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COOPER POWER
SERIES

CERTIFIED TEST REPORT

Single-Phase Distribution Class Disconnect Switches

Powering Business Worldwide

Design Tests for the Single-Phase Distribution Disconnect Air Switch
Per the following ANSI/IEEE Standards Requirements:
C37.30.1

D73P – Single-Phase Switch

Part #**D73P16S0** – Polymer 15kV/110 BIL/ 600a
Part #**D73P19S0** – Polymer 15kV/110 BIL/ 900a

Part #**D73P26S0** – Polymer 27kV/125 BIL/ 600a
Part #**D73P29S0** – Polymer 27kV/125 BIL/ 900a

Part #**D73P36S0** – Polymer 27kV/150 BIL/ 600a
Part #**D73P39S0** – Polymer 27kV/150 BIL/ 900a

Part #**D73P46S0** – Polymer 38kV/150 BIL/ 600a
Part #**D73P49S0** – Polymer 38kV/150 BIL/ 900a

Part #**D73P16P0** – Porcelain 15kV/110 BIL/ 600a
Part #**D73P19P0** – Porcelain 15kV/110 BIL/ 900a

Part #**D73P26P0** – Porcelain 27kV/125 BIL/ 600a
Part #**D73P29P0** – Porcelain 27kV/125 BIL/ 900a

D73P-HOM, CD, and LT Single-Phase Switch

Part #**D73VS19S0** – HOM Polymer 15kV/125 BIL/ 900a
Part #**D73VS49S0** – HOM Polymer 27/38kV/150 BIL/ 900a

Part #**D73CD19S0** – CD Polymer 15kV/125 BIL/ 900a
Part #**D73CD49S0** – CD Polymer 27/38kV/150 BIL/ 900a

Part #**D73LT19S0** – LT Polymer 15kV/110/125 BIL/ 900a
Part #**D73LT49S0** – LT Polymer 27/38kV/150 BIL/ 900a

Part #**D73LT59** – Polymer 38kV/200 BIL/ 900a

D733 – Bypass Switch

Part #**D73316S0** – Polymer 15kV/110 BIL/ 600a
Part #**D73319S0** – Polymer 15kV/110 BIL/ 900a

Part #**D73326S0** – Polymer 27kV/125 BIL/ 600a
Part #**D73329S0** – Polymer 27kV/125 BIL/ 900a

Part #**D73316P0** – Porcelain 15kV/110 BIL/ 600a
Part #**D73319P0** – Porcelain 15kV/110 BIL/ 900a

Part #**D73326P0** – Porcelain 27kV/125 BIL/ 600a
Part #**D73329P0** – Porcelain 27kV/125 BIL/ 900a

Part #**D73P56S0**– Polymer 38kV/200 BIL/ 600a
Part #**D73P59S0**– Polymer 38kV/200 BIL/ 900a

3D733 – Three Phase Bypass Switch

Part #**3D73316** – Polymer 15kV/110 BIL/ 600a
Part #**3D73319** – Polymer 15kV/110 BIL/ 900a
Part #**3D73326** – Polymer 27kV/125 BIL/ 600a
Part #**3D73329** – Polymer 27kV/125 BIL/ 900a
Part #**3D73336** – Polymer 27kV/150 BIL/ 600a
Part #**3D73339** – Polymer 27kV/150 BIL/ 900a
Part #**3D73346** – Polymer 38kV/150 BIL/ 600a
Part #**3D73349** – Polymer 38kV/150 BIL/ 900a

CERTIFICATION

Statements made and data shown are, to the best of our knowledge and belief, correct and within the usual limits of commercial testing practice.

M. Pitel 6/5/18

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Senior Project Engineer

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Jim Wenzel
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Introduction

Eaton's Cooper Power series D73P Air Switch has been developed to provide an industry standard Distribution Disconnect Air Switch with silicone insulators.

The report details, data, and testing conducted to verify performance and meet the applicable IEEE® standard requirements are available upon request.

Contents

Voltage Withstand Test

Air Switches of each voltage-rating category (rated 60 Hz voltage and related BIL) were tested per IEEE C37.30.1™-2011 standard Clause 8.1; Sub-Clause 8.1.1.1 Power frequency dry withstand voltage test, Sub-Clause 8.1.1.2 Power frequency wet withstand voltage test, and Sub-Clause 8.1.2 Lightning impulse dry withstand voltage test. Minimum acceptance criteria of creepage measurements and voltage withstand levels are identified in Table 1 and Table 2 respectively.

Table 1:

Rated Maximum Voltage rms kV	Rated Lightning Impulse Withstand Voltage, BIL kV Peak	Minimum Length of Break metal to metal mm	in	Minimum Insulator Centerline to Centerline Spacing mm	in
15.5	110	178	7	279	11
27	125	229	9	330	13
27	150	305	12	406	16
38	150	305	12	406	16
38	200	457	18	584	23

Table 2:

Rated Maximum Voltage rms kV	Rated Lightning Impulse Withstand Voltage kV Peak	Power Frequency (rms kV) Dry 1 min	Wet 10 s
15.5	110	38	30
27	125	60	50
27	150	70	60
38	150	70	60
38	200	95	80

Short-Time Withstand Current Test

Air Switches were tested for short-time current withstand (rated 60 Hz voltage) per IEEE C37.30.1™-2011 standard, Clause 8.3; Sub-Clause 8.3.4 Peak withstand current tests, and Sub-Clause 8.3.5 Short-time (symmetrical) withstand current tests. The Air Switch passed these tests by withstanding the current levels specified as shown in Table 3.

Table 3:

Rated Continuous Current	Peak (10 cycles)	Short-time (3s)
A	kA	kA
600	40	12.5
900	40	25
900	65*	25*

***NOTE**: For 200kV BIL ratings only

Temperature Rise Test

Per the test method IEEE C37.30.1™-2011 standard Clause 5.4 Rated continuous current, the maximum temperature rise allowed is specified in Table 4. The temperature rise tests on the Air Switch when tested per IEEE C37.30.1™-2011 standard, Clause 8.2 Temperature rise test met the requirements of the standards.

Table 4:

Switch Part	Allowable Maximum Temperature ˚C	Limit of Observable Temp Rise at Rated Current ˚C
a. Contacts in air	-	-
(1) Copper to Silver (600a)	90	43
(2) Silver to Silver (900a)	105	53
b. Conducting mechanical joints	-	-
(1) Copper or Aluminum (600a)	90	43
(2) Silver (900a)	105	53
c. Switch terminals with bolted connections	90	43
d. Other current carrying parts	-	-
(1) Copper	105	53
e. Insulator caps, pins, and bushing caps	110	57

Mechanical Test

Air Switches were tested for mechanical operations per IEEE C37.30™-2011 standard, Clause 8.6; Sub-Clause 8.6.2.1 Number of operations, Sub-Clause 6.1.1.5 Mechanical operations, and Sub-Clause 8.6.2.1 Terminal loading. The Air Switch passed these tests by withstanding 1000 open-close cycles; 900 open-close cycles without terminal loading and 100 open-close cycles with terminal loading. Terminal loading specifications are outlined in Table 6, and Figure 1.

Table 6:

Maximum Voltage	Current Rating	F(1) and F(2)		F(3) and F(4)	
kV	A	N	lb	N	lb
4.8-72.5	200-1200	400	90	130	30

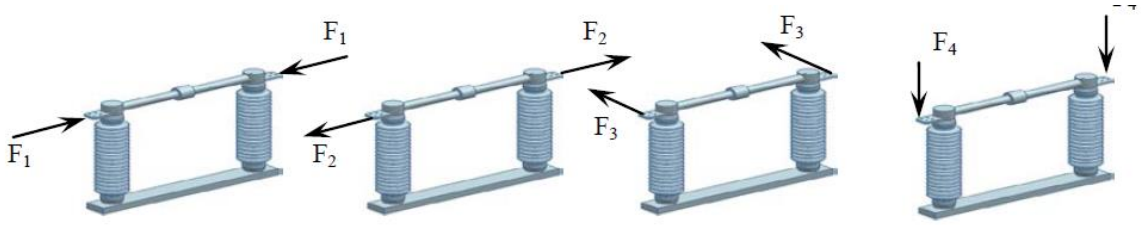

Figure 1: Terminal Loading

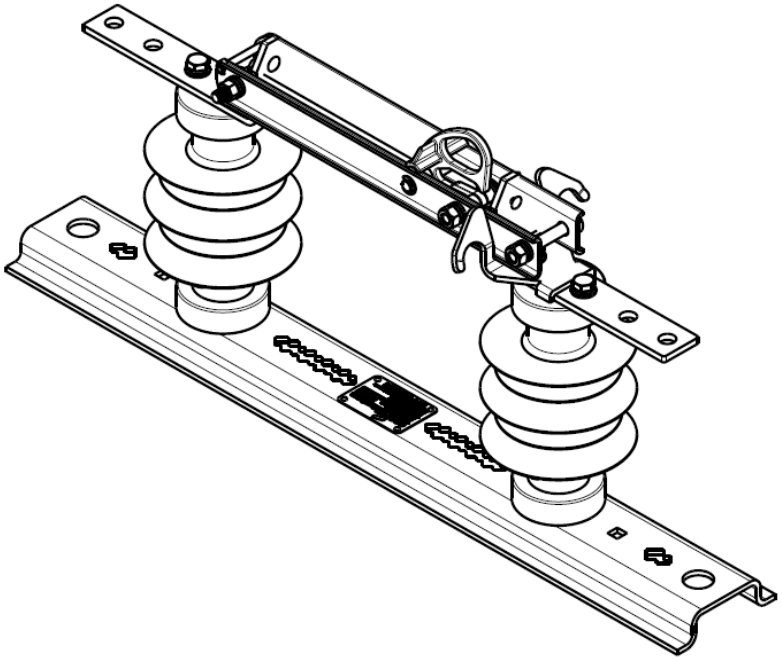

Figure 2: Example- D73P Single Phase Distribution Disconnect Air Switch

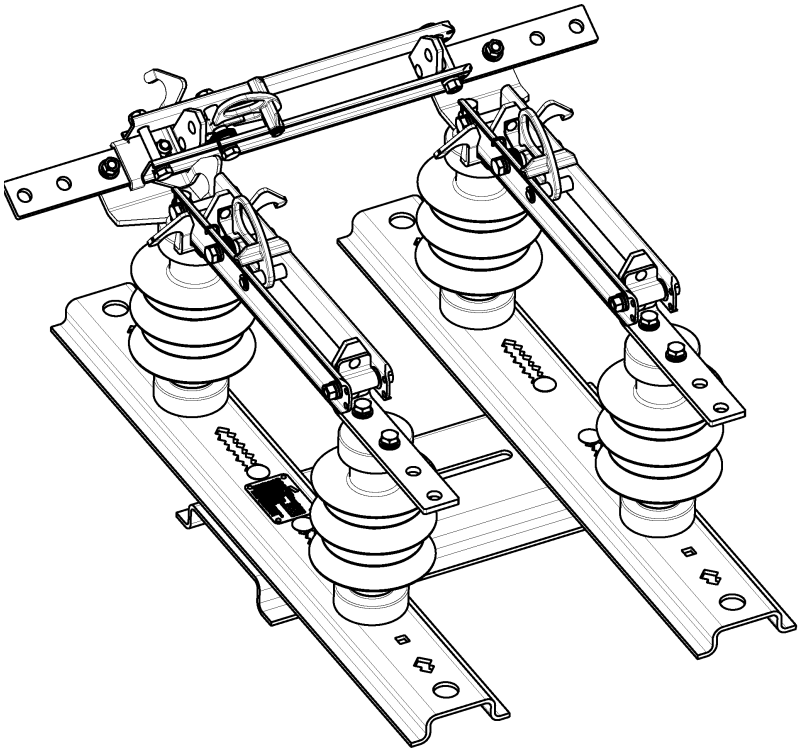

Figure 3: Example- D733 Bypass Distribution Disconnect Air Switch

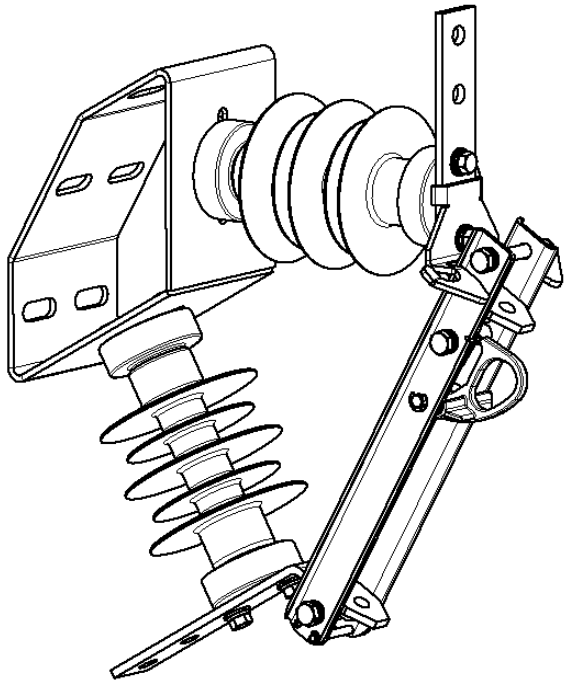

Figure 4: Example- D73P-VS, HOM Disconnect Air Switch Style 1

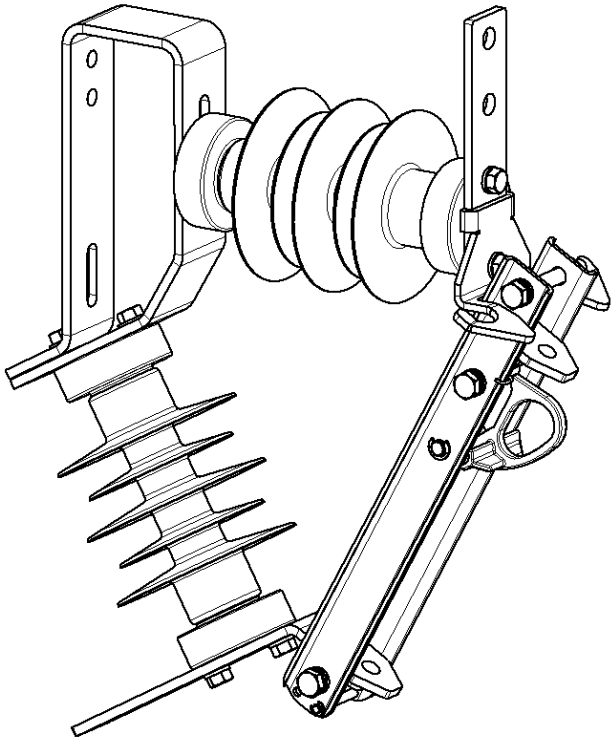

Figure 5: Example- D73P-VS, HOM Disconnect Air Switch Style 2

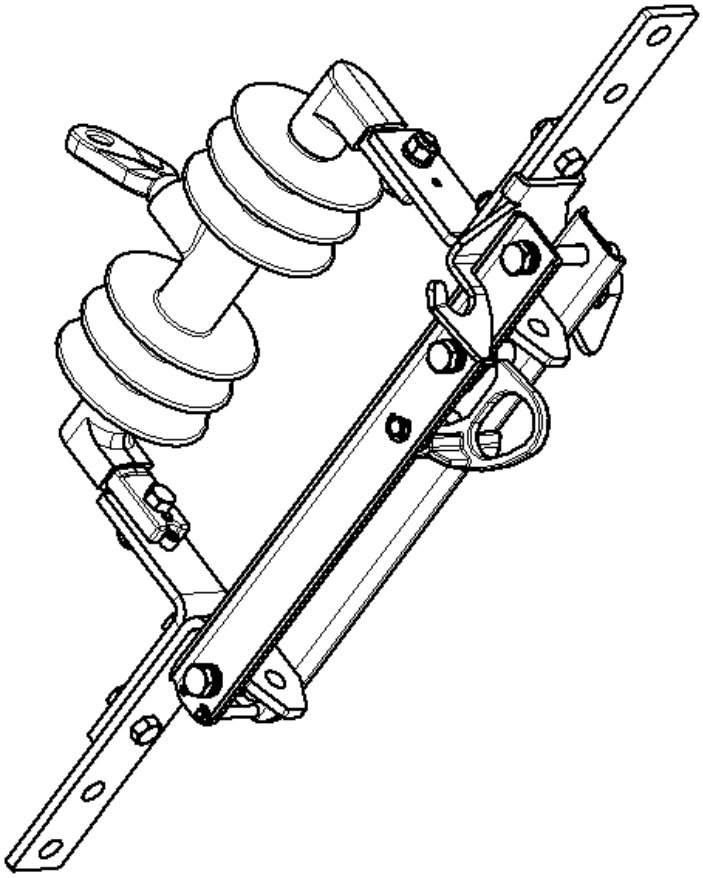

Figure 6: Example- D73P-CD, CD Air Switch

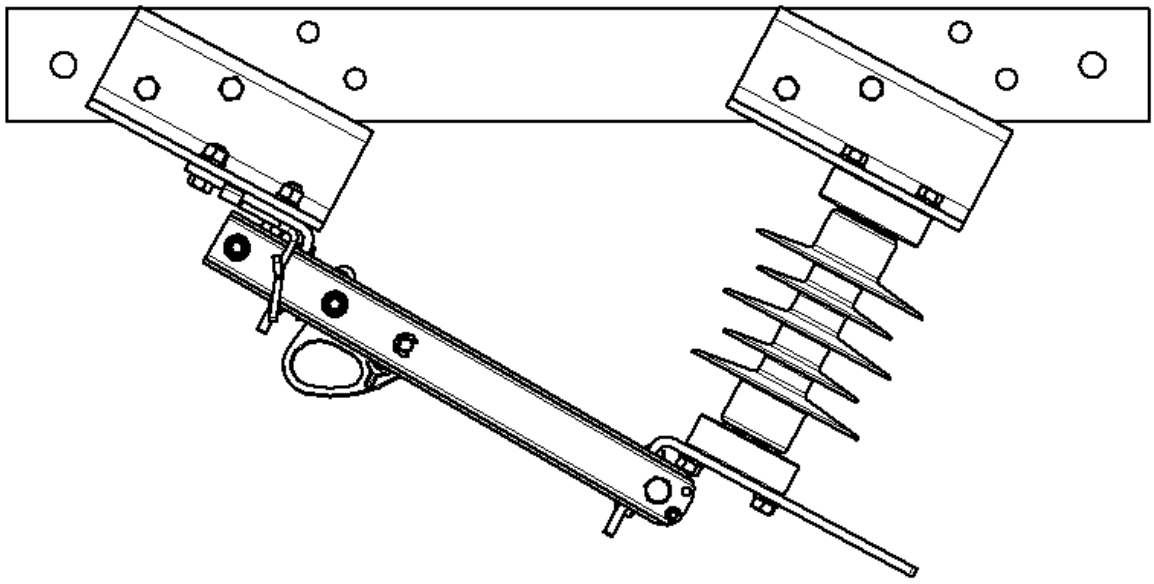

Figure 7: Example- D73P-CD, CD Air Switch

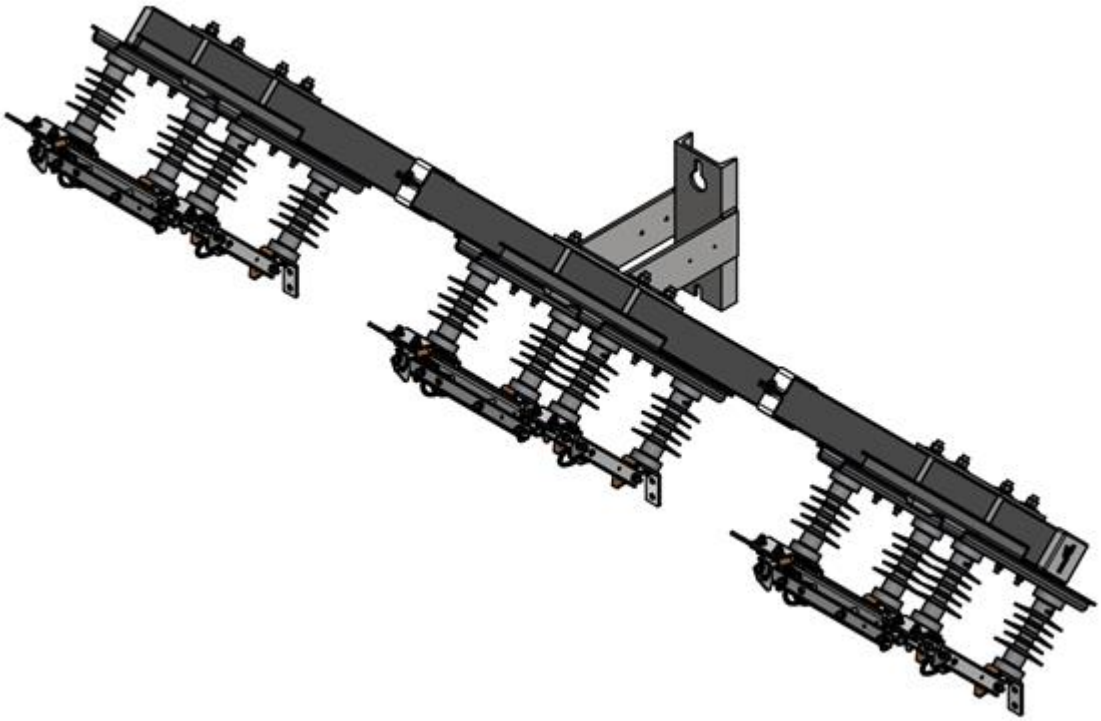

Figure 8: Example- 3D733 Three Phase Bypass Switch

Insulator Test

Composite insulator, 2210140P01, were tested by GB/T 20142-2006 for mechanical test as following GB/T 775.3 Clause 4.2 and dielectric tests as following GB/T 20142 Clause 7.2 were performed and passed test as shown Table 7. (Refer to test report: XY20130205) Mechanical test instruction by GB/T standards covers for ANSI C29.17-2002 Clause 9.4 and 9.5, and electric test by GB/T standards covers for ANSI C29.1-1988 Clause 4.2 and 4.8.

Table 7

Test Item	Requirement	Achieved
Mechanical Cantilever load	1,350 lbs	1460 lbs
Mechanical Tensile load	5,000 lbs	9,000 lbs
Torsional Tolerance load	350 lb-ft	380 lb-ft
Dry power frequency test	70kV	70kV
Impulse Test	125kV BIL	125kV BIL

Composite insulator shed material (XYPE-02-G) were tested by DL/T 864-2004 and GB/T standards and passed as shown in Table 8. DL/T and GB/T standards cover for ANSI C29.17-2002 Clause 7.4.2 and 7.5.

Table 8[a]

Test Item	Reference	Result
Flammability Test	GB/T 10707-2008 Rubber- Determination of flammability	Flammability reached FV-0 and met the requirements
Tracking and Erosion Test	GB/T6553-2003 Electrical insulation materials used under severe ambient conditions – Test methods for evaluating resistance to tracking and erosion	Met all requirements and passed
Hardness Test (Shore A)	GB/T 531.1-2008 Rubber, vulcanized or thermoplastic- Determination of indentation hardness- Part I: Durometer method (Shore hardness)	Met all requirements and passed
Volume Resistivity Test	GB/T 1692-2008 Vulcanized rubber- Determination of the insulation resistivity	Met all requirements and passed
Mechanical Tensile Strength and Elongation Test	GB/T 528-2009 Rubber vulcanized or thermoplastic- Determination of tensile stress-strain properties	Met all requirements and passed
Tear Strength Test	GB/T 529-2008 Rubber vulcanized or thermoplastic- Determination of tear strength (Trouser, angle and crescent test pieces)	Met all requirements and passed
Hydrophobility Test	GB/T 1408.1-2006 Electrical strength of insulating materials – Test method	Met all requirements and passed

Revisions

Revision No.	Date	What was added/changed:
01	10/28/13	Addition of the D-73P Porcelain Single Phase Switch Addition of the D-73P3 Bypass Switch Addition of the D-73P Polymer 27kV 150 BIL Single Phase Switch Addition of the D-73P Polymer 38kV 150 BIL Single Phase Switch
02	10/13/14	Addition of the D-73P Insulator Test
03	4/22/15	Addition of the D-73P HOM, CD, and LT Single Phase Switch
04	5/31/18	Added Three Phase Bypass & 200kV BIL Switches

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