



**TESTING LABORATORY
ELECTRICAL ENGINEERING DEPARTMENT.**

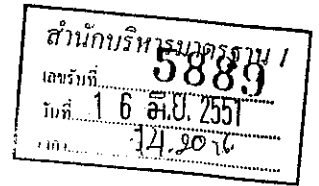
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TEST REPORT

SR. No. TL51039



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Approved Signatory

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TESTING LABORATORY

Test object description	: Spool Type Porcelain Insulators, Class 532
Manufacturer	: Fine Art Ceramic Company Limited
Sample number	: สบอ.14อ 227-18/1
Sample quantities	: 50 units
Date of receipt	: 8 April 2008
Specimen condition	: Normal
Client/Customer	: Thai Industrial Standards Institute, Ministry of Industry Rama VI Rd., Ratchathewi, Bangkok, 10400, Thailand
Refer to	: Letter No. 16784/336, dated 3 April 2008
Purpose	: Electrical and mechanical characteristics test
Date of test	: 9 April 2008 to 30 May 2008
Place of test	: High-voltage Laboratory, Faculty of Engineering, Chulalongkorn University The Bangkok Ceramics Industry Co., Ltd.
Reference standard	: TIS 227-2525: Standard for Spool Type Porcelain Insulators.

หน่วย
ภาค

Test items:

1. Low-Frequency Dry Flashover Voltage Test
2. Low-Frequency Wet Flashover Voltage Test
3. Cantilever Strength Test
4. Dimensional Test
5. Visual Inspection Test
6. Porosity Test

Distribution of samples:

Test items	Sample No.	Quantity, unit
1	1 - 3	3
2	4 - 6	3
3	7 - 11	5
4	12 - 14	3
5	1 - 50	50
6	Specimens from destroyed insulator	-

Test

1. Low-Frequency Dry Flashover Voltage Test

Test procedure

The test voltage was 50-Hz alternating voltage obtained from a 200-kV 10-kVA testing transformer. The voltage measurement was made by means of a 200-kV capacitor voltage divider with an accuracy of $\pm 1\%$. The test procedure was conducted in accordance with the paragraph 9.5.1 of TIS. 227-2525.

Quantity of sample : 3 units

Date of test : 30 May 2008

Atmospheric conditions

Barometric pressure, p	754.0	mmHg.
Temperature, T	28.0	°C
Relative humidity, h	71.0	%

Correction factors

The air density correction factor (k_d) and the humidity correction factor (k_h) based on standard conditions, i.e. $p = 760$ mm.Hg., $T = 25$ °C, and absolute humidity = 15 g/m^3 , are:

$$k_d = 0.982$$

$$k_h = 1.0$$

Test results : Test results are shown in Table 1.

Table 1 The results of low-frequency dry flashover test on Spool Type Porcelain Insulators, Class 53-2, Sample No. สทอ.14๑ 227-18/1.

Sample No.	Flashover voltage, kV
1	24.9
2	24.59
3	25.59
Mean value	25.03
Standard value	25
Standard requirement	Mean value ≥ 23.75

Note: The given flashover voltages were the average values of five consecutive applied voltages.

2. Low-Frequency Wet Flashover Voltage Test

Test procedure

The test voltage was 50-Hz alternating voltage obtained from a 200-kV 10-kVA testing transformer. The voltage measurement was made by means of a 200-kV capacitor voltage divider with an accuracy of $\pm 1\%$. The test procedure was conducted in accordance with the paragraph 9.5.2 and 9.5.3 of TIS. 227-2525.

Quantity of sample : 6 units

Date of test : 30 May 2008

Atmospheric conditions

Barometric pressure, p	754.0	mmHg.
Temperature, T	28.0	°C
Relative humidity, h	71.0	%

Correction factors

The air density correction factor (k_d) based on standard conditions, i.e. $p = 760$ mm.Hg., $T = 25$ °C, and absolute humidity = 15 g/m^3 , is:

$$k_d = 0.982$$

Characteristics of rain water

Resistivity	17,800	ohm-cm
Rate of precipitation	5	mm./min.
Water pressure	2.5	bars

Test results : Test results are shown in Table 2.

Table 2 The results of low-frequency wet flashover test on Spool Type Porcelain Insulators, Class 53-2, Sample No. สบอ.14๑ 227-18/1.

Sample No.	Flashover voltage, kV	
	Horizontal	Vertical
4	19.97	19.4
5	17.44	21.81
6	19.45	18.83
Mean value	18.95	20.01
Standard value	15	12
Standard requirement	Mean ≥ 13.50	Mean ≥ 10.80

Note: The given flashover voltages were the average values of five consecutive applied voltages.

3. Cantilever Strength Test

Test procedure

The test procedure was conducted in accordance with paragraph 9.4 of TIS. 227-2525. The load was applied normal to the axis of the test specimen until it was broken.

Quantity of sample : 5 units

Date of test : 21 April 2008

Atmospheric conditions

Barometric pressure, p	759.0	mmHg.
Temperature, T	30.0	°C
Relative humidity, h	65.0	%

Test results : Test results are shown in Table 3.

Table 3 The results of tensile strength test on Spool Type Porcelain Insulators, Class 53-2, Sample No. สมอ.14๑ 227-18/1.

Sample No.	Failing load of the insulators, kN
7	22.13
8	20.10
9	20.04
10	19.60
11	24.52
Mean value	21.28
Standard value	13.30
Standard requirement	1) Mean value ≥ 13.3 2) Each value ≥ 11.31

4. Dimensional test

Test procedure

The test procedure was conducted in accordance with paragraph 9.2 of TIS. 227-2525.

Quantity of samples : 3 units

Date of test : 30 May 2008

Test results : Test results are shown in Table 4.

5. Visual inspection

Test procedure

The test procedure was conducted in accordance with paragraph 9.1 of TIS. 227-2525.

Quantity of samples : 50 units

Date of test : 9 April 2008

Test results : No imperfection, exceeding the specified area, was observed.

6. Porosity Test

Test procedure

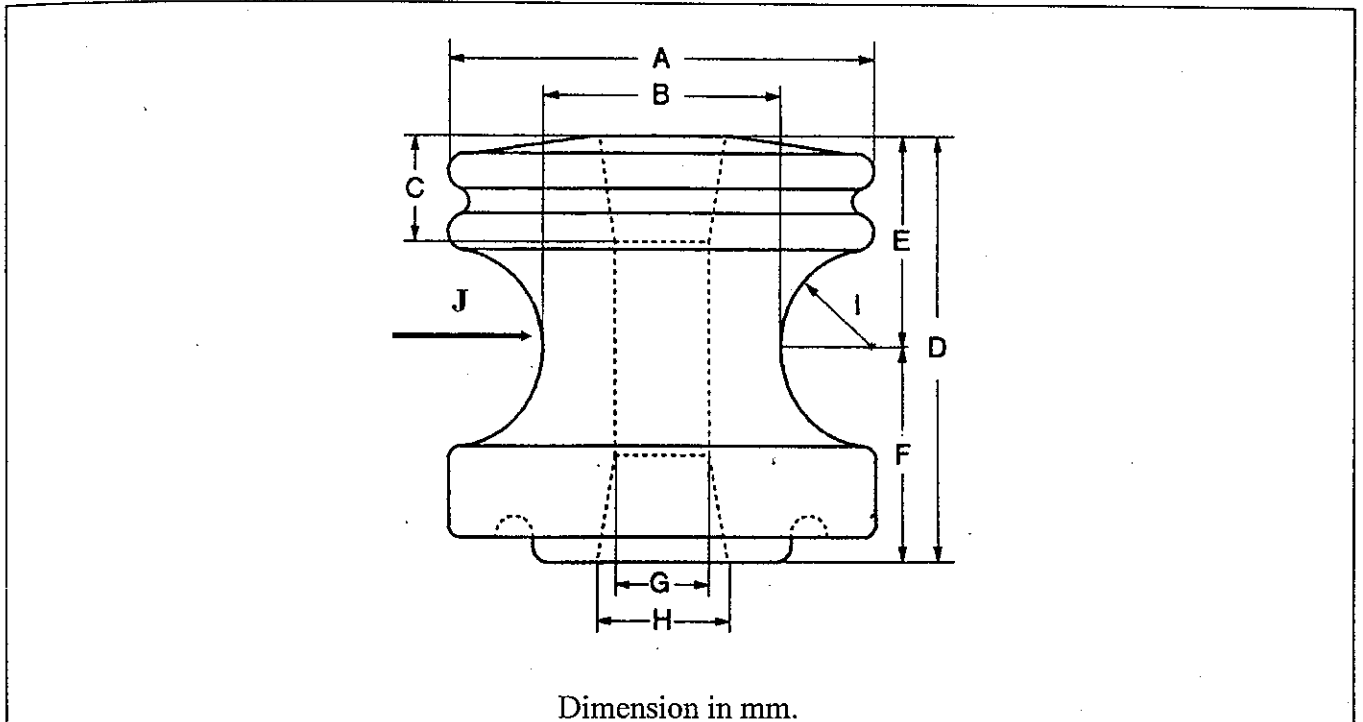
The test procedure was conducted in accordance with the paragraph 9.3 of TIS. 227-2525.

Quantity of specimens: Selected specimens from destroyed insulator in other tests.

Date of test : 17 April 2008

Test results : There was no visible penetration of dye into the porcelain on any of the fragments tested.

Table 4 The test results of dimensional test of Spool Type Porcelain Insulators, Class 53-2, Sample No. สบอ.14๑ 227-18/1.



Dimension in mm.

	Requirement	No.12	No.13	No.14		Requirement	No.12	No.13	No.14
A	78.5-81.5	80.3	80.6	80.5	F	38	36	35.5	36
B	42-48	46.5	46.5	46.5	G	18-19.5	18.7	19	18.3
C	17-23	21	20	22	H	22.5-25.5	23	23	22.5
D	74.5-77.5	76	76.5	76	I	18	17.5	18	18
E	38	40	41	40	J	$33.5 \leq J \leq 36$	$33.5 \leq J \leq 36$	$33.5 \leq J \leq 36$	$33.5 \leq J \leq 36$

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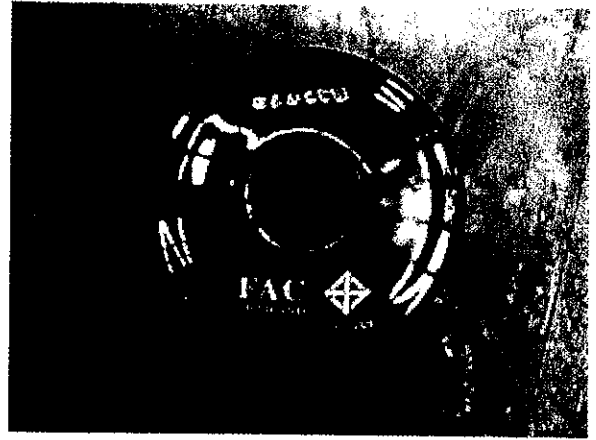


Figure 1. Spool Type Porcelain Insulators, Class 53-2, Sample No. สทอ.14๑ 227-18/1.