

Procedures and Results of Others Using Graphite Spray for Decarb and Scale Protection

Quick Review:

Since we discovered that graphite spray could protect against decarb and scale, we have done several more tests. We make throwing knives, so we wanted to determine if the O1 tool steel toughness was affected. Fifty hits with a four pound sledge on a test piece demonstrated to our satisfaction that the test piece was every bit as tough as before, if not more so. We also tested hardness of the piece and found the same. I have actually tested hardness with the graphite layer still in place.

During further testing, when I noticed that a sheet of the graphite came off during the quench, we tested further. We found that any layer of graphite added several minutes after applying the initial layer would come off in a sheet during the quench, leaving the underlying graphite layer intact. We also determined that as long as the graphite was applied quickly, the thickness of the layers didn't seem to cause any sheeting.

We learned from testing that this works for O1 tool steel. We also learned from testing that it works up to 1460° F. We have since thrown out our clay and powder. We also posted our findings on our website and on the Bladeforums site. We have invited others try the process and let us know their results.

Testing Results of Others:

We are now starting to get reports of tests and results. The stuff seems to work really well. I am also getting bored expounding on the virtues of the process, so I am asking others to provide their results and their e-mail addresses to continue the discussion. As I've said before, we're all in this together.

Due to testing done by others, I now know that it works for AEB-L SS at temperatures up to 1975° F. I am hopeful that other intrepid experimenters will add to our knowledge of this process.

I still have questions outside of decarb and scale protection. I wonder if it would be better than liquid tape as a coating for making canister Damascus. I wonder how well it works and how it would be applied for actual forging: open flame, pounding steel. Since we don't forge steel, I don't know. Maybe someone will try it.

For now, we are documenting the work of others on this project. Their efforts can be found on the following pages.

My original graphite coated Darts, below. I had to garnet-blast D59 to remove the graphite. Since graphite is impervious to organic solvents, I now remove it with 400 grit on a belt or by garnet blasting. We are now considering leaving it on—great protection against rust, we think!



**Maxim Bellehumeur Tests Graphite Coating on AEB-L SS
(maxbel71@hotmail.com)**

Overview of Maxim's test procedure:

1. Applied a light coat of Jigaloo dry graphite lubricant to a clean coupon of AEB-L after 120 grit belt.
2. Dried with a heat gun.
3. Soaked coupon to 1975° F for 15 minutes and plate quenched to room temperature.
4. Removed graphite after heat-treat with 120 grit belt.
5. Tested for Hardness

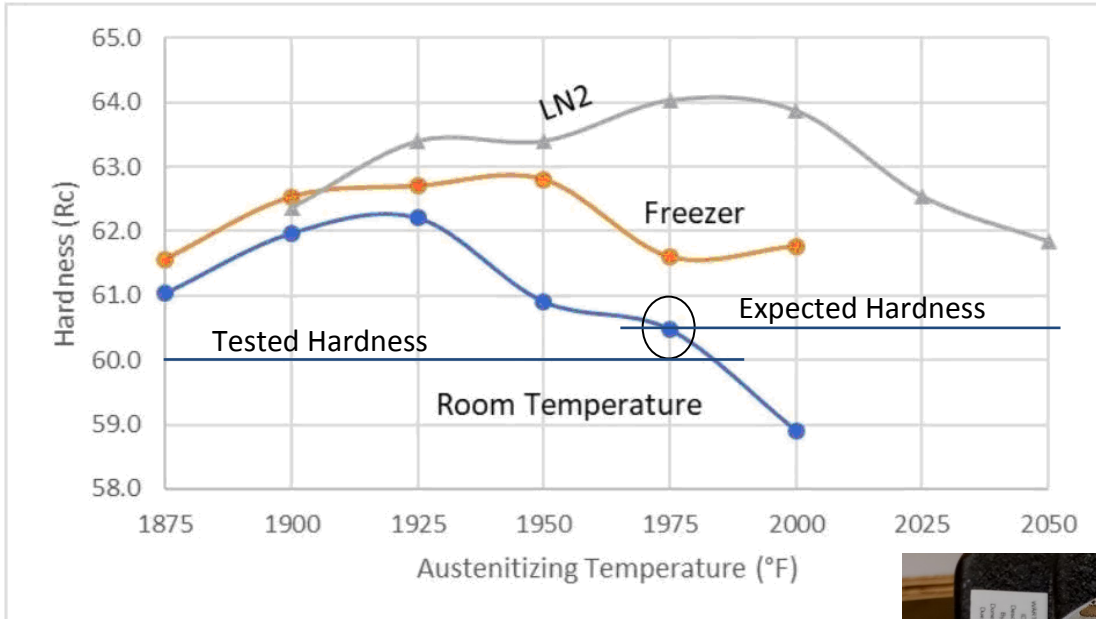


Maxim Bellehumeur Tests Graphite Coating on AEB-L SS (continued)

(maxbel71@hotmail.com)

Hardness test results for plate quench to room temperature:

The chart below is from an article at Knife Steel Nerds <https://knifesteelnerds.com/2019/03/04/all-about-aeb-l/> that was used as a reference for expected hardness. You can see that at an Austenitizing temperature of 1975° F, to room temperature (no cryo) expectation for hardness is ~60.5 Rc. This is within 0.5 Rc of Maxim's actual test results. Given the typical accuracy of Rockwell tests (± 1 Rc) and variations in furnace temp and accuracy of pyrometers, in general, I'd say this hits the mark!



Update:

Maxim recently decided to do a comparison test. He used two coupons of AEB-L, one wrapped in SS foil and the other sprayed with graphite. After heat-treat, he tested both for hardness. They tested the same! Since I have never used AEB-L, I am providing Maxim's e-mail address for further discussions.

I said it before and I'll say it again, I think we've got something here! Thanks, Maxim.

Ken H Tests Graphite Coating on a railroad spike and AEB-L

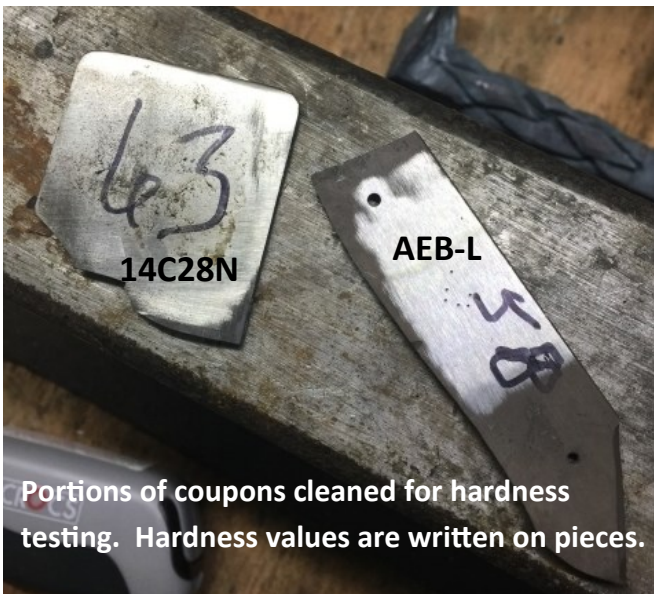
(sailingtoo@gmail.com)

Ken was actually the first to report on his use of graphite for decarb protection. His statement: "I did a railroad spike I forged and boy does that stuff work GREAT!"

Ken ordered, for his tests, the same dry graphite that I am using. He later sent more details on his procedures. They are shown below.

Overview of Ken's test procedure:

1. Applied two heavy coats of Blaster dry graphite lubricant to two clean coupons after 120 grit belt.
2. Allowed to dry overnight.
3. Soaked the AEB-L coupon at 1925° F for five minutes and plate quenched to room temperature. The other coupon was 14C28N. It was soaked at 1950° F for eight minutes.
4. Removed portion of graphite for hardness testing after heat-treat with 120 grit belt.
5. Tested for Hardness



6. Cleaned both test pieces with 120 grit on a belt.

So, the AEB-L tested at Rc 58 and the 14C28N tested at Rc 63. Ken is still in the process of testing more variables, but so far, so good Thanks Ken!