Vacuum interrupter withstand test voltage ratings information

Powering Business Worldwide

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Safety for life

Eaton's Cooper Power series products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result In death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage. G101.0

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage. G102.1

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install, or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G122.3

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Applicable to all Eaton Cooper Power series vacuum interrupters manufactured in South Milwaukee, WI.

⚠ WARNING

Hazardous voltage. The switchgear (apparatus and control) and high-voltage transformer must be in a test cage or similar protected area to prevent accidental contact with the high-voltage parts.

Solidly ground all equipment. Failure to comply can result in death, severe personal injury, and equipment damage. T221.5

⚠ CAUTION

Radiation. At voltages up to the specified test voltages, the radiation emitted by the vacuum interrupter is negligible. However, above these voltages, radiation injurious to personnel can be emitted. G109.2

- **American National Standard C37.61-1973, "Guide for the Application, Operation, and Maintenance of Automatic Circuit Reclosers",** allows testing after delivery which includes application of 75% of rated low-frequency withstand voltage across open contacts of the interrupter. This voltage (50-60 Hz) is tabulated below.
- At test voltages listed in Columns C and D, radiation is negligible. The electric field present in a vacuum interrupter during normal operation or recommended testing will not produce any hazard to personnel from X-rays.
- Testing at voltages higher than those listed in Columns C and D may cause radiation emission injurious to personnel.
- Vacuum interrupter testing above the value listed in Column C is not recommended.
- If direct-current dielectric tests (15 minute DC) are to be conducted on an underground system with apparatus connected, be sure vacuum interrupter contacts are closed.
- Normal electrical safety precautions should be observed.
- AC is the preferred withstand voltage testing method as the DC method may be unreliable when testing vacuum interrupters. Refer to IEEE Std. C37.60™-2003, Clause 8, Paragraph 2, for additional clarification.

Column A	Column B	Column C	Column D*	Column E ***
Apparatus type designation	**Interrupter rated maximum voltage (kV rms)**	**75% of rated low-frequency withstand voltage (1 min dry) (kV rms)**	**Recommended DC withstand voltage (1 min dry) (kV)**	**Nominal open-contact gap(in)**
Padmount				
PWE	15.5	26.2**	37.1**	1/2
PWVE	27.0	30.0**	42.4**	1/2
R-VAC/VFI	15.5	26.2**	37.1**	1/2
R-VAC/VFI	27.0	30.0**	42.4**	1/2
R-VAC/VFI	38.0	37.5**	53.0**	1/2
PST	15.5	26.2**	37.1**	1/2
PST	27.0	30.0**	42.4**	1/2
PST	38.0	37.5**	53.0**	1/2

*To prevent possible interrupter damage, the DC test source should be limited to 2 mA maximum. DC test voltages listed in Column D are not intended to specify 15-minute DC system test voltages. (AC is the preferred withstand voltage testing method as the DC method may be unreliable when testing vacuum interrupters.)

**Test voltages must not be applied directly to submersible bushing stud terminals without using proper termination.

***When testing vacuum interrupters not installed in distribution switchgear, the vacuum interrupter should have a nominal open-contact gap as listed in Column E.

Column A	Column B	Column C	Column D*	Column E
Apparatus type designation	**Interrupter rated maximum voltage (kV rms)**	**75% of rated low-frequency withstand voltage (1 min dry) (kV rms)**	**Recommended DC withstand voltage (1 min dry) (kV)**	**Nominal open-contact gap (in)**
Reclosers				
V4E	27.0	45.0	63.6	1/2
V4H	15.5	37.5	53.0	1/4
V6H	15.5	37.5	53.0	1/4
V4L	15.5	37.5	53.0	1/2
VSA12	15.5	37.5	53.0	7/16
VSA12B	15.5	37.5	53.0	7/16
VSA16	15.5	37.5	53.0	7/16
VSA20	15.5	37.5	53.0	7/16
VSA20A	15.5	37.5	53.0	7/16
VSO12	38.0	52.5	74.2	1/2
VSO16	38.0	52.5	74.2	1/2
VW	15.5	37.5	53.0	1/2
VWE	15.5	37.5	53.0	1/2
VWV27	27.0	45.0	63.6	1/2
VWV38X	38.0	52.5	74.2	1/2
VWVE27	27.0	45.0	63.6	1/2
VWVE38X	38.0	52.5	74.2	1/2
NOVA-TS-15	15.5	37.5**	53.0	7/16
NOVA-TS-27	29.2	45.0**	63.6	7/16
NOVA-TS-38	38.0	52.5**	74.2	7/16
NOVA15	15.5	37.5**	53.0	7/16
NOVA27	29.2	45.0**	63.6	7/16
NOVA38	38.0	52.5**	74.2	7/16
NOVA STS-15	15.5	37.5**	53.0	7/16
NOVA STS-27	29.2	45.0**	63.6	7/16
NOVA STS-38	38.0	52.5**	74.2	7/16

*To prevent possible interrupter damage, the DC test source should be limited to 2 mA maximum. DC test voltages listed in Column D are not intended to specify 15-minute DC system test voltages. (AC is the preferred withstand voltage testing method as the DC method may be unreliable when testing vacuum interrupters.)

**Test results for NOVA reclosers equipped with the internal voltage sensing option will be influenced by the source-to-ground connected sensing resistor. Refer to the service instructions for your NOVA recloser for additional high-potential withstand testing information.

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Column A	Column B	Column C	Column D*	Column E
Apparatus type designation	**Interrupter rated maximum voltage (kV rms)**	**75% of rated low-frequency withstand voltage (1 min dry) (kV rms)**	**Recommended DC withstand voltage (1 min dry) (kV)**	**Nominal open-contact gap (in)**
Breakers				
VSA20B	15.5	37.5	53.0	7/16
Load break switches				
DAS15	15.5	37.5**	53.0	7/16
DAS27	27.0	45.0**	63.6	7/16
DAS38	38.0	52.5**	74.2	7/16
Capacitor switches				
VCS3-15	15.5	37.5	53.0	7/16
VCS3-27	29.2	45.0	63.6	7/16

*To prevent possible interrupter damage, the DC test source should be limited to 2 mA maximum. DC test voltages listed in Column D are not intended to specify 15-minute DC system test voltages. (AC is the preferred withstand voltage testing method as the DC method may be unreliable when testing vacuum interrupters.)

**Test results for DAS switches equipped with the internal voltage sensing option will be influenced by the source-to-ground connected sensing resistor. Refer to the service instructions for your DAS switch for additional high-potential withstand testing information.

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