

Title/Subject: Policy on Circuit Breaker Settings for Trailing Cables		
EDDS No. : APOL2164	Version Date: 2004-11-24	Signature/Initial: <i>David C. Chirdon</i> /s

1.0 PURPOSE

The purpose of this Policy (POL) is to provide guidance to Electrical Safety Division (ESD) investigators when evaluating circuit breaker settings protecting trailing cables used on permissible mining equipment as required by Title 30 Code of Federal Regulations (30CFR), Sections 18.35(a)(4) and 18.35(a)(5).

2.0 SCOPE

This POL applies to equipment submitted to MSHA for evaluation under 30 CFR Part 18.

3.0 REFERENCES

This policy references 30 CFR Sections 18.35(a)(4) and 18.35(a)(5).

4.0 DEFINITIONS

4.1 **Minimum phase-to-phase short circuit current** – The minimum phase-to-phase short circuit current is the current that flows between two phases when an arcing fault occurs between these phases. The minimum phase-to-phase short circuit current is calculated by connecting two phases of a three-phase system together taking the following into account :

4.1.1 The applicant may use the default power system parameters specified in the A &CC short circuit calculation program (scwin3.exe) or specify the required power system parameters on the drawings. The latest version of the scwin3.exe program is on the MSHA website (www.msha.gov).

4.1.2 The system voltage is reduced by the arcing fault factor:

Nom. Voltage	Arcing Fault Factor
≤480 V	0.85
>480 V, ≤600 V	0.90
>600 V, ≤1040 V	0.95
>1040 V	1.00

- 4.1.3 The resistance of all cables is calculated at the rated maximum conductor temperature of the cable.
- 4.1.4 To account for voltage fluctuations, the system voltage is further reduced by 5 per cent`
- 4.2 **Maximum starting-current-inrush-** Current consumed by the machine between start-up until the machine reaches operating speed. The maximum starting-current-inrush will include an asymmetrical component for the first several cycles.

5.0 POLICY

- 5.1 For trailing cables 500 feet long or less, the investigator should notify the applicant that the settings in Table 8 of Appendix I are recommended maximums. If the specific equipment can operate on a lower setting, the lower setting should be specified.
- 5.2 For trailing cables 500 feet long or less where the applicant has requested a circuit breaker setting greater than the setting specified in Table 8 of Appendix I, the applicant must:
 - 5.2.1 Specify a circuit breaker setting as close as practicable to the maximum starting-current-inrush.
 - 5.2.2 Calculate the minimum phase-to-phase short circuit current available at the end of the trailing cable. If power system parameters other than those listed in the scwin3.exe program are used, these parameters must be specified on the drawings and must be specified as a condition of use on the approval letter.
 - 5.2.2.1 For machines with a nameplate voltage less than or equal to 1000 volts, the requested circuit breaker setting must not be more than 70% of the calculated minimum phase-to-phase short circuit current.
 - 5.2.2.2 For machines with a nameplate voltage greater than 1000 volts, the requested circuit breaker setting must not be more than 75% of the calculated minimum phase-to-phase short circuit current.
- 5.3 For trailing cables greater than 500 feet but less than or equal to the length specified in Table 9 of Appendix I, where the applicant has requested a circuit breaker setting no greater than that specified in Table 8 of Appendix I, the applicant must specify a circuit breaker setting as close as practicable to the maximum starting- current-inrush.

- 5.4 For trailing cables greater than 500 feet but less than or equal to the length specified in Table 9 of Appendix I, where the applicant has requested a circuit breaker setting greater than the setting specified in Table 8 of Appendix I the applicant must:
 - 5.4.1 Specify a circuit breaker setting as close as practicable to the maximum starting-current-inrush.
 - 5.4.2 Calculate the minimum phase-to-phase short circuit current available at the end of the trailing cable. If power system parameters other than those listed in the scwin3.exe program are used, these parameters must be specified on the drawings and specified as a condition of use in the approval letter.
 - 5.4.2.1 For machines with a nameplate voltage less than or equal to 1000 volts, the requested circuit breaker setting must not be more than 70% of the calculated minimum phase-to-phase short circuit current.
 - 5.4.2.2 For machines with a nameplate voltage greater than 1000 volts, the requested circuit breaker setting must not be more than 75% of the calculated minimum phase-to-phase short circuit current.
 - 5.4.3 The machine drawings and the caution statement should specify that the mine operator must notify the MSHA District office in writing prior to putting the machine in service. This requirement will be specified as a condition of use in the approval letter. This notification will permit MSHA enforcement personnel to verify that the trailing cable is installed in a workman-like manner and that the circuit breaker setting affords the same degree of protection as the same setting for equipment having trailing cable less than 500 feet in length.
- 5.5 Trailing cables greater than the length specified in Table 9 of Appendix I are not within the scope of this policy. Use of these trailing cables will require the mine operator to file a Petition of Modification under Section 101(c) of the Mine Act to modify 30 CFR 75.503, 57.22302, 57.22303, 57.22304 or 57.22305.