

ConduDisc[®]: Long-Life Utility Pole Grounding





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Introduction

SAE's ConduDisc[®] is an innovative utility ground plate that significantly reduces grounding installation costs while extending the life of a grounding system. Engineered to make quick work for utility workers, SAE's ConduDisc[®] provides installers with an effective and efficient solution that eliminates the need for ground rods – thus, minimizing material costs, ensuring long term reliable grounding and personnel safety.

Key Benefits:

- Increased reliability of your utility pole network
- High strength and superior conductivity
- Easy utility installation
- Minimal maintenance
- Personnel safety

Refer to Table 1 for an overview of the physical properties of the ConduDisc[®] Utility Ground Plate:

Table 1: Physical Properties

PROPERTY	TYPICAL VALUE	UNIT	TEST METHOD
PHYSICAL STATE	Black Solid		
ODOUR	None		
WATER PERMEABILITY	1.72 x 10 ⁻⁷	cm/sec	ASTM D5084 (2.6 PSI)
FLAMMABILITY	No ignition		EXPOSED TO A PROPANE TORCH (~2000 °C) FOR 60 SECONDS
ELECTRICAL CORROSION RESISTANCE COPPER STEEL GALVANIZED STEEL	100 98.09 99.91	%	SAE INC. STANDARD 100
COMPATIBILITY COPPER STEEL GALVANIZED STEEL	Yes Yes Yes		SAE INC. STANDARD 100
ENVIRONMENTAL IMPACT	Neutral		ONTARIO REGULATION 558/00 (LEACHATE TESTING)
FREEZE-THAW WITHSTAND	30	YEARS	SAE INC. STANDARD 102

"By utilizing ConduDisc[®] at every pole, utilities will improve network reliability and SAIDI/SAIFI performance, eliminate future pole grounding maintenance, and save millions of dollars over decades of service life."

> - Todd Sirola, CEO, SAE Inc.



Technical Overview

Manufactured using a conductive, polymeric, moulded material that has low permeability to water to encapsulate a galvanized steel plate, the ConduDisc[®] mounts to the bottom of the utility distribution pole.

Refer to Figure 1 for an overview of ConduDisc[®] Utility Ground Plate design:



Figure 1: ConduDisc[®] Utility Plate Design



SAE's ConduDisc[®] is engineered to withstand some of the toughest weather conditions, as it continues to perform in situ for the life of the utility pole – with no degradation despite freezing and thawing.

Refer to Table 2, Table 3 and Table 4, for ConduDisc[®] product properties and testing results.

Table 2: Mechanical Properties

PROPERTY	TYPICAL VALUE	UNIT	TEST METHOD
ELASTIC COMPRESSION 7000 KG			
12 000 KG	2.2 (4.3)	mm (%)	
14 500 KG	2.6 (5.1)	mm (%)	SAE INC. STANDARD 103
16 771 KG	3.0 (5.9)	mm (%)	
	3.1 (6.1)	mm (%)	
MAXIMUM LOAD APPLIED	16 771	KG	SAE INC. STANDARD 103

Table 3: Electrical Properties

PROPERTY	TYPICAL VALUE	UNIT	TEST METHOD
RESISTANCE	0.031	Ω	SAE INC. STANDARD 105
RESISTIVITY	30.39	Ω·CM	SAE INC. STANDARD 105

Table 4: Fault Current Withstand

RMS CURRENT (A)	RMS VOLTAGE (kV)	RESISTANCE BEFORE TEST (mΩ)	RESISTANCE AFTER TEST (mΩ)	APPROXIMATE TEMPERATUE RISE (°C)	TEST DURATION (milliseconds)
1040	19.5	30.6	20.3	1	508
2520	124.0	55.5	20.2	2	508
3730	239.0	44.9	46.0	13	234
4990	176.0	34.6	7.28	1	508



ConduDisc[®] is also environmentally neutral. It is provided as a solid that does not leach, dissolve or migrate into the soil or water. A table of toxicity characteristic leaching procedure (TCLP) results for ConduDisc[®] surround material is included in Table 5 below.

CONSTITUENT	CONDUDISC® TCLP CONCENTRATION (mg/L)	USEPA MAXIMUM CONTAMINANT LEVEL (mg/L)
Arsenic	< 0.010	0.010
Barium	1.490	2.000
Boron	1.067	2.000 ⁺
Chromium	0.026	0.100
Mercury	< 0.001	0.002
Selenium	0.013	0.050
Silver	< 0.01	0.100*
Uranium	< 0.01	0.030
Fluoride	0.190	2.000*
Nitrate (as Nitrogen)	< 0.01	10.000
Nitrite (as Nitrogen)	< 0.05	1.000
Cyanide	< 0.05	0.200

Table 5: Leachate (TCLP) Data

 No MCL established; value shown is USEPA's Lifetime Drinking Water Health Advisory.
 * No MCL established; value shown is USEPA's secondary drinking water standard. Note: < denotes less than method detection limit (MDL).

Installation and Application

Due to the ease of install and its one size fits all features, a ConduDisc[®] placed during a utility pole installation is more cost-effective than returning to add grounding at a later date. Also, future equipment installations do not have to wait for locates or require sidewalk repairs. Thus, saving utilities both time and money while improving grounding and surge dissipation characteristics during fault conditions.



Compliance and Regulations

The ConduDisc[®] Utility Ground Plate adheres to CSA Standard C22.2 No. 41-13 and No. 65-13; thus, it also adheres to the ESA Technical Guideline for Section 6 "Approval of Electrical Equipment" with regards to Ontario Regulation 22/04 and the construction requirements of the National Electrical Safety Code.

Refer to Figure 3 for a compliance installation example.



Figure 3: Utility Pole with ConduDisc[®] Installed Below Frost Line



Conclusion

SAE's ConduDisc[®] is a long-life grounding solution that improves the reliability of utility networks and enhances the performance of grounding systems while reducing downtime, as it virtually eliminates electrode corrosion up to 99.9%. ConduDisc[®] is easy to install, cost-efficient, and addresses personnel safety concerns. Unlike traditional grounding rods, it won't corrode or require regular maintenance deployment – making quick work for both you and your team of utility installers.

SAE Inc.

Founded in 1990, SAE Inc. (SAE) is a leading manufacturer that specializes in electrical grounding and cathodic protection. SAE provides reliability for critical systems that cannot tolerate service interruption and has 28 years of experience grounding structures and a proven track record of eliminating lightning-related outages. In addition to the ConduDisc[®], SAE also manufactures a variety of conductive backfill products used for electrical grounding: Conducrete[®], ConduFlow[®] and ConduForm[™]. We also provide full-service electrical grounding design and engineering. For more information visit SAE's website at <u>www.saeinc.com</u>.



Glossary

ConduDisc®: A utility pole ground plate, normally affixed to the bottom of a utility pole or transformer frame to dissipate surcharge.

CSA Standard: A group that enforces product certification and testing services to Canada, the U.S, Europe, and worldwide.

Leachate: Acid that has percolated through a solid and leached out some of the constituents.





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