Wednesday, October 26, 2011

Wire stretch!

Hi, been asked this question so many times's and as it has a lot to do with rig tensions, thought I would do the work again, and just see what happens.

I did it once with my son Harry, and then did it again just to make sure.

The results were very close, so I have simply averaged them, its also a very simply test so you can do it relatively easily.

There were 2 questions that had been continually put to me,

#1 how much do wires stretch?

#2 what is the difference between Dye-form and 1:7

I should add here that Dye-form is 316 Stainless steel, it has to be or they can't form it, where as 1:7 is 304 SS, harder, nominally stronger but its susceptible to minor rust.

So what I did was go and find to old pieces of 3.2mm (the old 1/8") dia wire, one was Dye-from the other was 1:7 and as probably the highest load wire on the boat is the D1, its around 1860mm long I cut these 2 pieces of wire at exactly the same length and swaged on exactly the same end fitting (swage eyes). I then wrapped 2 bits of chain around to relatively large concrete columns outside my office, to one piece I shackled one end of the wire to one ring of chain, to the other chain, I hooked on a 1 tone chain block, and to the active end I shackle the other end of the wire. Put a loogs gauge on the wire, tape a tape measure to one eye swage and let the tapes in-built retraction system hold the tape tight past the other end.

3.2mm Dye-Form/1:7 has very similar Breaking strains and SWL, its around BS of 3.2mm Dye-from is little over 1 tone, 1:7 is a tad more. But the most a D1 which is the most stressed wire on a 49er is ever likely to get to is 450 – 500kgs which is ½ BS and well inside SWL, and given I had a loogs gauge that goes comfortable to 40 (approx 400kgs) I decided that would be my upper limit.

So I simple took measurements/lengths/stretch at 10, 20, 30 and 40 on a loogs gauge.

The associated graphs are below.

The one other thing I did was weigh them, the Dye-form was 117gms, the 1:7 was 112gms, which is consistent given the dye-form is more compacted.

So to sum up, we used 3.2mm (or 1/8") wire. The loogs gauge numbers are for 3mm.

Both sets of wire stretched near as dam it 8mm at 40, in a control length which started at 1822mm, that's 0.44% which I have to admit to being quite surprised about. (Being that large)

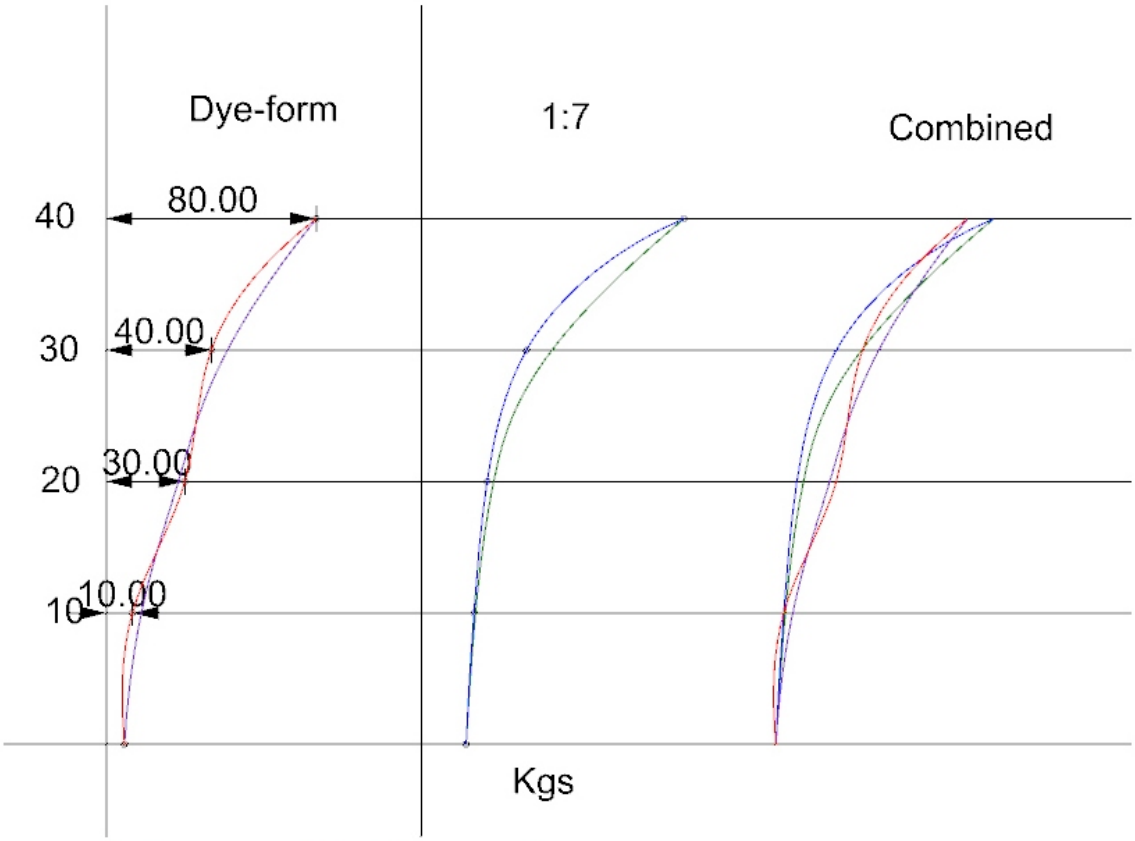
A 49er F/Stay is over 5m so apply the same number and they do get to 40, then you are talking 20mm of movment.

As for wire drag, there is quite a bit of empirical evidence that the rougher 1:7 wire is infact less draggy as its form, inhibits the Carmen Trail effect, same as those spirals you see on chimneys, to stop them oscillating and falling down.

We had exactly one of those experiences in 1993 with 2 identical 18teens with the exception of the wires. (BNZ & AAMI) and the 1:7 rigged boat was faster.

Take from this what you wish, I make no assertions what so ever.

Julian (& Harry)

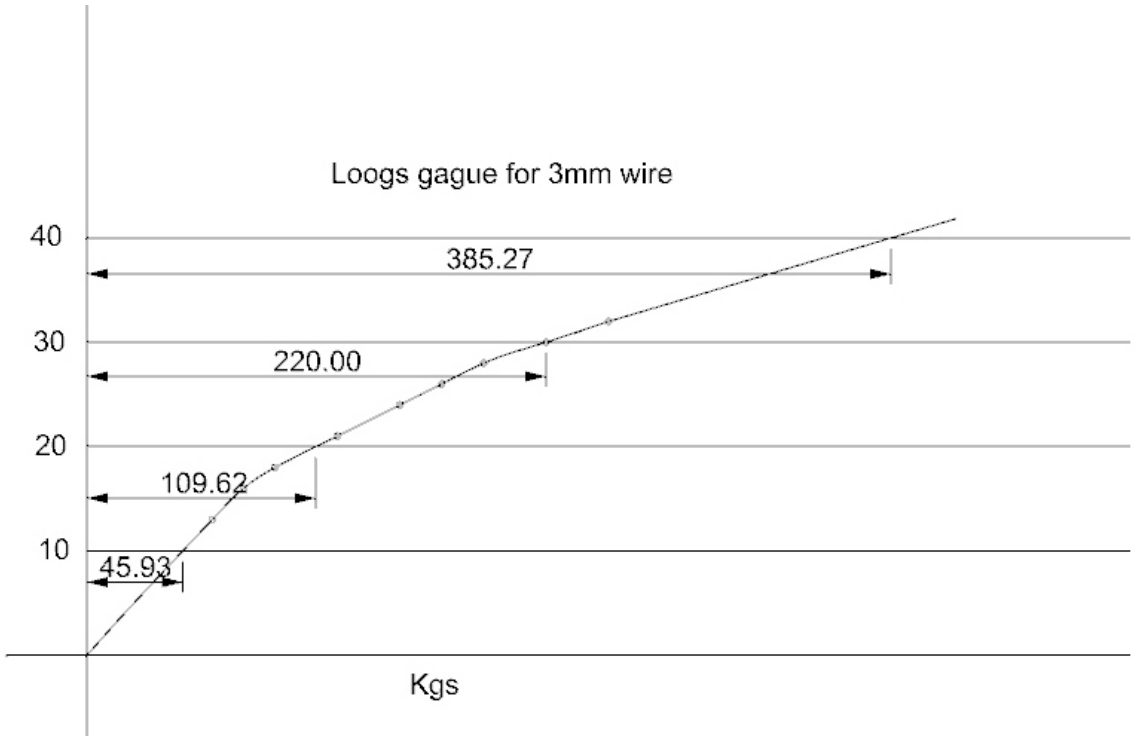


Red = actuall dyeform numbers

Purple = averaged Dye-form number

Blue = Actual 1:7 Numbers

Green = Averaged 1:7 numbers


Loogs gague for 3mm wire
40
30
20
10
385.27
220.00
109.62
45.93
Kgs