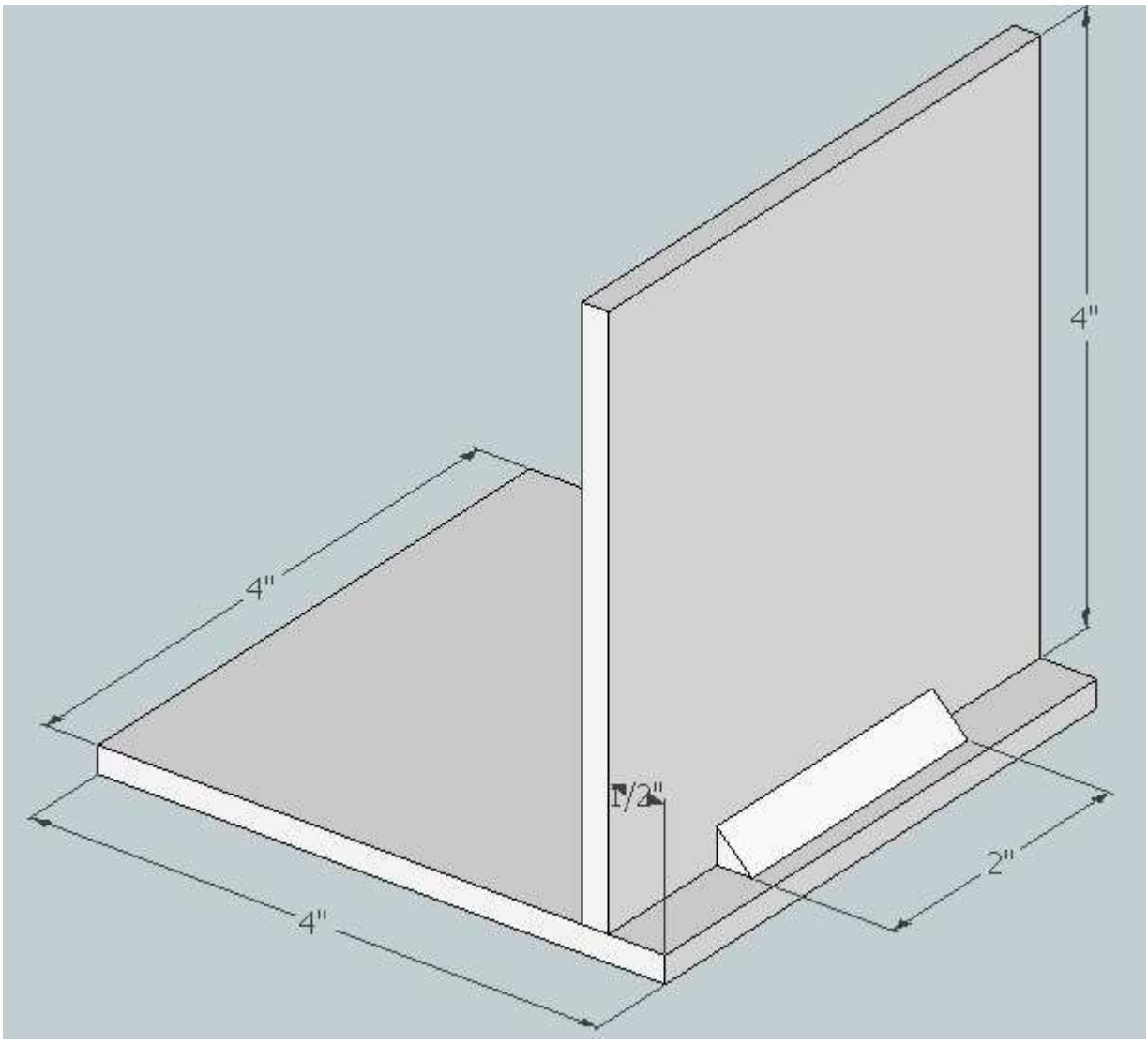
Tack welding test
(not exactly following test procedure),
but to give you an idea what to look for

by Wild_Explorer (member of Origamiboats Yahoo's group)

First of all, I was surprised that there is such test. Tack welders should be certified for tack welding in the position tack welds to be made.

Please note, that pictures in this document show plates which have INCORRECT dimensions for the test. However, the length of the tack weld (2”) and the position of vertical plate (1/2” from the edge) are correct. I used 3/16” plate (instead of 1/4” specified in the test).

Correct dimensions:

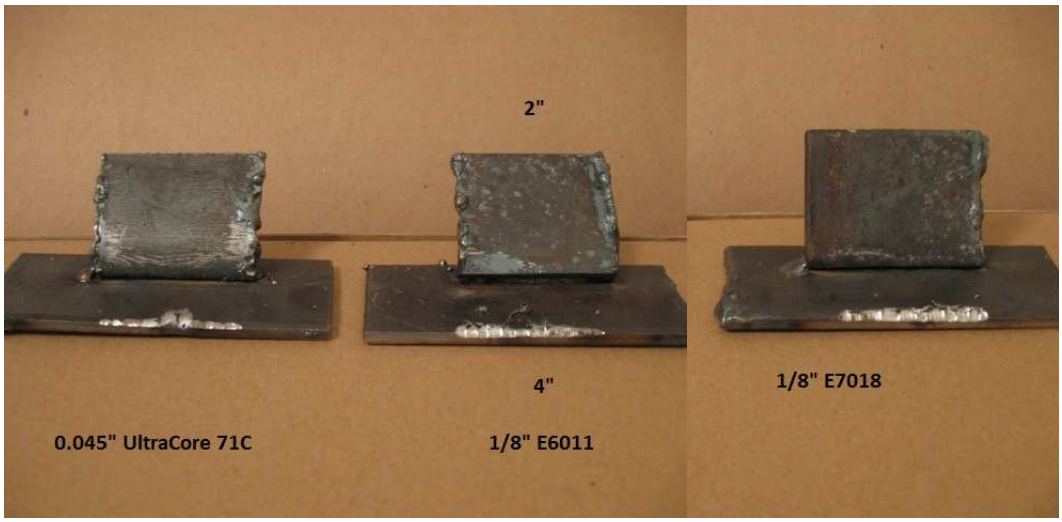


I used E6011, E7018 rod for SMAW and UltraCore 71C wire + 100% CO2 for FCAW-G

I mistakenly cut 2” long vertical pieces (instead of 4”) from available 3/16” steel strips and welded it to 4” 3/16” strips. It turned out, that you can see better what you need to look for. Then, test plates were bend in the wise (without braking it) to show what the difference is.

Bent plates:

3 Test plates to compare results:

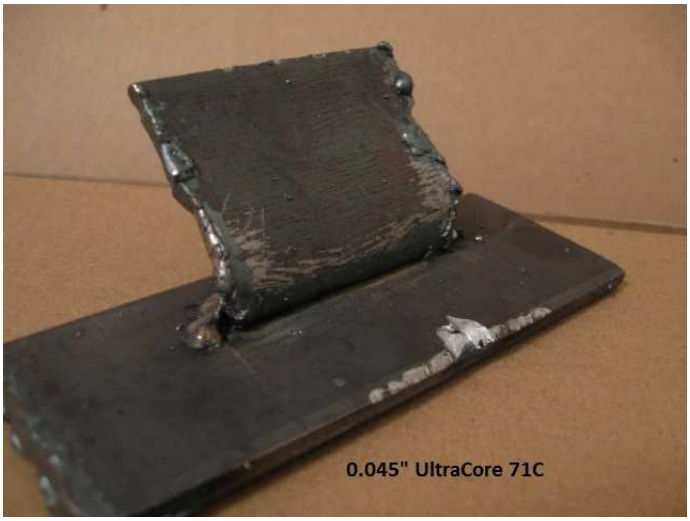


During the test, the edge of the vertical plate should not lift up. If it does, you did not pass a test.

BUT... for Origami constraction there are some differences....

When folding the hull, it is preferable not to put too much stress on the plate and need to avoid damaging the plate. Steel is very ductile (about 20%), but it is better to spare it, in case you really need this property of the steel to save your boat.

Take a look what happened with these 3 test plates (vertical tab) **Left to right:**.



1. Edge did not lift up, but the tab has been bent at the bottom (stress).

2. Straight tab, edge is lifted up

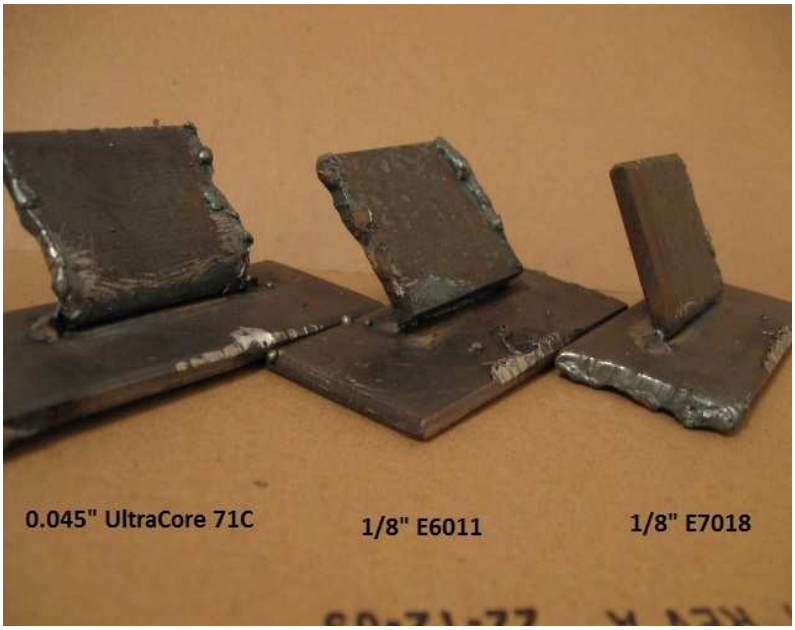
3. Edge lifted up slightly and the tab begins to bend at the bottom.

It is desirable to have good tack welds AFTER folding the hull and for longitudinals. That when it is need to be strong.

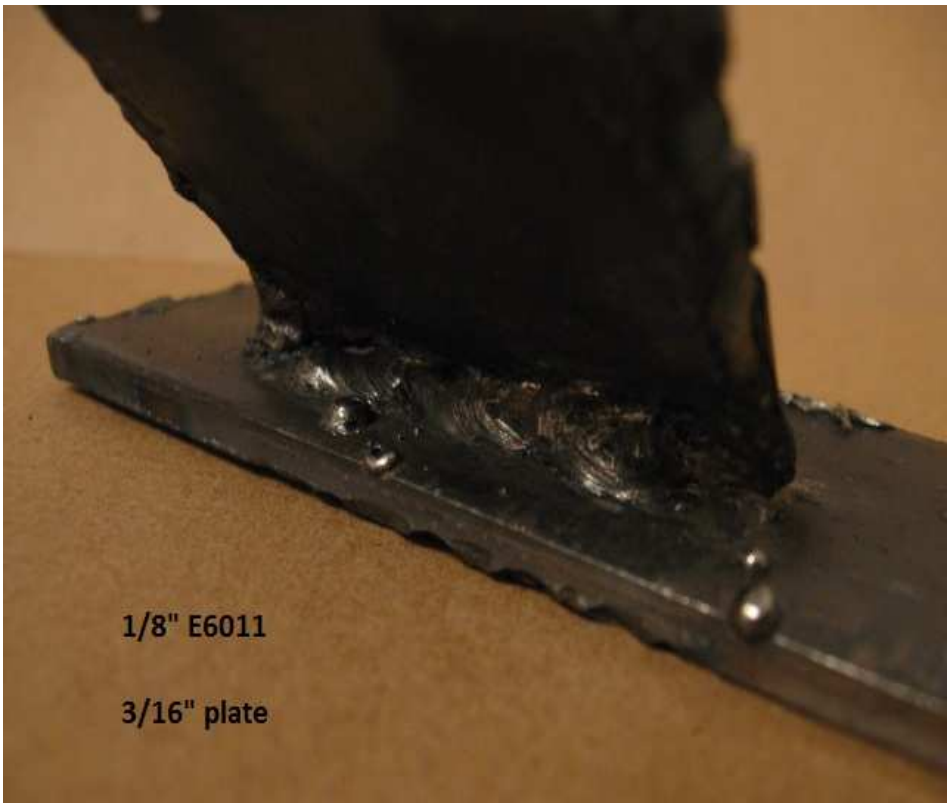
During folding the hull, tack welds need to be flexible and allow the hull fall into natural shape. On other hand, tack welds should not be weak and brake under the load during folding. Even if tack weld brakes, just put another one close to it and grind off / repair broken one later. It is better than overstress the plate.

So, it is need to find a compromise. In my opinion, stretched tack weld is better than stressed/stretched metal, because tack welds will be melted during final welding and tension inside the weld will be released.

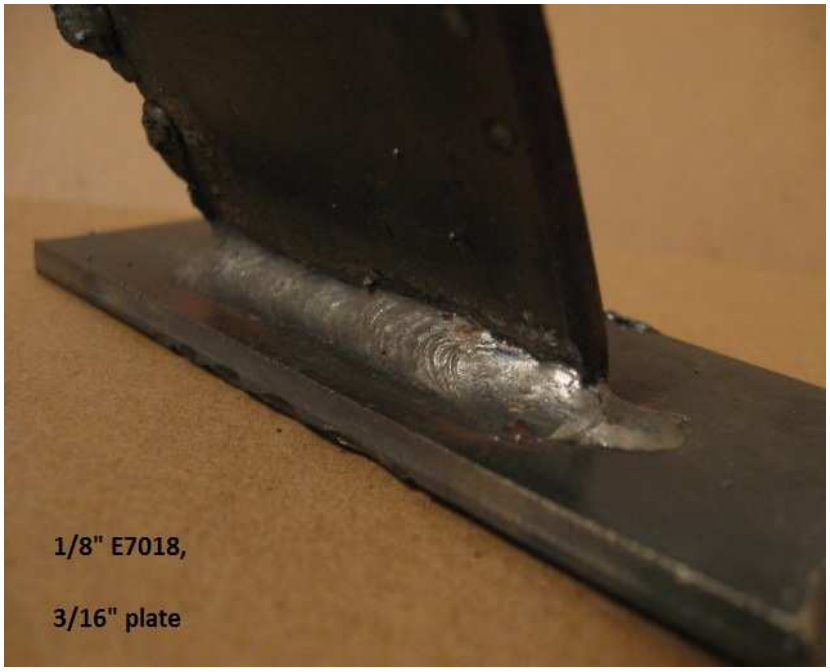
Another 3-plates' view:



I am sure you know how fillet welds of different filler materials looks like – just a reminder ;-)



I did not practice with E6011 for a long time, so it does not look very good – my fault.



E7018

UltraCore 71C

This is FCAW-G (flux cored wire with 100% CO2). I was practicing with it for only 2 hours before making this weld. Easy-y-y welding, easy cleaning ;-)

Note: Only one small problem - you need to avoid mixing different processes in the same weld.

I would appreciate you comments and suggestions (fixing errors, corrections, clarifications) to make this document better.

Version 0.1, March 3 2012