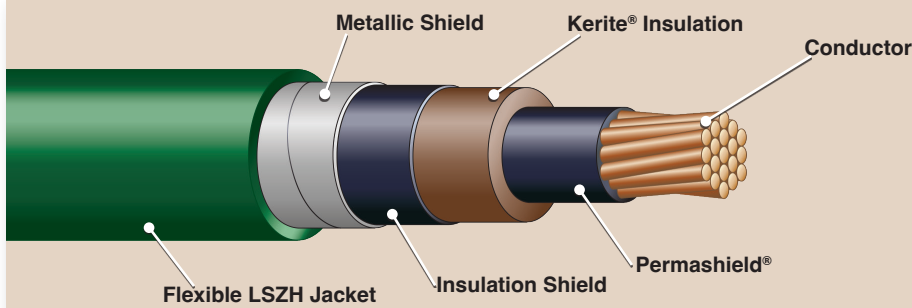


PermaLife® LSZH Shielded Medium Voltage Power Cable 5-35kV

Discharge Resistant Kerite® Insulation System



60 Year Qualified Life at 90°C
for Class 1E Nuclear Plant
Use

LOCA Qualified
Spec. RSS-7-010

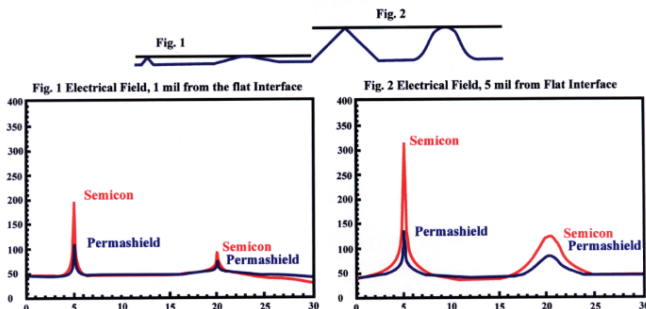
Scope

PermaLife medium voltage is a jacketed single conductor power cable designed for applications in Nuclear Power Generating Plants and Substations. It is intended for use in harsh and demanding environments and qualified for Class 1E applications (LOCA Qualified). It may be installed indoors or outdoors in trays, ducts, conduits, direct burial, or aerial applications to perform a variety of power functions.

Features

PermaShield® non-conducting stress control layer:

- 100% production tested in accordance with ICEA S-97-682.
- Greater than 2X reduction in electrical stress magnification caused by surface irregularities compared to semicon conductor shields.



- 66% improvement in average AC breakdown strength over semicon (Ref. A.D. Little, Inc., *The Physics of PermaShield®*, August 1983)

Kerite® discharge resistant insulation system:

- Discharge resistant insulation system formulated to prevent the degradation that occurs as a result of partial discharge per ASTM D2275.

Point Probe Test for Discharge Resistance

Discharge Resistant EPR	Discharge Free EPR	TR-XLPE	XLPE
TIME TO INCEPTION OF EROSION (HOURS)			
>250	48	Immediate	Immediate
TIME TO DIELECTRIC FAILURE (HOURS)			
>250	120	80	45

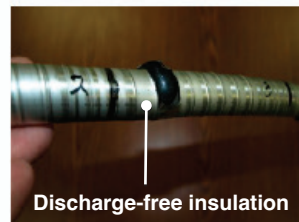


Rated 90°C for normal operation in wet and dry locations, 130°C for emergency overload conditions, and 250°C for short circuit conditions.

- Only medium voltage cable with zero reported failures of the insulation system. (Ref. NEI 06-05, *Medium Voltage Underground Cable White Paper* and EPRI *Plant Engineering: Aging Management Program for Medium Voltage Cable systems for Nuclear Power Plants*)

Helically applied tinned copper tape shield:

- Greater flexibility, easier to handle and install, and simpler to splice and terminate than LCS shielded designs.
- Discharge resistant medium voltage cables never require partial discharge testing. Therefore, it is unnecessary to perform in-service partial discharge tests making the LCS design unnecessary for this cable.
- No adverse interaction between shield and insulation as reported for some discharge free insulations due to high coefficients of thermal expansion. (Ref. EPRI Cable Users Group Conference, August 2014, *Sixty-year Life Nuclear Cables for Gen III+ Reactor Applications*)



Performance history:

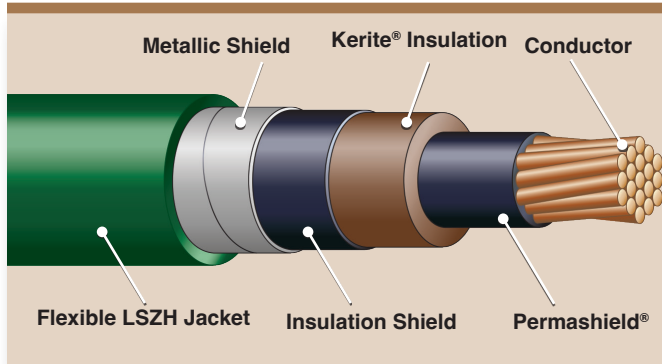
- NEI 06-05 *Medium Voltage Underground Cable White Paper* concluded that "81 units provided information on the number of circuits in wet and dry applications" and "of the 20 units having brown EPR (Kerite), none had a failure of wet underground cable." It further went on to state that "no wet failures of brown EPR have been identified to-date."
- EPRI *Plant Engineering: Aging Management Program Guidance for Medium-Voltage Cable Systems for Nuclear Power Plants*, Revision 1 concluded that "brown EPR (Kerite) insulation, while being available to the early nuclear plants, continues to be produced. Approximately 20% of plants report its use. No water related failures have been reported in the nuclear industry to date."

Performance Standards

- Designed and tested in accordance with ICEA S-97-682 and S-93-639 or S-68-516 and AEIC CS-6
- Class 1E qualified in accordance with IEEE 383-1974/2003 and IEEE 323-1974/2003
 - Nuclear qualified with a minimum 60 year thermal life expectancy at 90°C
 - Radiation resistant (up to 220 megarads)
- Cable passes IEEE 383-1974 as modified by NRC. Reg. Guide 1.131 vertical tray flame test and IEEE 1202 vertical tray flame test
- Quality Assurance program in accordance with 10 CFR Appendix B
- Full traceability
- Meets the low smoke generation requirements of UL 1685 and CSA FT4
- Meets halogen free requirements of ICEA standard S-93-639

PermaLife® LSZH Shielded Medium Voltage Power Cable 5-35kV

Discharge Resistant
Kerite® Insulation System



Construction

Conductor: Bare copper (tinned copper also available), class "B" compressed strand (compact strand also available)

Conductor Shield: Permashield® conductor shield (non-conducting stress control layer)

Insulation: Proprietary Kerite® discharge resistant insulation

Insulation Shield: Thermoset semiconducting layer

Metallic Shield: 5 mil helically applied tinned copper tape with 20% overlap

Barrier Tape: Flame barrier tape(s)

Jacket: Flexible, thermoset low smoke zero halogen (LSZH)

Note: Special designs are available on request

5kV Single Conductor 115 Mil Insulation (133%) and 140 Mil for 2000 kcmil and larger

Catalog No. Prefix	Size (AWG/kcmil)	Number of Strands	O.D. Over Insulation (Inch)	Jacket Thickness (Mils)	Jacket O.D. (Inches)	Cable Weight (Lbs/M')
P45-0261	2/0	19	0.69	80	0.95	810
P45-0461	4/0	19	0.80	80	1.06	1,110
P45-0361	350	37	0.95	80	1.21	1,650
P45-0561	500	37	1.10	80	1.36	2,200
P45-0761	750	61	1.29	80	1.55	3,100
P45-1061	1000	61	1.44	110	1.76	4,100
P45-2061	2000	127	1.96	110	2.28	7,600

8kV Single Conductor 140 Mil Insulation (133%) and 175 Mil for 2000 kcmil and larger

Catalog No. Prefix	Size (AWG/kcmil)	Number of Strands	O.D. Over Insulation (Inch)	Jacket Thickness (Mils)	Jacket O.D. (Inches)	Cable Weight (Lbs/M')
P45-0262	2/0	19	0.74	80	1.00	860
P45-0462	4/0	19	0.84	80	1.10	1,165
P45-0362	350	37	1.00	80	1.26	1,695
P45-0562	500	37	1.14	80	1.40	2,250
P45-0762	750	61	1.33	80	1.59	3,150
P45-1062	1000	61	1.48	110	1.80	4,150
P45-2062	2000	127	2.02	110	2.34	7,750

15kV Single Conductor 220 Mil Insulation (133%)

Catalog No. Prefix	Size (AWG/kcmil)	Number of Strands	O.D. Over Insulation (Inch)	Jacket Thickness (Mils)	Jacket O.D. (Inches)	Cable Weight (Lbs/M')
P45-0260	2/0	19	0.88	80	1.14	1,000
P45-0460	4/0	19	0.99	80	1.25	1,325
P45-0360	350	37	1.14	80	1.40	1,865
P45-0560	500	37	1.29	80	1.55	2,450
P45-0760	750	61	1.48	110	1.80	3,500
P45-1060	1000	61	1.63	110	1.95	4,400
P45-2060	2000	127	2.10	110	2.42	7,900

25kV Single Conductor 320 Mil Insulation (133%)

Catalog No. Prefix	Size (AWG/kcmil)	Number of Strands	O.D. Over Insulation (Inch)	Jacket Thickness (Mils)	Jacket O.D. (Inches)	Cable Weight (Lbs/M')
P45-0268	2/0	19	1.10	80	1.36	1,250
P45-0468	4/0	19	1.21	80	1.47	1,625
P45-0368	350	37	1.36	80	1.62	2,175
P45-0568	500	37	1.51	110	1.83	2,900
P45-0768	750	61	1.70	110	2.02	3,900
P45-1068	1000	61	1.85	110	2.17	4,800
P45-2068	2000	127	2.32	110	2.64	8,400

Note: 100% insulation level available upon request.

All gauge sizes and triplex constructions are available.

25kV designs only qualified to IEEE 383-1974 and IEEE 323-1974.



Made in the USA



Marmon Electrical
A Berkshire Hathaway Company