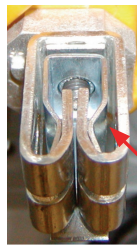


Continuous rating of meter socket jaws

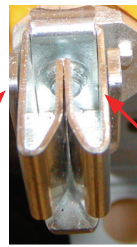
Authors:
Daniel Vosbrink,
Lead Analyst

Jason Cook,
Product Line
Manager

Reinforcing clips are used in conjunction with meter jaws for the purpose of increasing the amount of current that the jaw can safely and effectively conduct. These clips allow the meter jaws to apply more pressure to the meter spades allowing better conductivity for current flow and reducing the amount of heat generated at this juncture. At present, two main types of springs are used; internal springs and external springs.



Internal Spring



External Spring

UL 414 details the characteristics and requirements that the jaws must meet. UL 414 does not address the type of jaw to be used. The jaws may not exceed 65 degrees C above ambient temperature. A "heat test" is required to determine if the jaws, and the meter socket as a whole, meet the needed criteria. Listed below are the steps, in order, of the three phases of this test with a brief description of each phase:

Phase I: Initial heat test, duration- 5 hours

Purpose: To bring the jaw temperatures up to a recordable temperature. This test, and Phase III, must run until three consecutive readings, fifteen minutes apart, have less than 1 degree C change in temperature.

1. A test meter is installed and removed five times with disconnect sleeves installed. *This conditions the new jaws to ensure no "set"¹ of the jaws occur.*
2. Energize power supply to 100% of the continuous current rating.

3. Check and adjust current after 30 minutes. *This is to ensure the proper current level remains steady.*
4. Maintain current in the system at the continuous rating throughout the duration of the test.

¹ Set refers to the jaws ability to retain its spring characteristics. A meter jaw that takes a set loses these characteristics and will not clamp as tightly on the meter spades.

Phase II: Cycle test: duration- 48 hours

Purpose: To purposely overheat the meter socket and cause premature wear, loosening, or set of the jaws.

1. Remove meter and reinsert thirteen times while thermally hot. *This is to stress the spring characteristics of the jaws to ensure no set occurs.*
2. Allow to cool 2 hours or to room ambient temperature.
3. Remove Meter and reinsert twelve times.
4. Attach a timing circuit to the power supply to allow it to cycle on for two hours and off for one hour. *This will cause the meter socket to heat up and cool down. The constant expanding and contracting tests all junctures to ensure they will not loosen up causing "hot spots" and also tests temperament of the jaws and bussing.*
5. Energize power supply to 120% of continuous rating.
6. Check and adjust current after 30 minutes.
 - a. *One cycle consists of two hours on and one hour off.*
7. Run test for 16 cycles maintaining proper current levels throughout the test..



Powering Business Worldwide

Phase III: Second Heat test: duration- 5 hours

Purpose: The recordings of this test determine if the meter socket, after the conditioning of Phase I and stressing of Phase II, meet the criteria laid out in UL 414.

1. Energize power supply to 100% of continuous current rating.
2. Check and adjust current after 30 minutes.
3. Maintain current in system until the end of the test.

The test set-up consisted of a 200 A, single phase, non-lever bypass meter socket. The internal spring assemblies were installed on Line A. The external spring assemblies were installed on Line B. As stated above, the object of the test is for the jaws not to exceed 65 degrees C above ambient temperature. Both the internal and external style springs were within tolerable limits of the test criteria.

Temperature Rise Test Results

Internal Spring Temperature Rise Line A Jaw (°C)	Internal Spring Temperature Rise Line A Jaw (°C)	Internal Spring Temperature Rise Line A Jaw (°C)	Internal Spring Temperature Rise Line A Jaw (°C)	Current (Amperes)
58.9	44.9	54.3	43	200

Insertion & Withdrawal Force Results

	Spring Type	Insertion Force (lbs)	Withdrawal Force (lbs)
Before Test	Internal Spring	28	30
	External Spring	30	30
After Test	Internal Spring	16	15
	External Spring	30	30

Observations:

1. While both jaws performed within allowable limits, the external spring jaws rose, on average, 45 degrees C above ambient while the internal jaws rose, on average, 56 degrees C above ambient. Both were well within allowable limits
2. The internal jaws took a partial set at the conclusion of the test while the external springs retained their original properties.

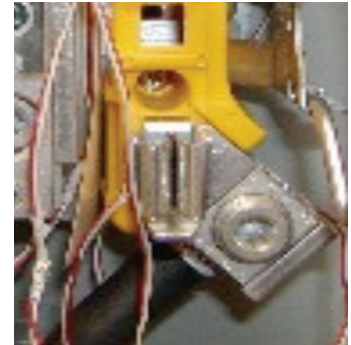
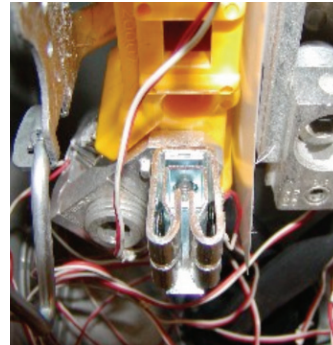
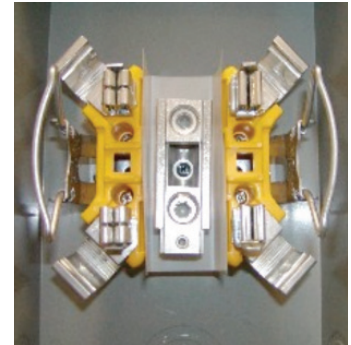
Conclusions:

Both the internal and external spring design tested, performed within the limits set forth by UL 414. Below are some pictures of the test before and after.

Before



After



Eaton
 1000 Eaton Boulevard
 Cleveland, OH 44122
 United States
 Eaton.com

© 2016 Eaton
 All Rights Reserved
 Printed in USA
 Publication No. WP307004EN
 September 2016 - BLTPS-16