گواهینامه تایید صلاحیت آزمایشگاه
Laboratory Accreditation Certificate

سامانه های نوین افرا
AFRA MODERN SYSTEMS

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TEST REPORT

Sample: 24 kV silicone rubber Suspension insulator (DS-160660)

Manufacturer: Afra Modern Systems Company (Samanehaye Novin Afra)

Rated voltage: 24 kV

Number of sheds: 7

Creepage distance: 660 mm

Insulator material: Silicone Rubber

Test according to: IEC 62217 (2012), IEC 61109 (2008), ISO 868 (2003), IEC 60587 (2007), IEC TS 62073 (2016), IEC 60695-11-10 (2013), IEC 60383-1 (1993), IEC 60383-2 (1993), IEC 60060-1 (2010).

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1. General Information

1.1. Product Information

Equipment under test : Silicon rubber suspension insulator

Manufacturer : Afra Modern Systems (Samanehaye Novin Afra)

Manufacturer's address : Block E2-79, Shiraz Especial Economic Zone (SEEZ), Fars, Iran

Silicone compound manufacturer : Afra Modern Systems (Samanehaye Novin Afra) Company

Silicone manufacturer : Wynca Company

The diameter of the core used : 16 mm

Number of sheds : 7

Rated voltage : 24 kV

SML : 70 kN

Creepage distance : 660 mm

1.2. Performed Tests

No.	Test Title	Related Standard	Test Result
1.	Verification of Dimensions	IEC 62217 (clause 8)	passed
	Design Test		
2.	Hardness test	IEC 62217 (subclause 9.3.1), ISO 868	passed
3.	Accelerated Weathering Test (UV)	IEC 62217 (subclause 9.3.2), ISO 4892	passed
4.	Tracking and Erosion Test – 1000 h Salt Fog Test	IEC 62217 (subclause 9.3.3)	passed
5.	Flammability test	IEC 62217 (subclause 9.3.4), IEC 60695-11-10	passed
6.	Porosity test (Dye Penetration)	IEC 62217 (subclause 9.4.1)	passed
7.	Water Diffusion	IEC 62217 (subclause 9.4.2)	passed
8.	Assembled core load-time test	IEC 61109 (subclause 10.4)	passed
	Type test		
9.	Dry Lightning Impulse Test	IEC 61109 (subclause 11.1) -IEC 60060-1	passed
10.	Wet Power-Frequency Test	IEC 61109 (subclause 11.1), IEC 60060-1	passed
11.	Damage Limit Proof Test and Test of the Tightness of the Interface between End Fittings and Insulator Housing	IEC 61109 (subclause 11.2)	passed
	Sample Test		
12.	Verification of the SML	IEC 61109 (subclause 12.4)	passed
13.	Galvanizing Test	IEC 61109 (subclause 12.5), IEC 60383-1	passed
	Routine Test		
14.	Mechanical routine test	IEC 61109 (subclause 13.1)	passed
15.	Visual Examination Test	IEC 61109 (subclause 13.2)	passed
	Other Tests		
16.	Dry Power Frequency Test	IEC 62217 (subclause 9.2.4), IEC 60060-1	passed
17.	Water immersion pre-stressing	IEC 62217 (subclause 9.2.6)	passed
18.	Hydrophobicity test Method C & A	IEC TS 62073	passed
19.	Tracking and erosion test –Inclined Plane Test-	IEC 60587	passed

2. Performance and Results of Tests

2.1. Verification of Dimensions

- According to IEC 62217 clause 8

Arcing distance, creep distance and insulator length were measured using glue tape and ruler.

Acceptance Criteria: The insulator passed the test if the allowable tolerances for different dimensions of the insulator are as follows:

± (0.04 × d + 1,5) mm when d ≤ 300 mm,

± (0.025 × d + 6) mm when d > 300 mm with a maximum tolerance of ± 50 mm.

Result of Test (Date: 09- November -2024):

Properties	Sample	Measuring value (mm)	Acceptable tolerances (mm)
Creepage distance	DS-160660	665	631,5-682,5
Arcing distance		281	272,1-297,9
Big shed diameter		100	94,5-105,5
Small shed diameter		70	65,6-74,3

2.2. Design Test

2.2.1. Hardness Test

- According to IEC 62217 subclause 9.3.1 & ISO 868

Two specimens of the insulator housing material with thickness of 4 mm were taken from the housing of two insulators. Hardness of the mentioned samples was measured with Shore A durometer at ambient temperature. After that, the samples were kept immersed in boiling deionized water with 0,1 % by weight of NaCl for 42 h. At the end of the boiling period, the samples were allowed to cool and, within 3 h, their hardness was measured again at the same temperature as that of the pre-boiling measurements ± 5 K.

Acceptance Criteria: The hardness of each specimen shall not change from the pre-boiled value by more than ± 20 %.

Result of Test (Date: 11- November -2024): According to table 1, hardness test was passed.

Table 1: Hardness Results

Sample	Pre-Boiled Hardness	After-boiled Hardness	Difference of Change	Result
1	65	66	1,53 %	Passed
2	65	67	3,07 %	Passed

2.2.2. Accelerated Weathering Test (UV)

- According to IEC 62217 subclause 9.3.2 & ISO 4892

Three specimens of insulator housing (markings on the housing) were subjected xenon (UV lamp) irradiation for 1000 hours. At the end of the test, visual inspection and surface roughness test were performed.

Acceptance Criteria: After the test, marking on shed or housing material shall be legible. Surface degradations such as cracks and raised areas are not permitted.

Result of Test (Date: 17-November-2024): The insulator has passed this test and surface degradations such as cracks and raised areas was not occurred. Also, the R_z = 14,60

2.2.3. Tracking and Erosion Test – 1000 h Salt Fog Test

- According to IEC 62217 subclause 9.3.3

Two insulators were cleaned and installed at a suitable distance from each other in the test chamber. The voltage of test was calculated and applied based on creepage distance. The test was applied for 1000 h on the insulators.

Test voltage = 19,5 kV

NACL content of water = 8 ± 0,4 kg/m^3

Ambient temperature =20°C ± 5K

Acceptance Criteria: The insulators have passed this test if no tracking and erosion occurs on insulator surface. Erosion depth is less than 3 mm and does not reach the insulator core. No shed, housing or interface is punctured.

Result of Test (Date: 13- November -2024): The insulator has passed this test. The shed and housing was not punctured and the erosion depth was not observed.

2.2.4. Flammability test

- According to IEC 62217 subclause 9.3.4 & IEC 60695-11-10

This test can be conducted in two ways as follows:

In two variations of this test, a rectangular bar-shaped test specimen is supported horizontally or vertically by one end and the free end is exposed to a specified test flame. The burning behavior of the horizontally supported bar under specific test conditions is assessed by measuring the linear burning rate. The burning behavior of the vertically supported bar under specific test conditions is assessed by measuring the after flame and afterglow times (observing whether the material is self-extinguish), the extent of burning and the dripping of flaming particles.

2.2.4.1. Horizontal Flammability test

Three bar specimens with the dimensions of 125 mm ± 5 mm long by 13,0 mm ± 0,5 mm wide, and 3 mm thickness were tested. Each test specimen was marked with two lines perpendicular to the longitudinal axis of the bar, 25 mm ± 1 mm and 100 mm ± 1 mm from the end that was exposed to the test flame. The test specimen was clamped at the end furthest from the 25 mm mark, with its longitudinal axis approximately horizontal and its transverse axis inclined at 45° ± 2°.

The test flame was applied without changing its position for 30 s ± 1 s or was removed as soon as the flame front on the test specimen reaches the 25 mm mark if within less than 30 s. The timing device was restarted when the flame front reaches the 25 mm mark.

Acceptance Criteria: The materials were classified HB, HB40 or HB75 (HB = horizontal burning) in accordance with IEC 60695-11-10, with the following sub-classes:

a) If it does not burn with a flame after the ignition source is removed;

b) If the test specimens continue to burn with a flame after removal of the ignition source, and the flame front does not pass the 100 mm mark;

c) If the flame front passes the 100 mm mark and it does not have a linear burning rate exceeding 40 mm/min.

Result of Test (Date: 15- November -2024): Three specimens did not burn after the ignition source was removed, so this material can be classified as **HB 40** (clause A).

2.2.4.2. Vertical Flammability test

Five bar specimens with the dimensions of 125 mm ± 5 mm long by 13,0 mm ± 0,5 mm wide, and 3 mm thickness were tested. The test specimen was clamped using the upper 6 mm of its length with the longitudinal axis vertical. The lower end of the test specimen was 300 mm ± 10 mm above the horizontal cotton pad.

The central axis of the burner tube was maintained in the vertical position, approached the test specimen horizontally towards the wide face. The flame was applied centrally to the middle point of the bottom edge of the test specimen so that the top of the burner was 10 mm ± 1 mm below that point. The burner was maintained at that distance for 10 s ± 0,5 s and moved in the vertical plane in response to any changes in the length or position of the test specimen.

After that, the burner was withdrawn immediately and the timing device was used to commence measurement of the after flame time t_1. After that the flame was applied again and the after flame time t_2, and the afterglow time t_3 of the test specimen were recorded. This procedure was repeated for all of the five specimens.

Acceptance Criteria: The specimens can be classified according the following table:

Criteria	Materials Classification		
	V-0	V-1	V-2
Individual test specimen afterflame times (t_1, t_2)	≤ 10 s	≤ 30 s	≤ 30 s
Total afterflame time t_f for any conditioned set of five specimens	≤ 50 s	≤ 250 s	≤ 250 s
Individual test specimen afterflame time plus afterglow time after the second flame application ($t_2 + t_3$)	≤ 30 s	≤ 60 s	≤ 60 s
Afterflame and/or afterglow of any specimen burned to the holding clamp	No	No	No
Cotton indicator pad ignited by flaming particles or drops	No	No	Yes

Result of Test (Date: 15-November-2024): Regarding table 2, specimens were classified as **V-0**

Table 2: Vertical Flammability Results

Sample	t_1	t_2	t_3	t_2+t_3	Result
1	0	1	0	1	Passed
2	0	0	0	0	Passed
3	0	0	0	0	Passed
4	0	1	0	1	Passed
5	0	2	0	2	Passed

2.2.5. Dye Penetration

- According to IEC 62217 subclause 9.4.1

Ten samples, with the length of 10 mm ± 0.5 mm, were cut from the insulator with a diamond-coated circular saw blade under running cold water. The cut surfaces were smoothed by means of fine abrasive cloth (grain size 180). The specimens were placed on a layer of steel balls of same diameter in a tray. A solution of 1 % (by weight) of Astrazon BR 200 in methanol was poured into the tray, its level being 2 mm or 3 mm higher than the level of the balls. The specimens were observed for 15 minutes.

Acceptance Criteria: No dye shall rise through the specimens before the 15 minutes have elapsed.

Result of Test (Date: 11-November-2024): according to figure 1, no dye rises through the specimens before the 15 minutes have elapsed.

Figure 1: Schematic View of Dye Penetration Test

2.2.6. Water Diffusion

- According to IEC 62217 subclause 9.4.2

Six cylindrical samples with 30 mm ± 0,5 mm height was cut from the insulator making the cut approximately 90° to the long axis of the insulator. The specimens were boiled in a suitable container for 100 h ± 0,5 h in deionized water with 0,1 % by weight of NaCl.

After boiling, the specimens were removed from the boiling container and placed in another container filled with tap water at ambient temperature for 15 min. Immediately before the voltage test, the specimens were removed from the container and their surfaces dried with filter paper.

For voltage test, each specimen was put between the electrodes. The test voltage was increased at approximately 1 kV per second up to 12 kV. The voltage was kept constant at 12 kV for 1 min and then decreased to zero.

Acceptance Criteria: During the test no puncture or surface flashover shall occur. The current during the whole test shall not exceed 1 mA (r.m.s.).

Result of Test (Date: 10-November-2024): According to table 3, all specimens passed the test.

Table 3: Water Diffusion Test Results

Sample	Duration (min)	Voltage (kV)	Ultimate current (µA)	Result
1	1	12.0	15	Passed
2	1	12.1	20	Passed
3	1	12.1	18	Passed
4	1	12.2	12	Passed
5	1	12.0	21	Passed
6	1	12.2	20	Passed

2.2.7. Assembled core load-time Test

- According to IEC 61109 subclause 10.4

Six insulators were subjected to Visual and dimensional evaluation. Three of the insulators subjected to a tensile load. The tensile load was increased rapidly but smoothly from zero to approximately 75% of the expected mechanical failing load and then gradually increased in a time between 30 s and 90 s until breakage of the core complete pull-out occurs. The average of the three failing loads M_{AV} calculated.

Three other specimens were subjected to tensile load that be increased rapidly but smoothly from zero up to 60 % of M_{av}, and then maintained at this value for 96 h.

Acceptance Criteria: The insulator passed the test if no failure (breakage or complete pull-out) occurs at 60 % M_{av} for 96 h.

Result of Test (Date: 12-November-2024): The insulator has passed this test and the failure not be occurred at 60 % M_{av} (M_{av}=83 kN).

2.3. Type Test

2.3.1. Dry Lightning Impulse Test

- According to IEC 61109 subclause 11.1 & IEC 60060-1

The standard 1.2µs/50µs lightning-impulse voltage with a front time less than 20 s was used. 15 impulses of positive and 15 impulses of negative polarity were applied to the sample. Minimum time interval between pulses was 3 s. The insulator should withstand 15 impulses and then the voltage was increased additionally which arcing of the insulator occurred.

It should be noted that the test voltage was corrected according to the atmosphere correction factor. According to the following ambient conditions, the atmosphere correction factor was 0,800.

Pressure: 844 hPa

Ambient temperature: 31,9 ˚C

Relative humidity: 18,8%

Acceptance Criteria: The insulator shall be considered to have passed the test if no flashover or puncture occurs. Additionally, regarding 24 kV insulator, the dry lightning impulse withstand voltage should be equal or higher than 125 kV in both positive and negative polarities.

Result of Test (Date: 09-November-2024): Corrected withstand and breakdown voltage (V_{actual}) of the insulator were measured as following which demonstrate that the insulator has passed the test.

Positive Withstand voltage:170,0 kV Negative Withstand voltage: 180,0 kV

2.3.2. Wet Power-Frequency Test

- According to IEC 61109 subclause 11.1 & IEC 60060-1

The wet test procedure was intended to simulate the effect of natural rain on external insulation. The insulator was sprayed with water falling on it as droplets and directed so that the vertical and horizontal components of the spray intensity were approximately equal. The insulator was pre-wetted initially for at least 15 min. then, the insulator was put in high potential circuit and test voltage was applied between fittings. The test voltage was linearly raised to the withstand

value and maintained for 1 min. Then the voltage was increased additionally which arcing of the insulator occurred. It should be noted that the test voltage was corrected according to the atmosphere correction factor. According to the following ambient conditions, the atmosphere correction factor was 0.900.

Pressure: 843.6 hPa

Ambient temperature: 32.3 °C

Acceptance Criteria: The insulator shall be considered to have passed the test if no flashover or puncture occurs. Additionally, regarding 24kV insulator, the wet power frequency withstand voltage should be equal or higher than 50 kV.

Result of Test (Date: 09-November-2024): Corrected withstand and breakdown voltage (V_{actual}) of the insulator were measured as following which demonstrate that the insulator has passed the test.

Withstand voltage: 70 Kv

2.3.3. Damage Limit Proof Test and Test of the Tightness of the Interface between End Fittings and Insulator Housing

- According to IEC 61109 subclause 11.2

The four insulators were subjected to visual and dimensional evaluation**.** The insulators were subjected to tensile load applied between the couplings at ambient temperature. The tensile load was increased rapidly but smoothly from zero up to 70% of the SML and then maintained at this value for 96 h. At the end of 96 hours, both ends one of the specimens was subjected the crack indication by dye penetration test.

The three remaining insulators were then again subjected to tensile load applied at ambient temperature. The tensile load was increased rapidly but smoothly from zero to approximately 75 % of the SML and then gradually increased to the SML in a time between 30 s to 90 s. Then the load was maintained for the remainder of the 90 s.

Acceptance Criteria: The insulators have passed this test if no failure (breakage or complete pull-out of the core, or fracture of the metal fitting) occurs either during the 96 h test at 70% of the SML or during the 1 min 100% withstand test at SML. No cracks should be seen in dye penetration. The investigation of the halves shows clearly that the cracks do not reach the core.

Result of Test (Date: 15-November-2024): The insulator has passed this test and the failure not be occurred and cracks not be seen in dye penetration.

2.4. Sample Test

2.4.1. Verification of the SML

- According to IEC 61109 subclause 12.4

According to ISO 3452, at the first cleaner, then penetrant sprays were applied the surface of insulator. Then tensile load of 70 % of the SML was applied at the ambient temperature. The tensile load must increase rapidly but evenly from zero to 70% SML and be under this force for 1 minute. After the test the surface was cleaned and dried. Then the developer spray was applied.

Other specimens were subjected at ambient temperature to tensile load. The tensile load was increased rapidly but smoothly from zero to approximately 75 % of the SML and then gradually increased to the SML in a time between 30 s to 90 s. Then the load was maintained for the remainder of the 90 s.

Acceptance Criteria: The insulators have passed this test if no failure (breakage or complete pull-out of the core, or fracture of the metal fitting) occurs, no cracks are indicated after the dye penetration and dye penetration clearly shows that no cracks have reached the core.

Result of Test (Date: 16-November-2024): The insulator tolerates 70 kN effectively and the test was passed. No failure occurs either during the 1 min 70 % withstand test and during the 1 min 100% withstand test. No cracks not be seen in dye penetration.

2.4.2. Galvanizing Test

- According to IEC 61109 subclause 12.5 & IEC 60383-1

The coating thickness of the ferrous fittings of insulator was determined by coating thickness instrument (Elcometer). On the test sample, three to ten randomly distributed measurements were carried out according to its dimensions.

Acceptance Criteria: The coating shall be continuous, as uniform and as smooth as possible and free from anything that is determined to the stated use of the coated object. The mean coating thickness of specimen shall be not less than 85 µm.

Result of Test (Date: 13-November-2024): Mean coating thickness of fitting as following tables:

NO.	Thickness of Ball (µm)
1	142.5
2	127.9
3	115.6
4	116.3
5	109.4
6	137.7
Average	124.9

NO.	Thickness of Y-Clevis (µm)
1	127.3
2	114.6
3	138.6
4	127.9
5	112.8
6	132.5
Average	125.6

2.5. Routine Test

2.5.1. Mechanical routine test

- According to IEC 61109 subclause 13.1

The sample was subjected to RTL tensile force at 0.5 × SML (0.5 × 70 kN= 35 kN) at ambient temperature for 10 s.

Acceptance Criteria: The insulator shall withstand the tensile force of the RTL for at least 10 seconds and no breakage, pull-out fittings, cracking or deformation shall not be occurred.

Result of Test (Date: 18-November-2024): The insulator has passed this test. The pull-out fittings and cracking not be occurred at 35 kN.

2.5.2. Visual Examination Test

- According to IEC 61109 subclause 13.2

The mounting of the end fittings on the insulator were evaluated according to the drawings.

Acceptance Criteria: The insulator passed the test if the following defects are not permitted:

a) Superficial defects of an area greater than 25 mm^2 (the total defective area not to exceed 0.2% of the total insulator surface) or of depth greater than 1 mm.

b) Cracks at the root of the shed, notably next to the metal fitting.

c) Separation or lack of bonding at the housing to metal fitting joint (if applicable).

d) Separation or bonding defects at the shed to sheath interface.

e) Molding flashes protruding more than 1 mm above the housing surface.

Result of Test (Date: 17-November-2024): The insulator has passed this test.

2.6. Other Test

2.6.1. Dry Power Frequency Test

- According to IEC 62217 subclause 9.2.4 & IEC 60060-1

The insulator was cleaned and put in high potential circuit and test voltage was applied between fittings. The test voltage was linearly raised to the withstand value and maintained for 1 min. Then the voltage was increased additionally which arcing of the insulator occurred.
It should be noted that the test voltage was corrected according to the atmosphere correction factor. According to the following ambient conditions, the atmosphere correction factor was 0.776.

Pressure: 845.9 hPa

Ambient temperature: 28.2˚C

Relative humidity: 21.8%

Acceptance Criteria: The insulator shall be considered to have passed the test if no flashover or puncture occurs. Additionally, regarding 24kV insulator, the dry power frequency withstand voltage should be equal or higher than 70 kV.

Result of Test (Date: 09-November-2024): Corrected withstand and breakdown voltage (V_{actual}) of the insulator were measured as follows which demonstrate that the insulator has passed the test.

Withstand voltage: 83.5 Kv

2.6.2. Water immersion pre-stressing

- According to IEC 62217 subclause 9.2.6

The insulator was cleaned and boiled in a suitable container for 42 h in deionized water with 0.1 % by weight of NaCl. At the end of the boiling period, the samples were allowed to cool. Then check adhesion of the insulator housing to core.

Acceptance Criteria: The housing of insulator is inspected usually. No cracks are permissible.

Result of Test (Date: 14-November-2024): The insulator has passed this test and the crack was not observed.

2.6.3. Hydrophobicity test

- According to IEC TS 62073

2.6.3.1. Hydrophobicity Test- Method C

For determining the hydrophobicity of insulator, the mist was applied on the insulator housing from a distance of 20 cm ±10 cm, for a period of 10 s to 20 s. The measurements of the wettability were performed within 10 s after the spraying has been completed. The appearance on the insulator surface after mist exposure was identified with one of the seven wettability (hydrophobicity) classes (HC).

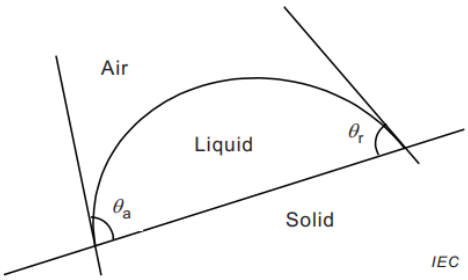
Acceptance Criteria: HC is a value between 1 (the most hydrophobic) and 7 (the least hydrophobic).

Result of Test (Date: 08-November-2024): According to figure 1, only discrete droplets were formed which are practically circular, so hydrophobicity class is **HC1**.

Figure 2: Hydrophobicity of the Insulator

2.6.3.2. Hydrophobicity Test-Method A

This test is performed to evaluate the hydrophobicity class of the shed, according the method A with contact angle device. Angles of a droplet on an inclined solid surface that exhibits two different angles. The advancing contact angle (θa) is the angle inside the water droplet between the solid surface and the droplet surface at the lower part of the droplet on the inclined surface (see Figure). The receding contact angle (θr) of a droplet on an inclined surface is the angle inside the droplet between the solid surface and the droplet surface at the droplet rear (highest part on the inclined surface).



Acceptance Criteria: The test has passed if the receding contact angle (θr) greater than 60°.

Result of test (Date: 08-November-2024): According to table 6, for all drops the θ_r value was greater than 100°.

Table 5- Hydrophobicity Test-Method A result

θ_r	θ_a
100.03	105.12
101.38	103.50
102.57	104.76

θ_a θ_r

Figure 3: Hydrophobicity Test (Method A) of the Insulator

2.6.4. Tracking and erosion test –Inclined Plane Test

- According to IEC 60587

This test was carried out at ambient temperature on sets of five specimens of insulator housing. The contaminant was flowed uniformly at rate of 0.6 ml/min on samples' surface. After that the apparatuses were switched on and the voltage raised to 4.5 kV. The voltage was maintained constant for 6 h. The constant tracking voltage is the highest voltage withstood by all five specimens for 6 h without failure.

Acceptance Criteria: The test is passed if the value of the current in the high voltage circuit through the specimens does not exceed 60 mA, ignition and puncturing of the sample do not occur.

Result of Test (Date: 10-November-2024): According to table 5, all five specimens survived 6 h at 4.5 kV and no ignition or puncture occurred.

Table 4: Tracking and Erosion Results

Sample	Current (mA)	Erosion Depth (mm)
1	14	1.09
2	13	0.75
3	15	0.35
4	14	1.18
5	14	0.86

3. Used measuring / testing equipment

Figure 4: Shore A Durometer (Date of Test: 11-November-2024)

Figure 5: Tracking Machine Tester (Date of Test: 10-November-2024)

Figure 6: Flammability Test Machine (Date of Test: 15-November-2024)

Figure 7: Brass Electrodes Used in Water Diffusion Test (Date of Test: 10-November-2024)

Figure 8: Elcometer Used for Coating Thickness Measurement (Date of Test: 13-November-2024)

Figure 9: Equipment of Lightening Impulse Voltage Test (Date of Test: 09-November-2024)

Figure 10: Wet Power Frequency Voltage Test Chamber (Date of Test: 09-November-2024)

Figure 11: Tensile Test Machine (Date of Test: 12, 15, 13, 16 -November -2024)

Figure 12: UV Test Machine (Date of Test: 17-November-2024)

Figure 13: Salt fog Test Machine (Date of Test: 13-November-2024)

Figure 14: Contact angle device (Date of Test: 08-November-2024)

Date of calibration	Serial number	Type	Equipment	#
2024/04	ST-140 I-S-95	ST140 I	HIPOT	1
2024/04	B022004	ZLT-UL94	Flammability tester	2
2024/04	S-960371	ST401	salt fog tester	3
2024/04	20170325001	ZL-1029	Tracking tester	4
2024/09	004221	Type A (WR-104A)	Shore A Durometer	5
2024/02	16102602	TR200	Roughness tester	6
2024/09	RZ16082341	---	Digital Caliper	7
2024/04	YY-170531	YXEL-225	UV tester	8
2024/04	M2A004152	UN3	Bending Tester	9
2024/07	A456CFBS VM14767	Elcometer456	Thickness Measurement	10
2024/07	AD12231	CAG200	contact angle tester	11
2024/04	---	---	Tensile Tester	12
2024/04	HC2020081409	HCDH-111	Arc Discharge Resistance Tester	13

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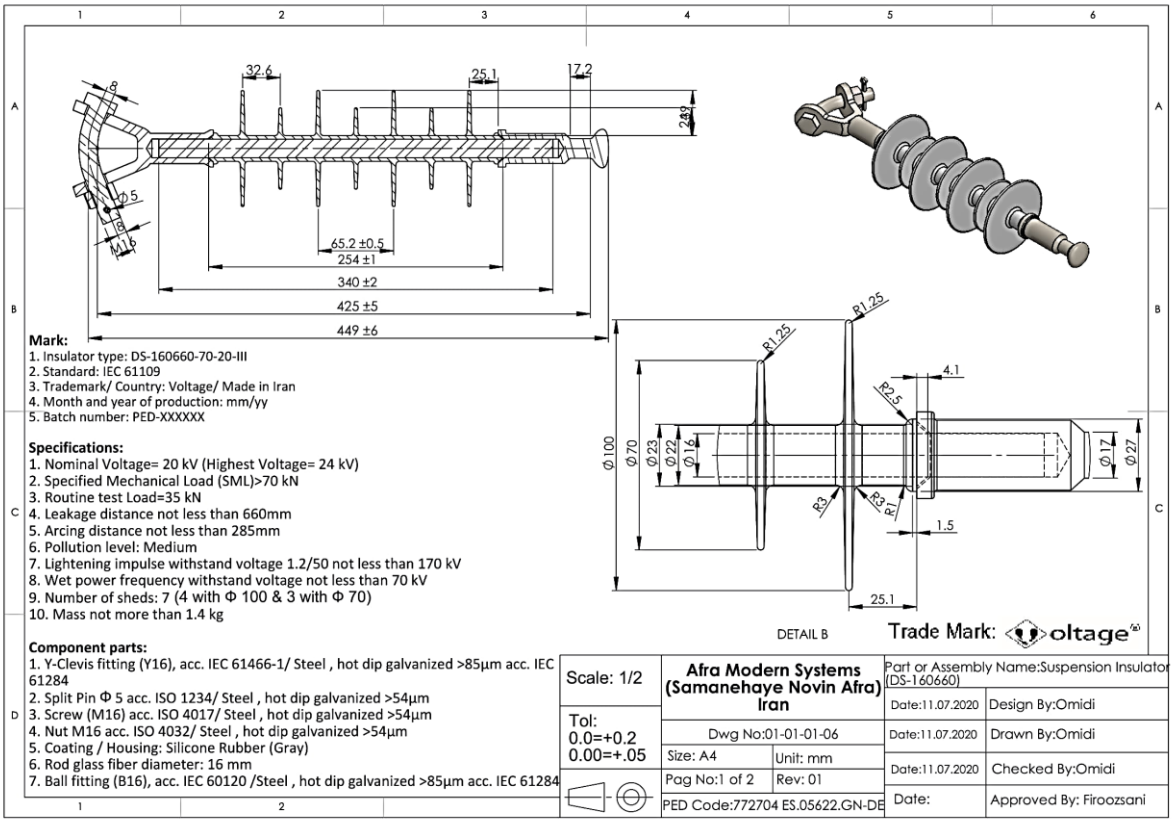
4. Product Plane



Mark:
1. Insulator type: DS-160660-70-20-III
2. Standard: IEC 61109
3. Trademark/ Country: Voltage/ Made in Iran
4. Month and year of production: mm/yy
5. Batch number: PED-XXXXXX

Specifications:
1. Nominal Voltage= 20 kV (Highest Voltage= 24 kV)
2. Specified Mechanical Load (SML)>70 kN
3. Routine test Load=35 kN
4. Leakage distance not less than 660mm
5. Arcing distance not less than 285mm
6. Pollution level: Medium
7. Lightening impulse withstand voltage 1.2/50 not less than 170 kV
8. Wet power frequency withstand voltage not less than 70 kV
9. Number of sheds: 7 (4 with Φ 100 & 3 with Φ 70)
10. Mass not more than 1.4 kg

Component parts:
1. Y-Clevis fitting (Y16), acc. IEC 61466-1/ Steel , hot dip galvanized >85µm acc. IEC 61284
2. Split Pin Φ 5 acc. ISO 1234/ Steel , hot dip galvanized >54µm
3. Screw (M16) acc. ISO 4017/ Steel , hot dip galvanized >54µm
4. Nut M16 acc. ISO 4032/ Steel , hot dip galvanized >54µm
5. Coating / Housing: Silicone Rubber (Gray)
6. Rod glass fiber diameter: 16 mm
7. Ball fitting (B16), acc. IEC 60120 /Steel , hot dip galvanized >85µm acc. IEC 61284

Scale: 1/2	Afra Modern Systems (Samanehaye Novin Afra) Iran		Part or Assembly Name:Suspension Insulator (DS-160660)
Tol: 0.0=+0.2 0.00=+.05	Dwg No:01-01-01-06		Date:11.07.2020 Design By:Omidi
	Size: A4	Unit: mm	Date:11.07.2020 Drawn By:Omidi
	Pag No:1 of 2	Rev: 01	Date:11.07.2020 Checked By:Omidi
	PED Code:772704 ES.05622.GN-DE		Date: Approved By: Firoozsani