April 1, 2004
Subject: Russian and Hamamastsu Burn Tests
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The purpose of these burn tests were to obtain a general idea of the relative flammability of the Russian and Hamamatsu bases, general flame spread as mounted in the horizontal configuration relative to each other, and the self extinguishing properties of each base when the ignition sources were removed. It was not to measure the energy level required to ignite the bases. It is evident enough energy was present to ignite the bases by the fire and damage. If the bases self-extinguished after ignition, when the power was removed, assuming the electrical and thermal safety features worked, I feel the damage would be limited to a small area. This is the reason many experiments try to utilize flame retardant, self-extinguishing, or fire proof, or resistive materials, especially using non halogenated fire rated materials as required by CERN.

What I concluded from these tests is:

1) Enough energy was present in some form to ignite the Russian base and have self-sustained burning without the need for additional energy input;
2) The Russian base burn rapidly to consumption in 2 to 3 minutes;
3) The Russian base dripped its burning material down spreading, the fire and produced enough flame and energy vertically and horizontality, to rapidly spread the fire to adjacent units;
4) The less flammable Hamamastsu bases and the gap between the grates and the backward airflow most likely limited the fire because the Russian bases were consumed rapidly in 2 to 3 minutes. The fire duration was most likely between three and 10 minutes.

TESTS

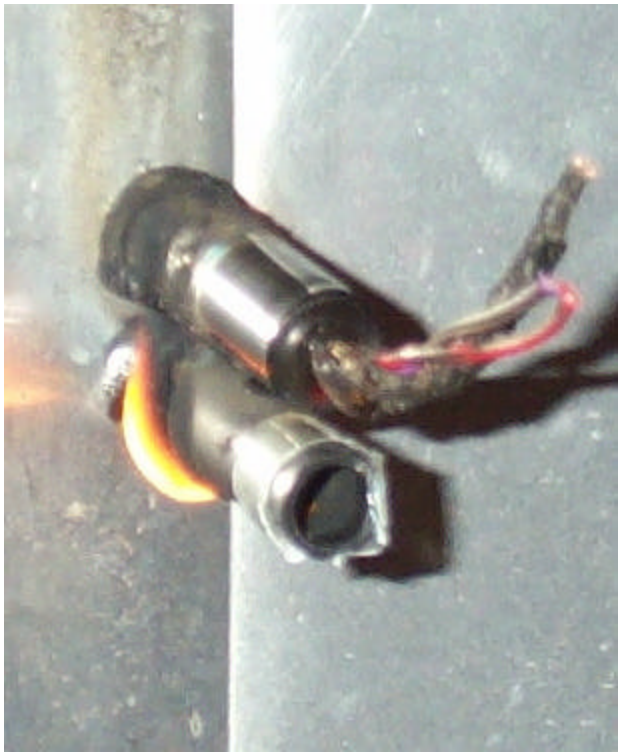
There were three tests. Test 2 used a piezoelectric continuous spark generator at about 4 joules for ignition. Test 1 used a flame equal to 1 candle, about 4 joules. Test 3 used a flame exposed to only the unconsumed portion of the Hamamatsu base.

Test 1:

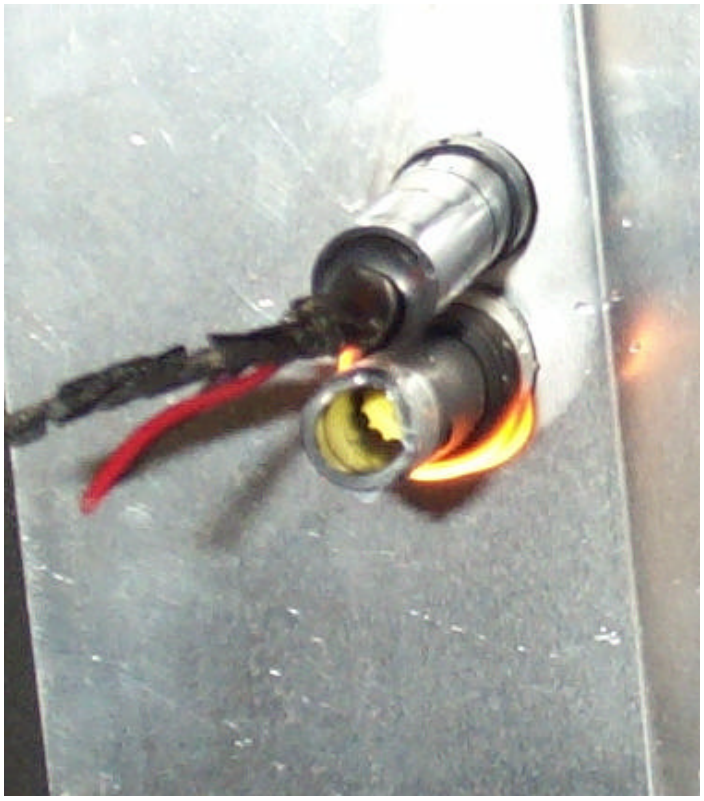
In the configuration shown, the Russian base was exposed to a low energy flame. Within 3 seconds the base ignited and burned quickly. The Russian base consumed itself in about 2 to 3 minutes. I was not timing the first trial, as I was not anticipating the rapid burn.

Results: The Hamamatsu burned for as long as the Russian base was burning. No additional energy was required after ignition for a self-sustaining burning of the Russian base. Consumption of the base took between 2 and 3 minutes.

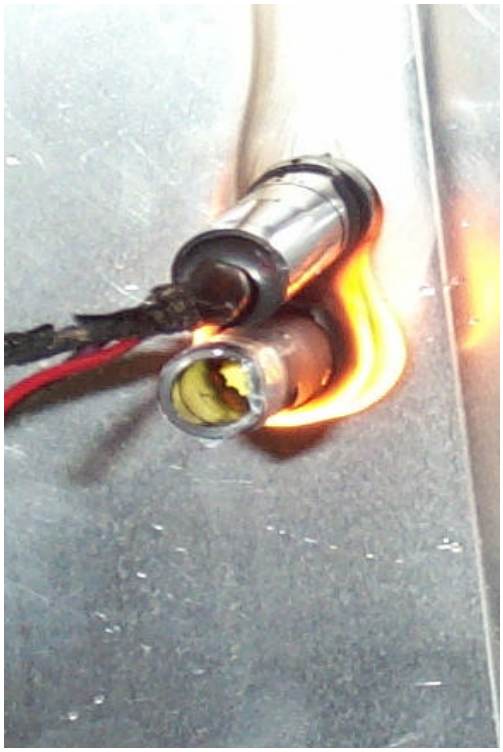
Fixture



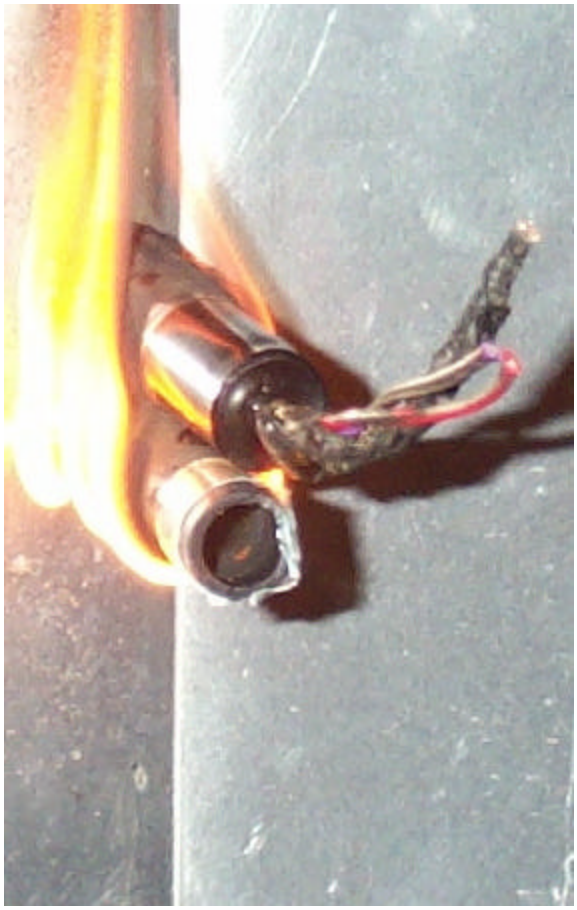
Test 1 ~ 3 seconds after ignition by flame



Test 1: ~8 seconds



Test 1: ~ 15 seconds



Test 1: ~ 20 seconds. Note the Hamamatsu base is not burning

Test 1: ~25 seconds Note the Hamamatsu base is charring from the exposure

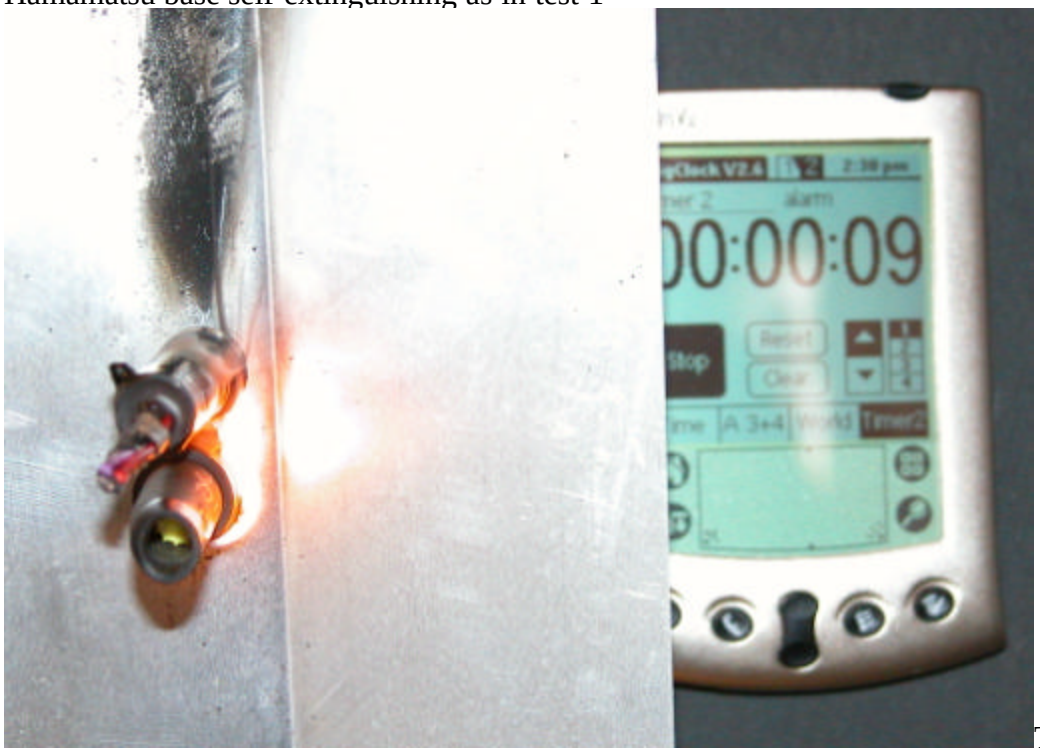
Test1: ~ 1 minute Note: Russian base deforming and Hamamatsu base charring and burning

Test 1: Note: Burning drip. This occurred through out the burning process.

Test 1 ~ 1-1/2 minutes. Note flame around the Hamamatsu and the drip.

Test 1 The Hamamatsu fell from fixture and the dripped Russian material kept burning.

Test 2:
Ignition was by a piezoelectric continuous spark generator at about 4 joules. It took about 10 seconds of exposure to a small 1cm area to ignite the Russian base. The Hamamatsu base would not ignite The Russian base was consumed in about 2 to 3 minutes with the Hamamatsu base self-extinguishing as in test 1



Test 2: 9 seconds

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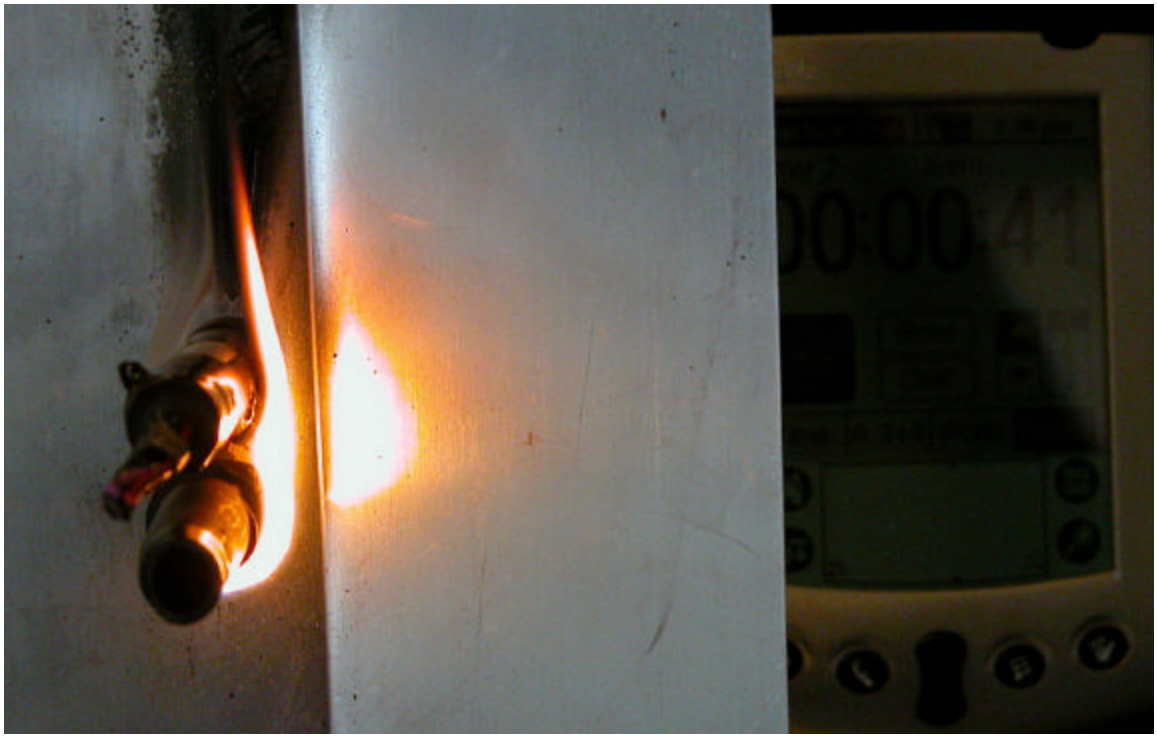
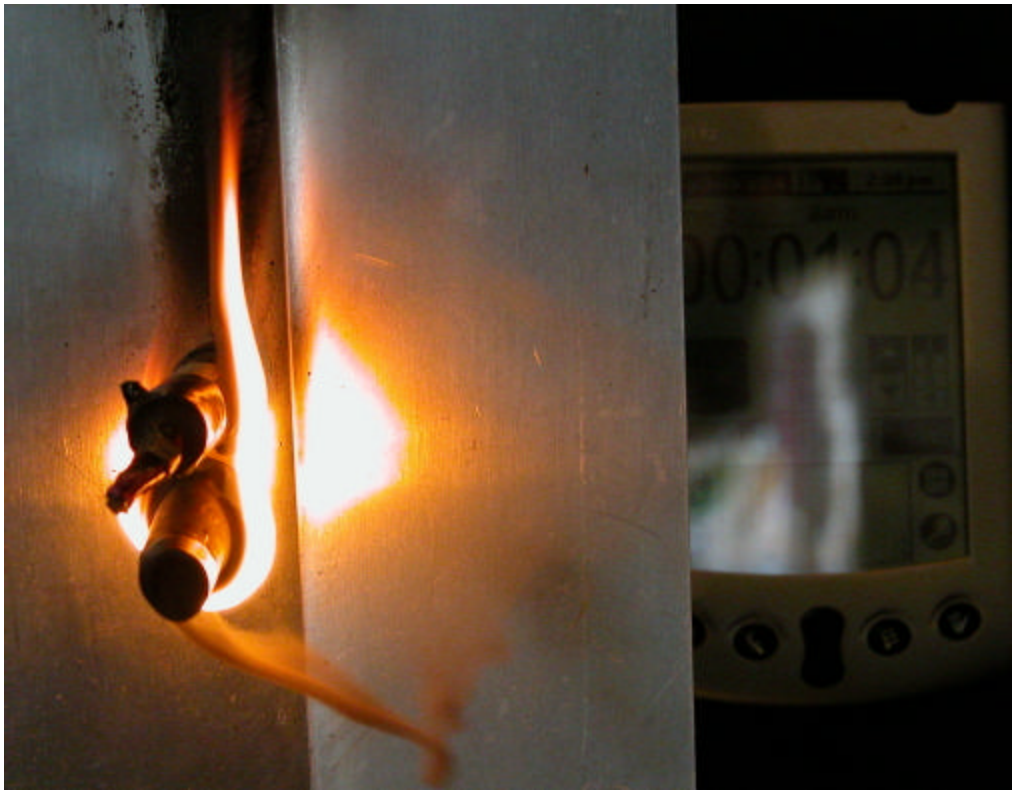
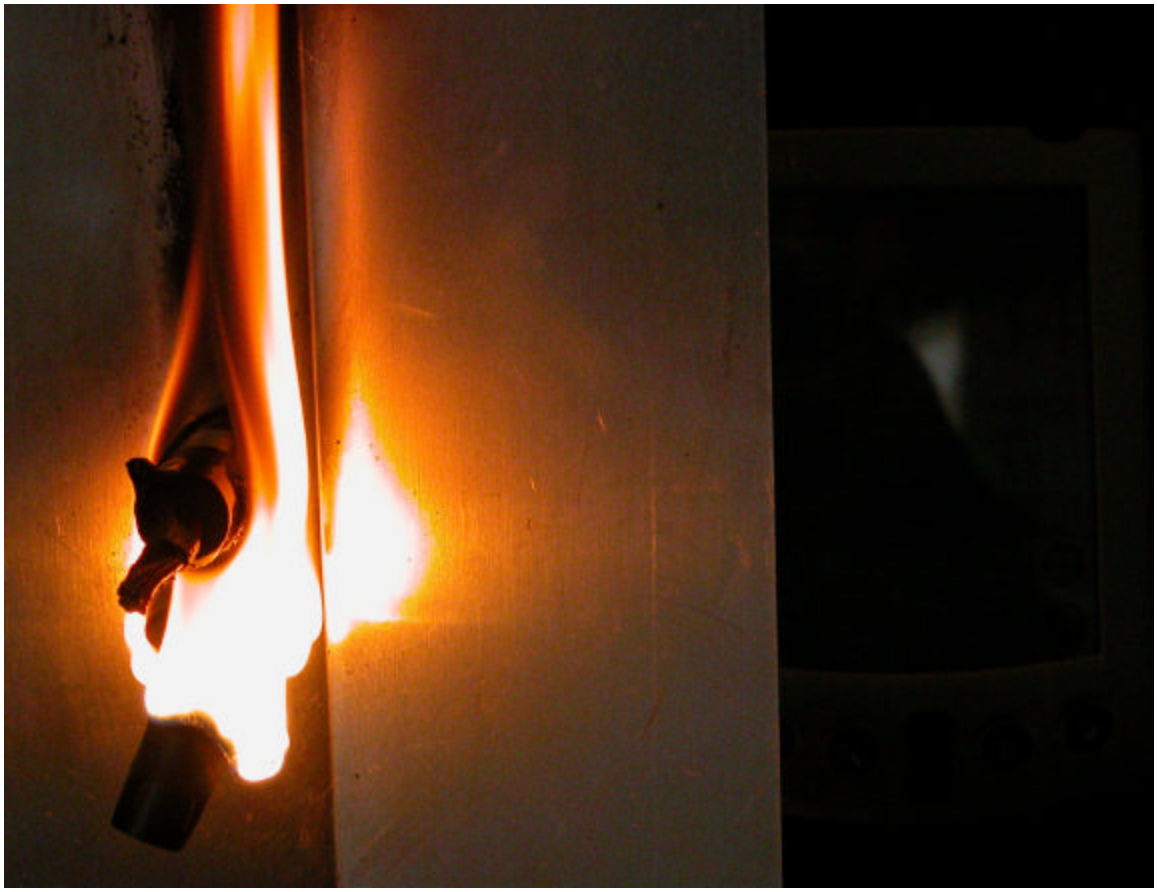
Test 2 : 13 seconds Note: Hamamatsu is not burning char is forming on the underside.

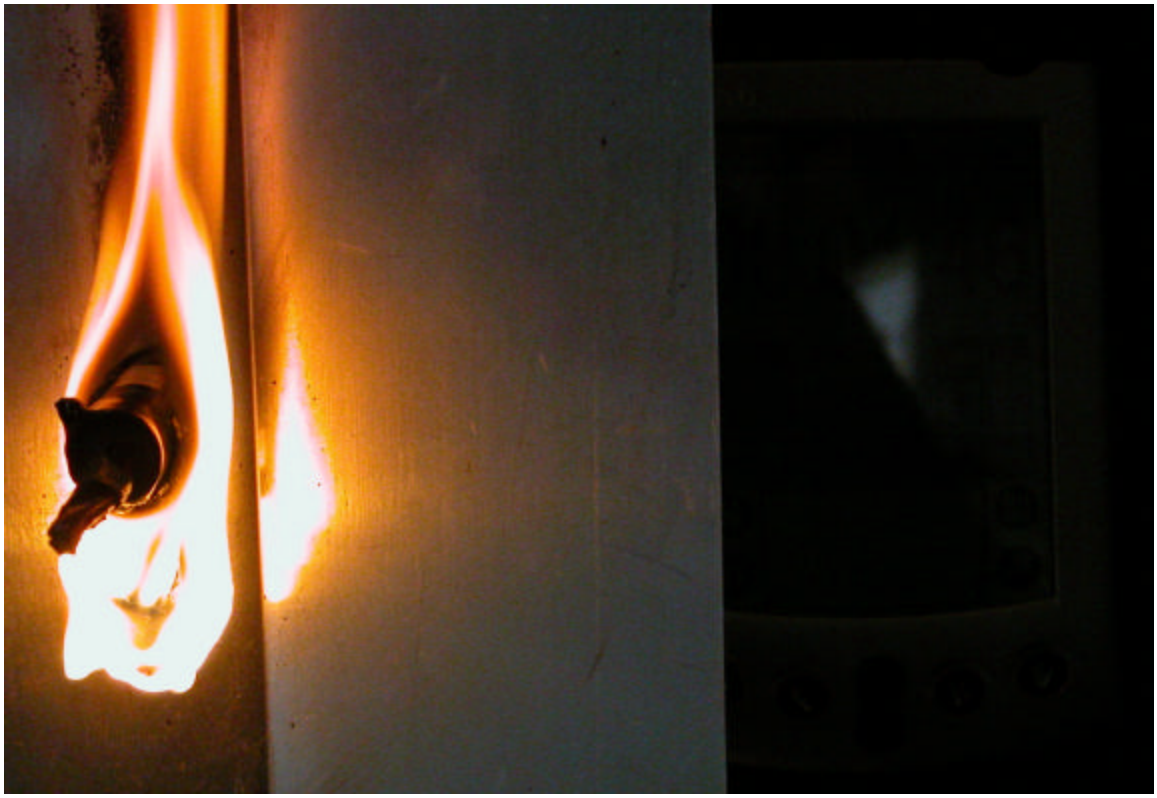
Test 2: 17 seconds


Test 2: 25 seconds


Test 2: 30 seconds. Note gas jet to right bottom of Russian base. Hamamatsu is charring but not burning.



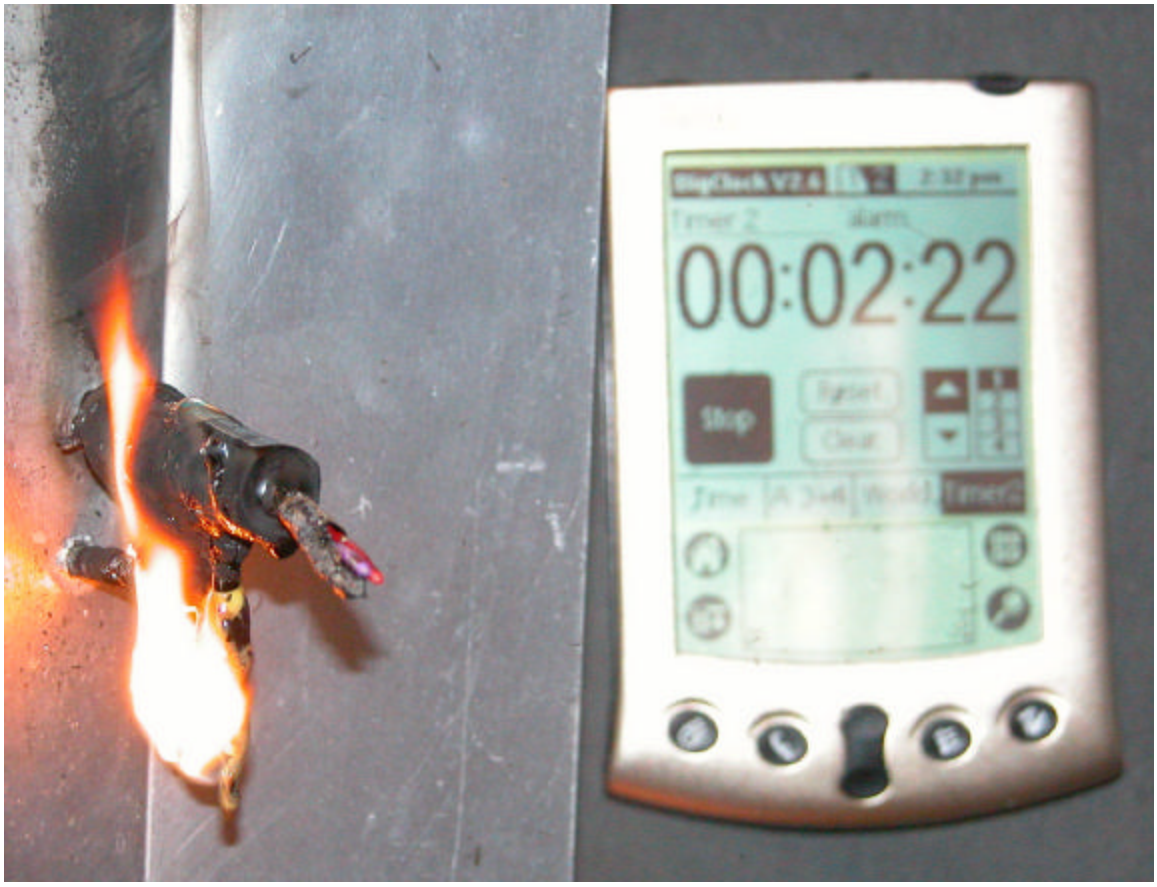
Test 2: 1 minute



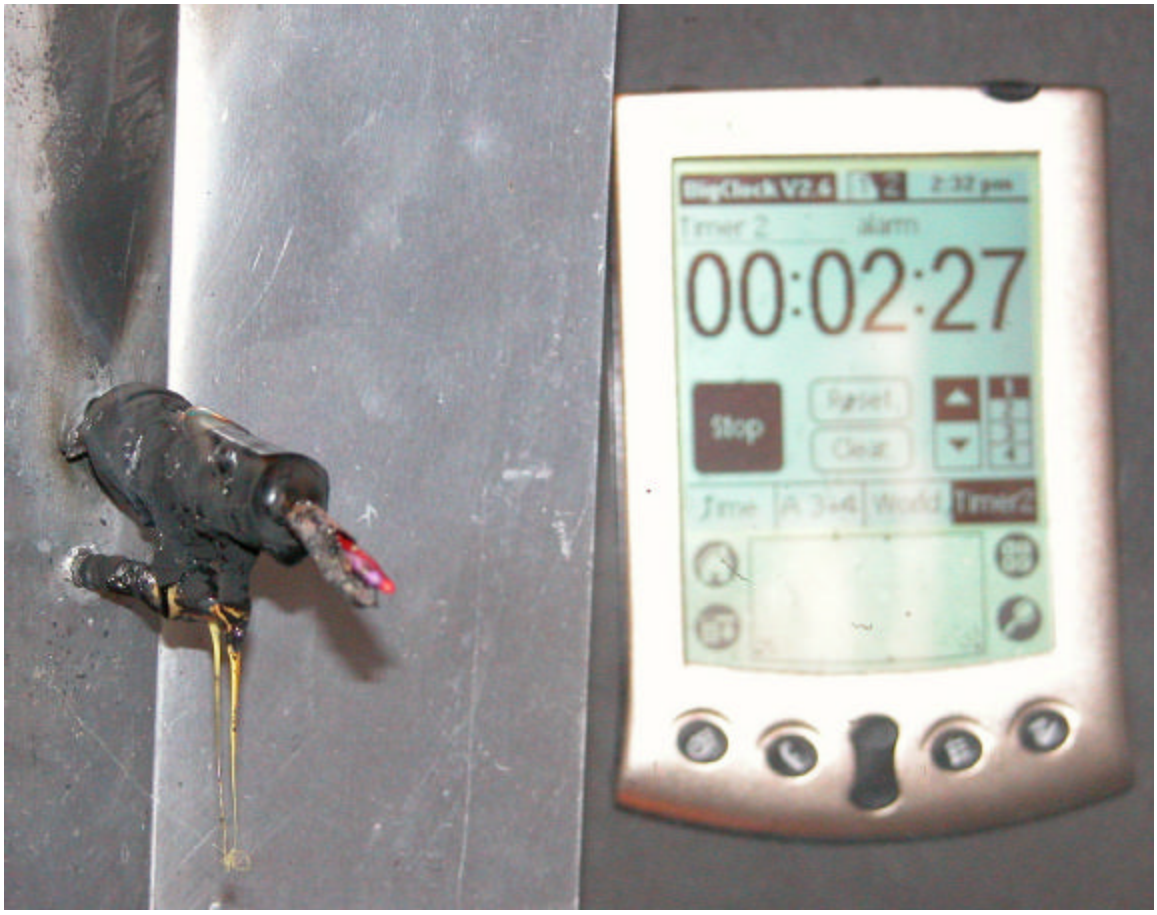
Test 2: 1minute 30 seconds

Test 2: 1 minute 45 seconds Note:

Test 2: 2 minutes 17 seconds Note. The Hamamatsu base is charred but not burning. Notice the burning drip from the Russian base.



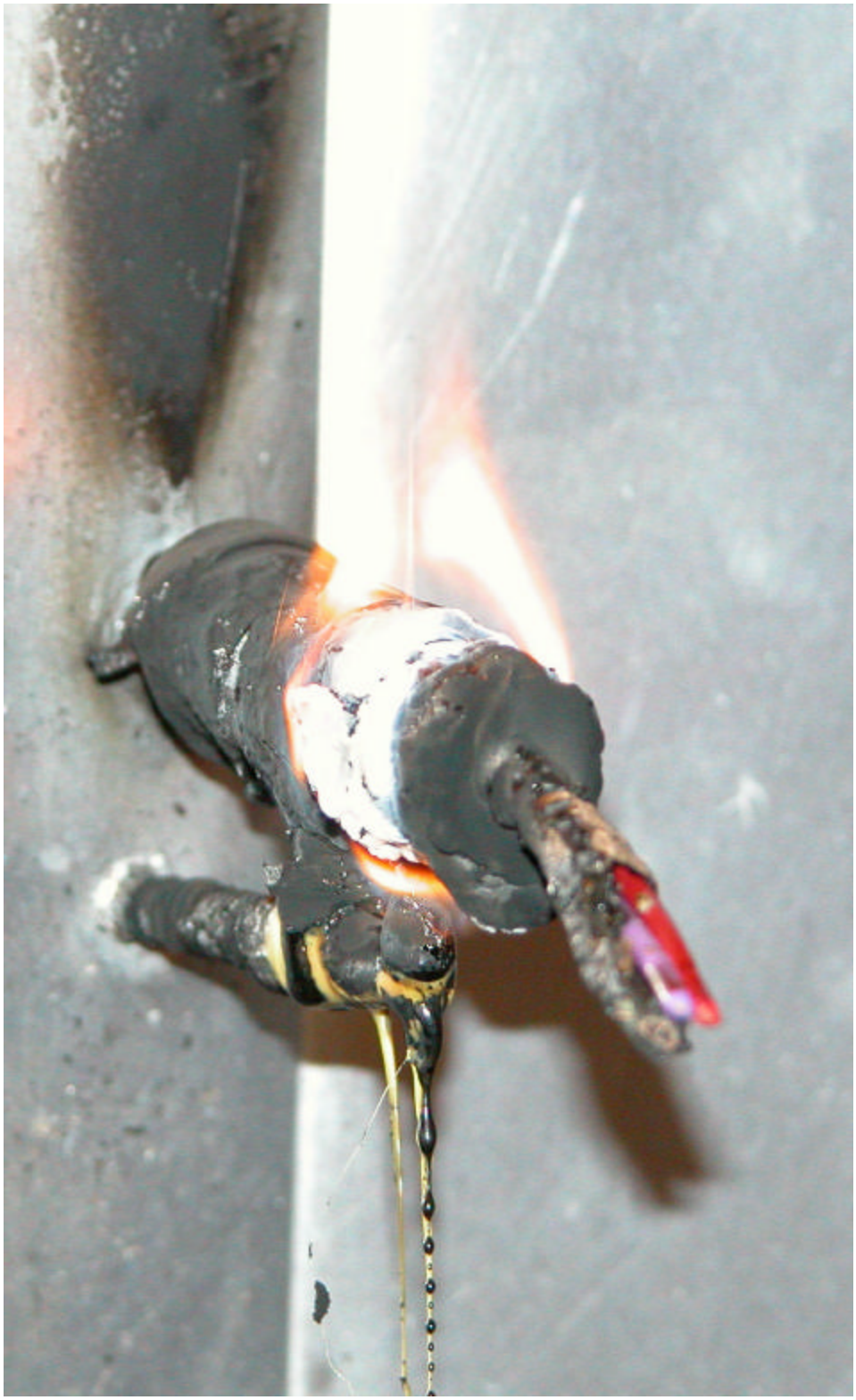
Test 2: 2 minutes 22 seconds



Test 2: 2 minutes 27 seconds. Note Russian base consumed and the burning of the Hamamatsu base self extinguishes.

Test 2: Drips from Russian base is still burning after base is consumed on fixture.

Test 3.
I re-ignited the Hamamatsu with a long exposure to a low energy flame. Time to ignition was about 25 plus seconds.. It then burned and self-extinguished after 30 seconds ..



Test 3: Applied flame to Hamamatsu base until it sustained burning. Note charring fro test two and the condition of the base.

Test 3: 25 seconds flame is about to go out. Not sure id material deposited from the Russian base is adding part of the burning material.

Test 3: 30 seconds Hamamatsu base self extinguishes.