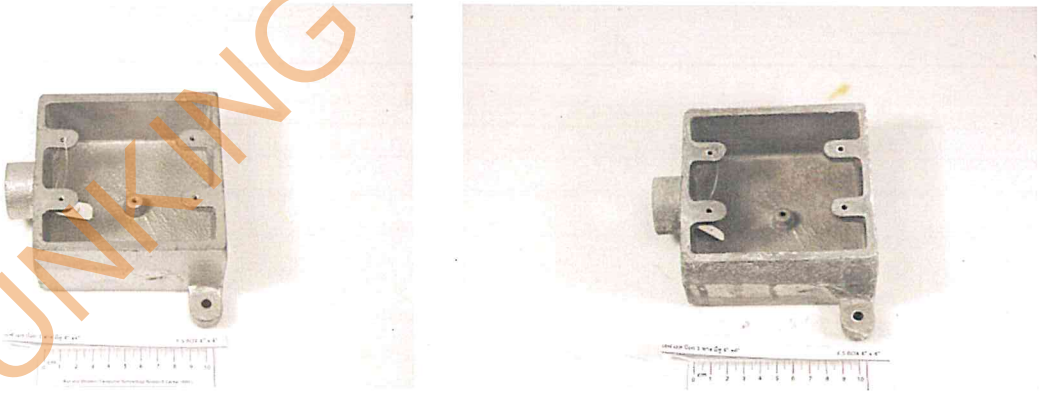
3. Results

The physical appearances of the samples of wire way, cable tray, able ladder and electrical conduit fitting before and after salt spray testing at 24 hours are shown in **Figs. 2–52**, respectively.



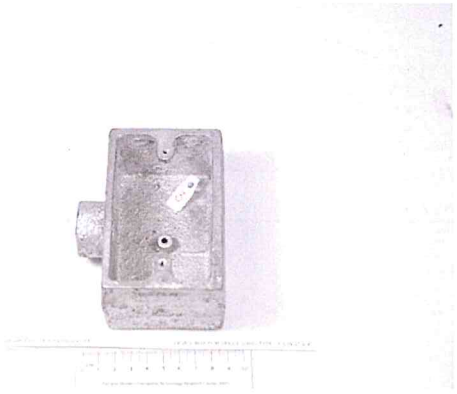
Sample before salt spray test Sample after 24-hours salt spray test

Fig. 2: DEVICE BOX FOR DUOBLE GANG TYPE - F.S 4"x4" before-after salt spray test.



Sample before salt spray test Sample after 24-hours salt spray test

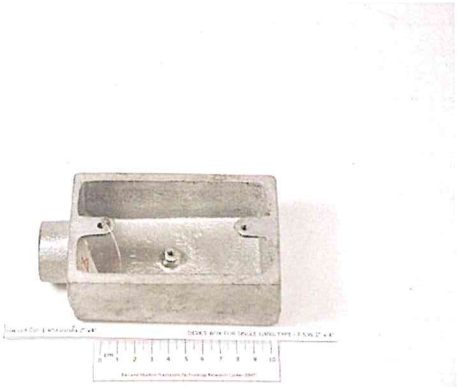
Fig. 3: F.S BOX 4"x4" before-after salt spray test.



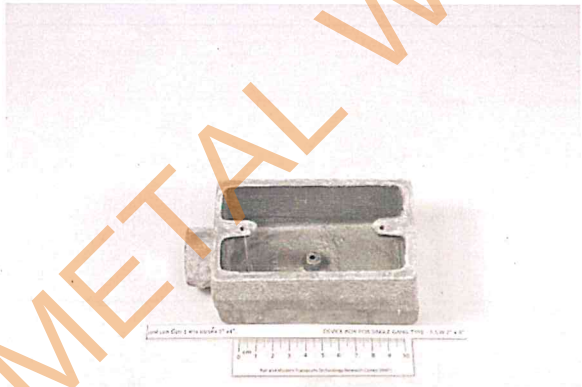
Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 4: DEVICE BOX FOR SINGLE GANG TYPE - F.S.W 2"x4" before-after salt spray test.

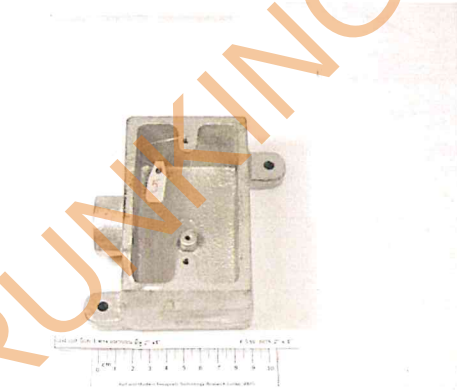


Sample before salt spray test

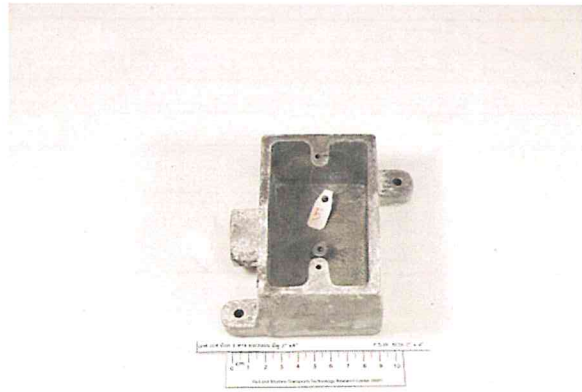


Sample after 24-hours salt spray test

Fig. 5: DEVICE BOX FOR SINGLE GANG TYPE - F.S. 2"x4" before-after salt spray test.

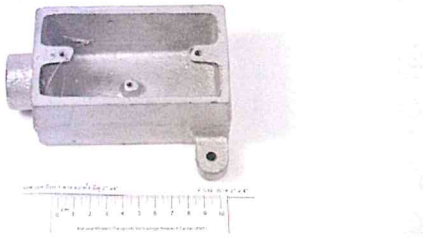


Sample before salt spray test



Sample after 24-hours salt spray test

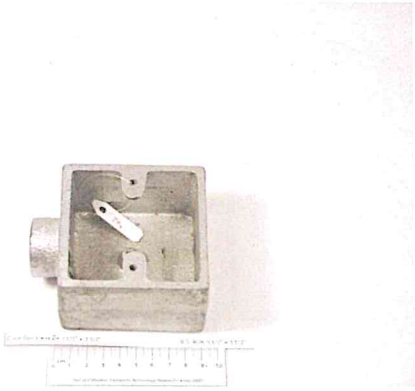
Fig. 6: F.S.W BOX 2"x4" before-after salt spray test.



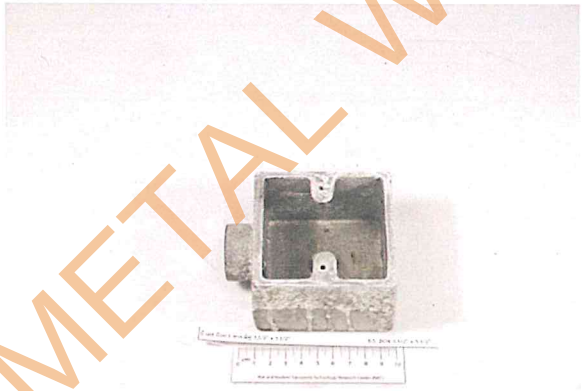
Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 7: F.S.W BOX 2"x4" before-after salt spray test.

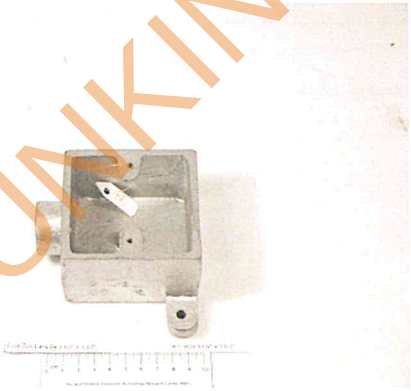


Sample before salt spray test

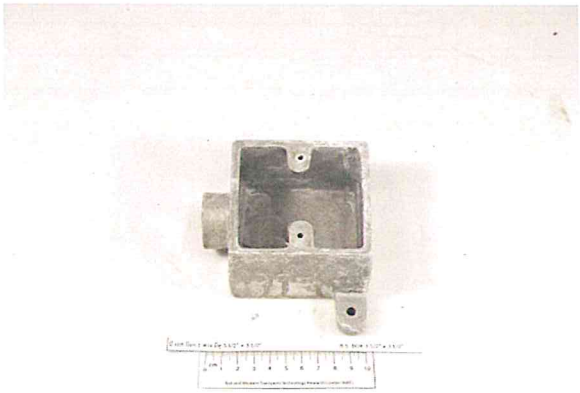


Sample after 24-hours salt spray test

Fig. 8: DEVICE BOX FOR SINGLE GANG TYPE - B.S3.½"x 3.½" before-after salt spray test.

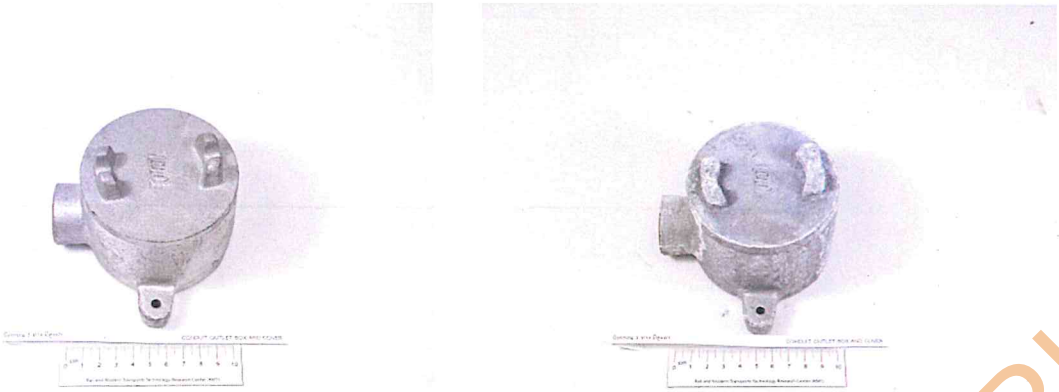


Sample before salt spray test



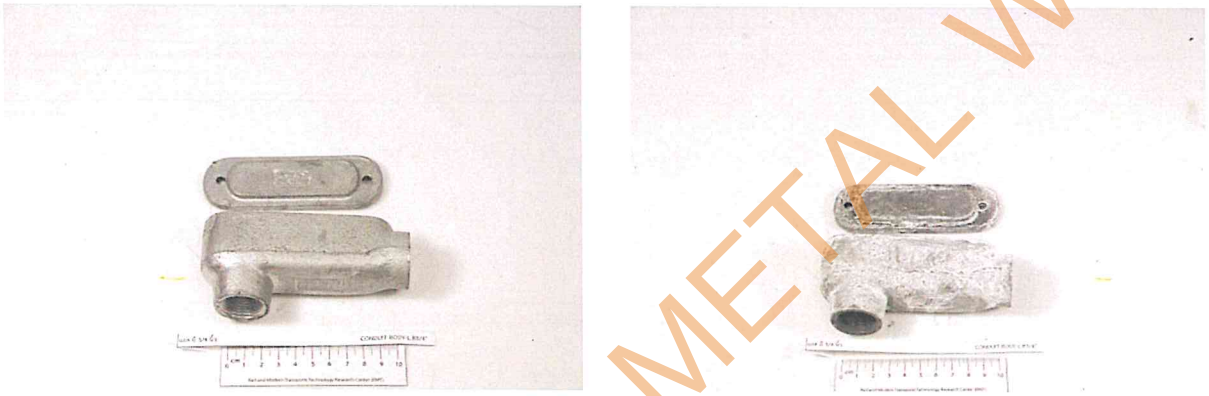
Sample after 24-hours salt spray test

Fig. 9: B.S BOX 3.½"x 3.½" before-after salt spray test.



Sample before salt spray test Sample after 24-hours salt spray test

Fig. 10: CONDUIT OUTLET BOX AND COVER before-after salt spray test.



Sample before salt spray test Sample after 24-hours salt spray test

Fig. 11: CONDUIT BODY-L.B ¾" before-after salt spray test.

Sample before salt spray test Sample after 24-hours salt spray test

Fig. 12 CONDUIT BODY-L.R ¾" before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 13: CONDUIT BODY-L.L¾" before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 14: HANDY BOX-DEEP (NO KNOCKOUT) before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 15: OCTAGON BOX-DEEP (NO KNOCKOUT) before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

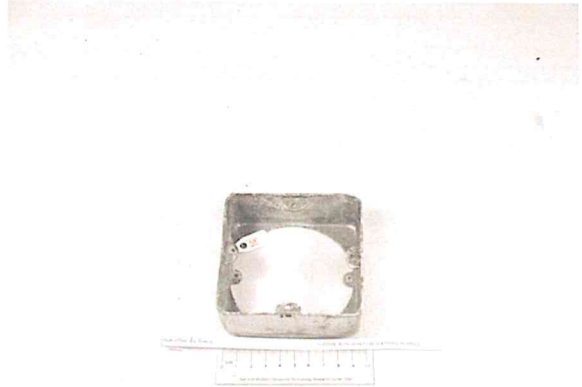
Fig. 16: SQUARE BOX-SHALLOW (NO KNOCKOUT) before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 17: SQUARE BOX-DEEP (NO KNOCKOUT) before-after salt spray test.

Sample before salt spray test



Sample after 24-hours salt spray test

Fig. 18: SQUARE BOX-SHALLOW (EXTENSION RING) before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 19: EUROPA BOX-DEEP (NO KNOCKOUT) before-after salt spray test.

Sample before salt spray test

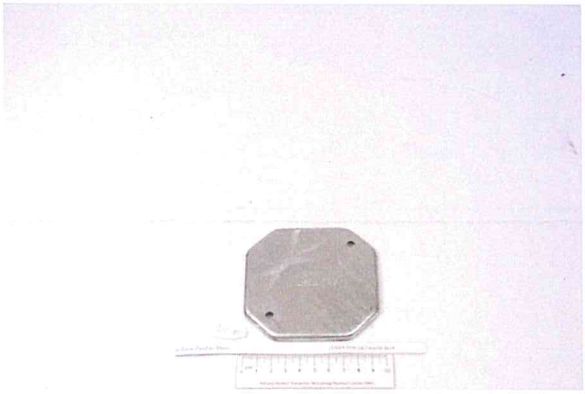
Sample after 24-hours salt spray test

Fig. 20: EUROPA BOX-DEEP (EXTENSION RING) before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

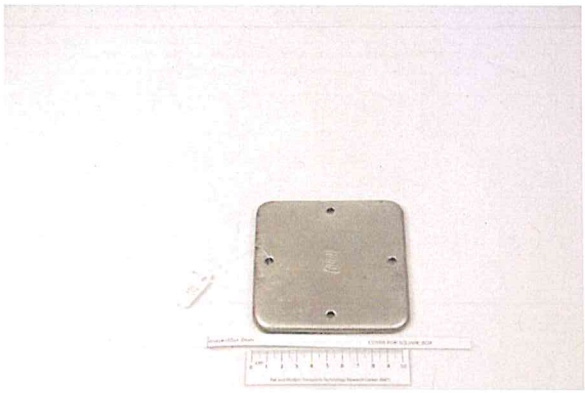
Fig. 21: MK BOX-DEEP (NO KNOCKOUT) before-after salt spray test.



Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 22: COVER FOR OCTAGON BOX before-after salt spray test.



Sample before salt spray test

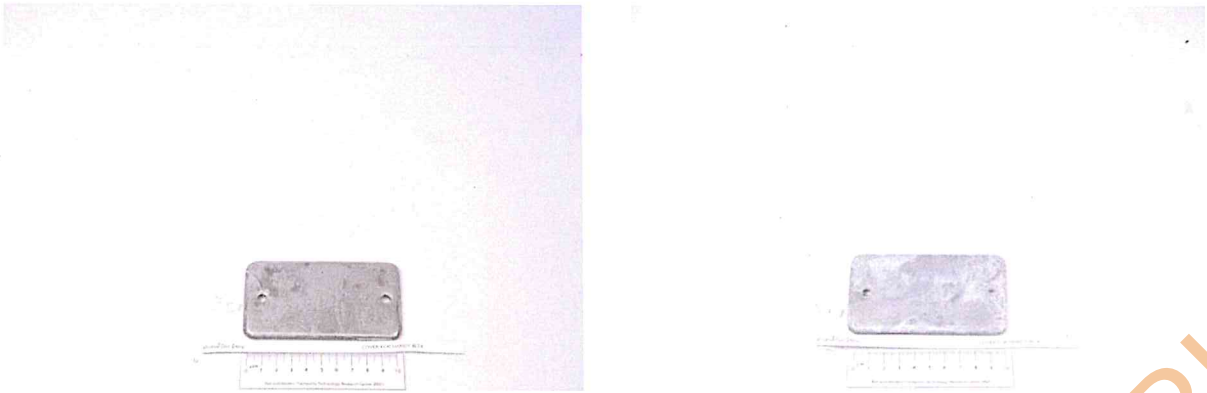
Sample after 24-hours salt spray test

Fig. 23: COVER FOR SQUARE BOX before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 24: COVER FOR EUROPA BOX before-after salt spray test.



Sample before salt spray test Sample after 24-hours salt spray test

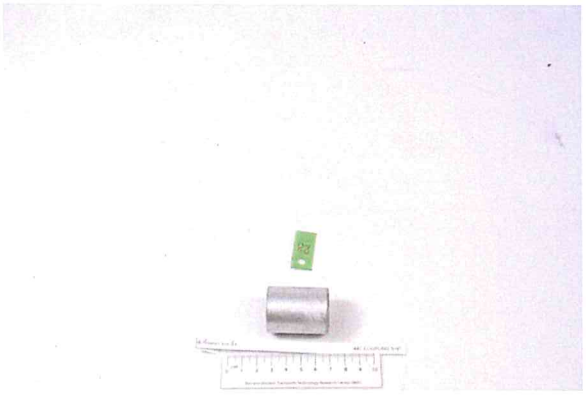
Fig. 25: COVER FOR HANDY BOX before-after salt spray test.

Sample before salt spray test Sample after 24-hours salt spray test

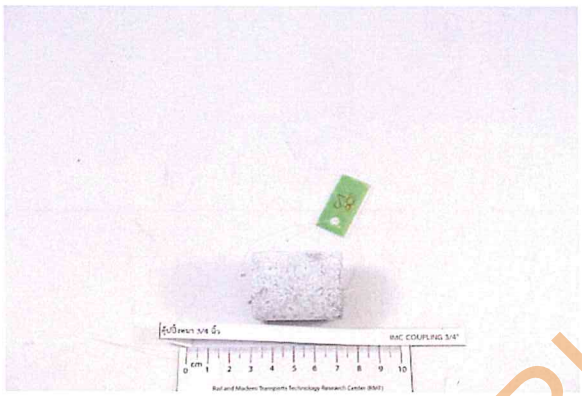
Fig. 26: BEAM CLAMP UB before-after salt spray test.

Sample before salt spray test Sample after 24-hours salt spray test

Fig. 27: IMC COUPLING 1" before-after salt spray test.

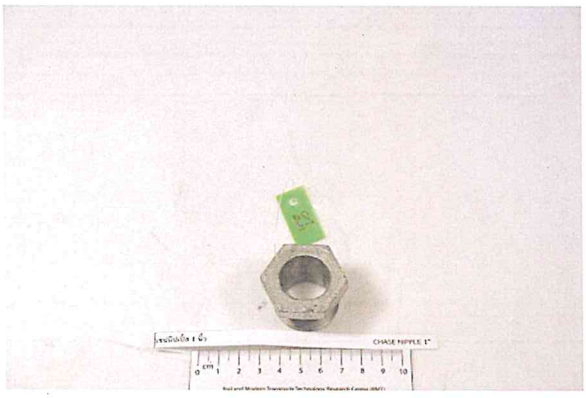


Sample before salt spray test



Sample after 24-hours salt spray test

Fig. 28: IMC COUPLING ¾" before-after salt spray test.



Sample before salt spray test

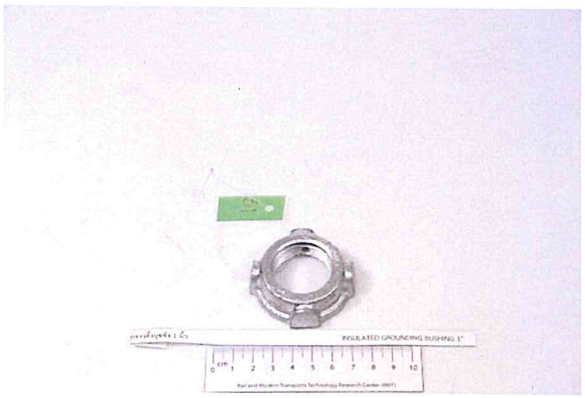
Sample after 24-hours salt spray test

Fig. 29: CHASE NIPPLE 1" before-after salt spray test.

Sample before salt spray test

Sample after 24-hours salt spray test

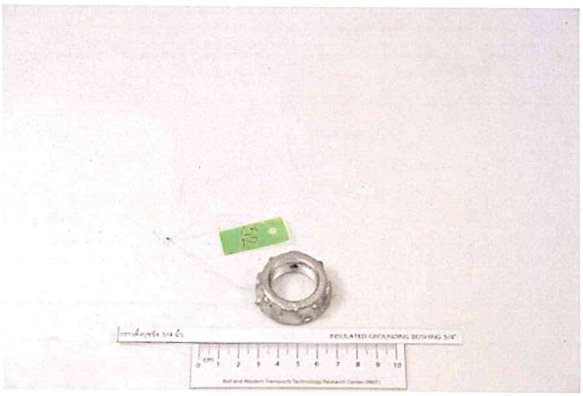
Fig. 30: CHASE NIPPLE ¾" before-after salt spray test.



Sample before salt spray test

Sample after 24-hours salt spray test

Fig. 31: INSULATED GROUNDING BUSHING 1" before-after salt spray test.

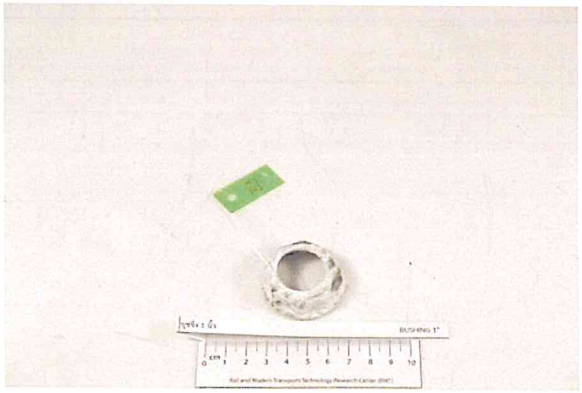


Sample before salt spray test

Sample after 24-hours salt spray test

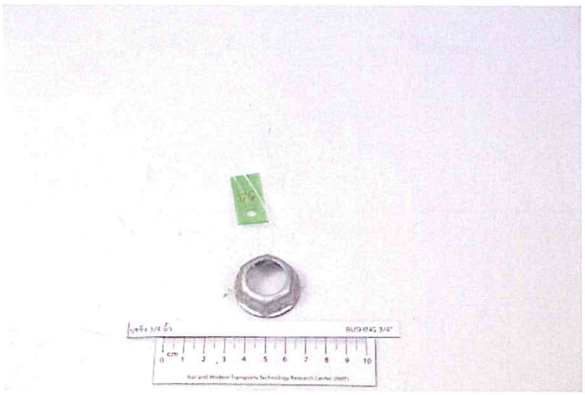
Fig. 32: INSULATED GROUNDING BUSHING ¾" before-after salt spray test.

Sample before salt spray test

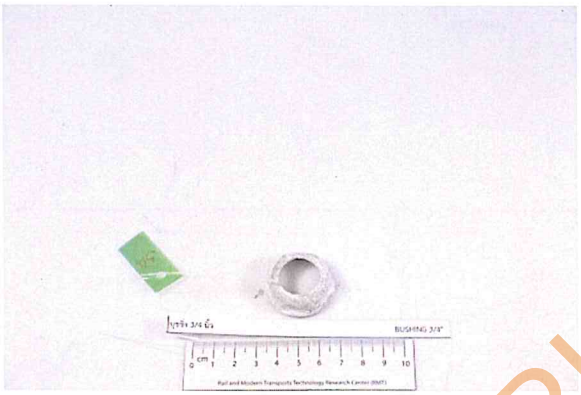


Sample after 24-hours salt spray test

Fig. 33: BUSHING 1" before-after salt spray test.

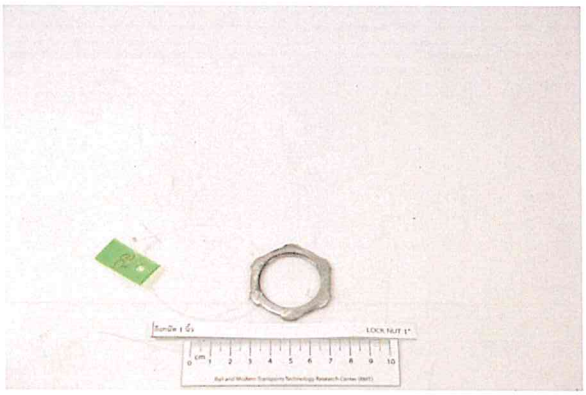


Sample before salt spray test

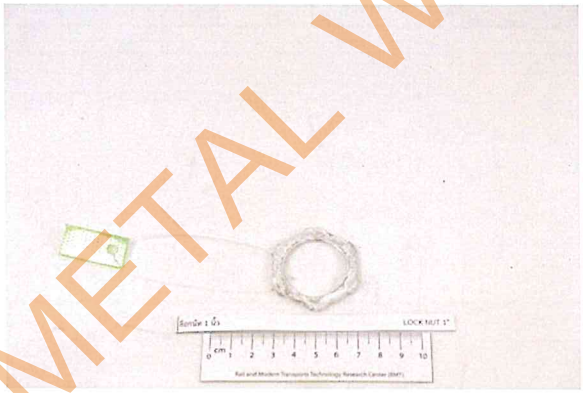


Sample after 24-hours salt spray test

Fig. 34: BUSHING ¾" before-after salt spray test.



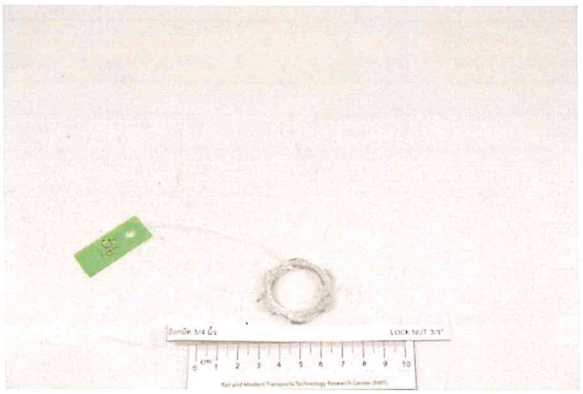
Sample before salt spray test



Sample after 24-hours salt spray test

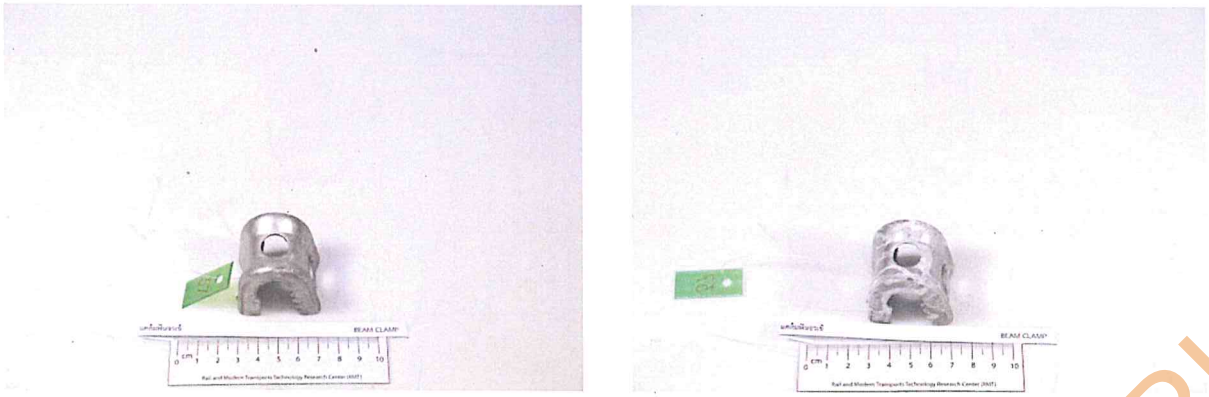
Fig. 35: LOCK NUT 1" before-after salt spray test.

Sample before salt spray test



Sample after 24-hours salt spray test

Fig. 36: LOCK NUT ¾" before-after salt spray test.

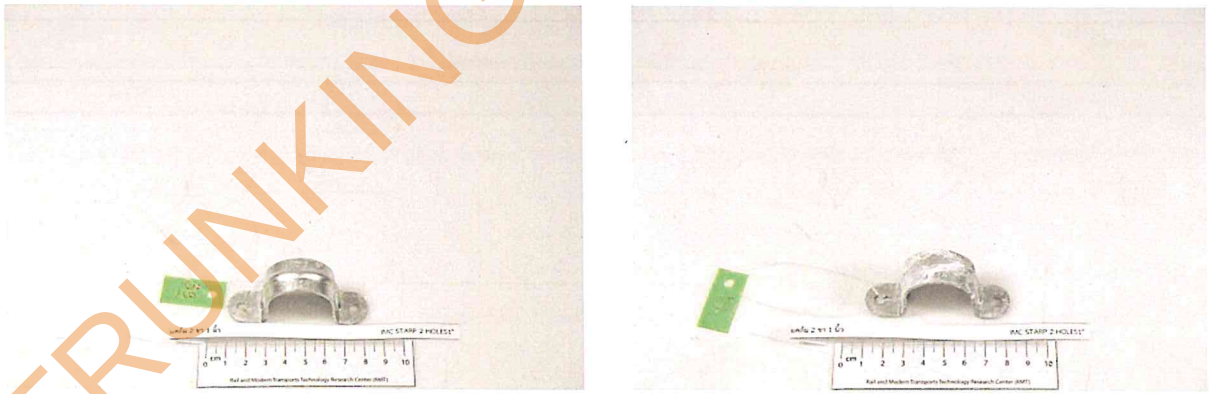


Sample before salt spray test Sample after 24-hours salt spray test

Fig. 37: BEAM CLAMP before-after salt spray test.

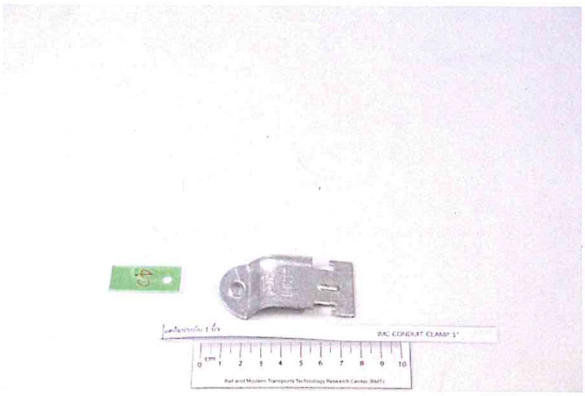
Sample before salt spray test Sample after 24-hours salt spray test

Fig. 38: IMC STARP 2 HOLES 1.¼" before-after salt spray test.

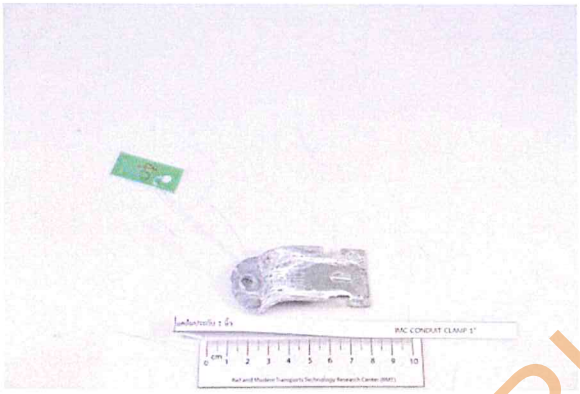


Sample before salt spray test Sample after 24-hours salt spray test

Fig. 39: IMC STARP 2 HOLES 1" before-after salt spray test.

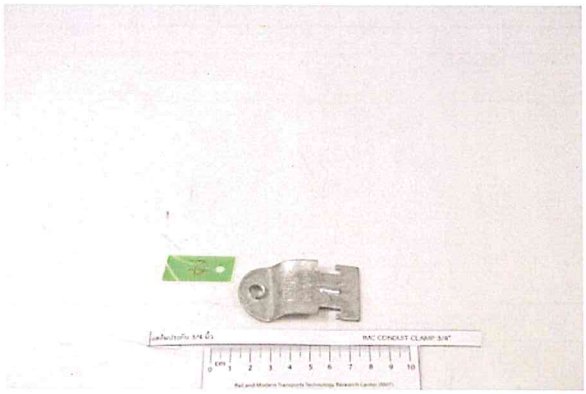


Sample before salt spray test



Sample after 24-hours salt spray test

Fig. 40: IMC CONDUIT CLAMP 1" before-after salt spray test.

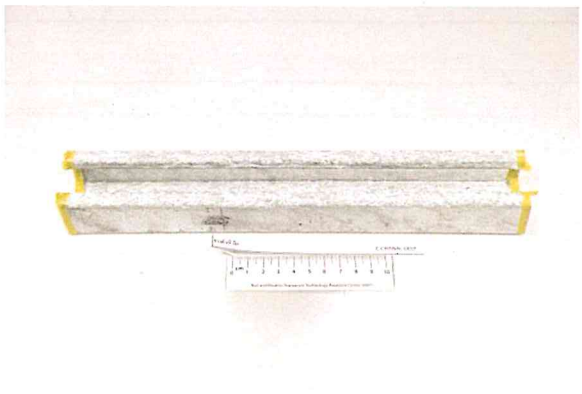


Sample before salt spray test

Sample after 24-hours salt spray test

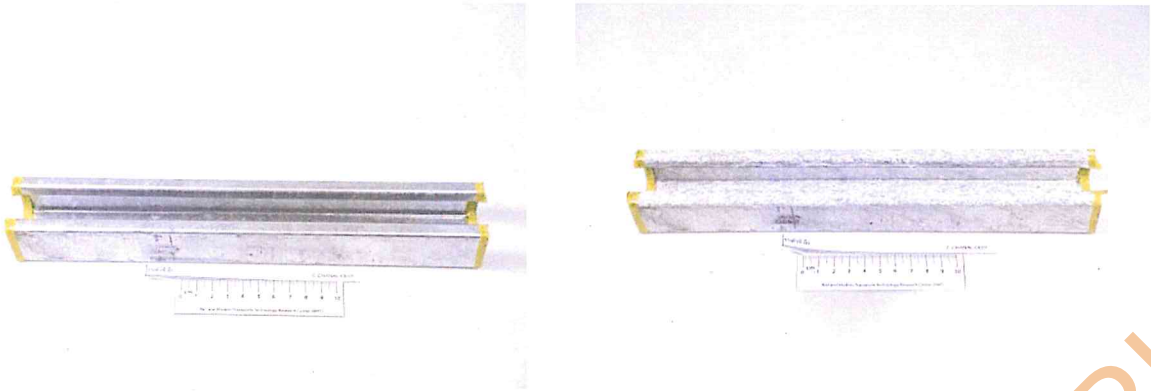
Fig. 41: IMC CONDUIT CLAMP ¾" before-after salt spray test.

Sample before salt spray test



Sample after 24-hours salt spray test

Fig. 42: C-CHANAL-SHALLOW before-after salt spray test.



Sample before salt spray test Sample after 24-hours salt spray test

Fig. 43: C-CHANAL-DEEP before-after salt spray test.

4. Conclusion

The results of salt fog corrosion resistance testing of all samples of electrical conduit fitting samples after a 24-hour salt spray test are summarized in Table 1. It can be concluded that no rust spots can be detected (OK) in all samples.

Table 1: Summary of salt spray testing for 24 hours

Samples	24 hours
DEVICE BOX FOR DUOBLE GANG TYPE - F.S 4"x4"	OK
F.S BOX 4"x4"	OK
DEVICE BOX FOR SINGLE GANG TYPE - F.S.2"x4"	OK
DEVICE BOX FOR SINGLE GANG TYPE - F.S.W2"x4"	OK
DEVICE BOX FOR SINGLE GANG TYPE - B.S3.½"x 3.½"	OK
F.S. BOX 2"x4"	OK
F.S.W BOX 2"x4"	OK
B.S BOX 3.½"x 3.½"	OK
CONDUIT OUTLET BOX AND COVER	OK
CONDUIT BODY-L.B ¾"	OK
CONDUIT BODY-L.R ¾"	OK
CONDUIT BODY-L.L ¾"	OK
OCTAGON BOX-DEEP (NO KNOCK OUT)	OK
HANDY BOX-DEEP (NO KNOCK OUT)	OK
SQUARE BOX-SHALLOW (NO KNOCK OUT)	OK
SQUARE BOX-DEEP (NO KNOCK OUT)	OK
SQUARE BOX-SHALLOW (EXTENSION RING)	OK

EUROPA BOX-DEEP (NO KNOCK OUT)	OK
EUROPA BOX-DEEP (EXTENSION RING)	OK
MK BOX-DEEP (NO KNOCK OUT)	OK
COVER FOR OCTAGON BOX	OK
COVER FOR SQUARE BOX	OK
COVER FOR EUROPA BOX	OK
COVER FOR HANDY BOX	OK
BEAM CLAMP UB	OK
IMC COUPLING 1"	OK
IMC COUPLING ¾"	OK
CHASE NIPPLE 1"	OK
HASE NIPPLE ¾"	OK
INSULATED GROUNDING BUSHING 1"	OK
INSULATED GROUNDING BUSHING ¾"	OK
BUSHING 1"	OK
BUSHING ¾"	OK
LOCK NUT 1"	OK
LOCK NUT ¾"	OK
BEAM CLAMP	OK
IMC STARP 2 HOLES 1.¼"	OK
IMC STARP 2 HOLES 1"	OK
IMC CONDUIT CLAMP 1"	OK
IMC CONDUIT CLAMP ¾"	OK
C-CHANAL-DEEP	OK
C-CHANAL-SHALLOW	OK

5. Reference

1. ISO 9227-2017, Corrosion tests in artificial atmospheres - Salt spray tests.
2. ASTM D610-01, Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces.
3. EN 12329:2000, Corrosion protection of metals Electrodeposited coatings of zinc with supplementary treatment on iron or steel.

Work Performed and Analyzed by:

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Approved by:

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