

# TechTopics No. 119

## Momentary ratings – peak or rms?

The meaning of a “momentary rating”, and the ratings values, are the subject of this issue of TechTopics. When discussing medium-voltage circuit breaker ratings, the momentary rating is referred to as the closing and latching current rating. For low-voltage power circuit breakers, it is referred to as the making current. The momentary ratings of switchgear and circuit breakers have been discussed in previous TechTopics issues including 4, 21, 22, 26, and 44.

In older versions of the standards, for example, IEEE Std C37.04-1979 and IEEE Std C37.20.2-1987, the required values for closing and latching current (for medium-voltage circuit breakers) and momentary current (for medium-voltage, metal-clad switchgear), were stated in rms asymmetrical (total) current, as 1.6 times the rated symmetrical current of the circuit breaker or switchgear. IEEE Std C37.04-1979 also contained a condition that the peak value should not exceed 2.7 times the rated symmetrical current value.

These values were based on 60 Hz system frequency and an X/R ratio of 17. The calculations, however, were performed manually with slide rules and were actually incorrect. With today’s personal computers, the correct values can be calculated, which yields a peak value slightly below 2.6 times the symmetrical current rating and an rms asymmetrical value of 1.55 times the symmetrical current rating.

Modern versions of the standards have changed the rating to be the peak value equal to 2.6 times the symmetrical current rating for medium-voltage circuit breakers and 2.3 (unfused circuit breakers) or 2.16 (fused circuit breakers) times the symmetrical current ratings for low-voltage power circuit breakers and associated switchgear.

Siemens still continues to publish both the peak current values and the rms asymmetrical current values. Why is this?

The major reason that Siemens still shows the rms asymmetrical current values is that the NEC® (NFPA 70®) still mentions the asymmetrical current rating.

Article 490.21(A)(4)(3) requires that the closing rating of a circuit breaker be not less than the maximum asymmetrical fault current into which the circuit breaker can be closed. Similarly, article 490.21(A)(4)(4) requires that the momentary rating of a circuit breaker be not less than the maximum asymmetrical fault current at the circuit breaker.

This reference is one of the last references to the asymmetrical current rating in the NEC. Over the years, the other references to momentary or asymmetrical current ratings have been modified. Unfortunately, the upcoming 2017 edition of the NEC still has these references so the need to understand what the momentary capability is will remain.

Published by Siemens Industry, Inc. 2015.

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Article No. EMMS-T40035-00-4A00  
Printed in U.S.A.  
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