

Memo

To: REID STAVA, J/24 Class Measurer
From: STEVE HAARSTICK
Date: October 16, 1998
Re: PENTEX

The introduction of Pentex laminates has created a good deal of controversy regarding its potential advantages and its effect on sail prices. As there seems to be a lack of specific information, perhaps it is time to look at some actual test data, and cloth pricing.

I have listed below the results of our cloth tests of Dimension Polyant Sailcloth's Pentex Mylar laminate "PE 15 1.5 mil Triply", compared to several current dimension laminates that we have used in J/24 genoas. I have also listed dimension's current catalogue pricing of these fabrics.

The column labeled "New Max LD Thrline" lists the load required to stretch a new 2-inch strip of each fabric type 1.0% when pulled in the warp direction. "New" means that the strip is cut from the cloth sample and tested without first "abusing" or "fluttering" - more about this later.

It is clear that the "New" Pentex laminate "PE15- 1.5m Triply" is stronger than any of the other "Standard" polyester laminates. Compared to a identical construction in polyester, "PX15- 1.5m Triply", it takes 111 pounds to stretch the Pentex version 1.0% versus 77 pounds for the PX15. This is a 44% increase in strength for Pentex.

Compared to other laminates on this list, PE15 is 23% stronger than the "PX15- 1.5m Taffeta", and 18% stronger than "FXP5- 1.5m Fibreplex". "PX15- 1.5m Taffeta" is similar to "PX15 1.5m Triply", but has a lightweight polyester cloth glued to one side, with Mylar film on the other side. (Triply laminates are film on both sides).

The fourth cloth on the list, "FXP5- 1.5m Fibreplex" is has a different substrate construction. Instead of the large 1000 denier warp threads with a 13.5 count/inch (PX15), or the 1000 denier Pentex warps with a 12 count/inch (PE15), FXP5 uses 440 denier threads that are flat and untwisted with a 39 count/inch. This construction produces a heavier substrate with no crimp, or twist. This results in a very low stretch polyester laminate that is the closest to the strength of the Pentex with 94 pounds at 1.0% elongation.

<u>Dimension's</u> <u>Cloth Name</u>	<u>Price</u>	<u>Weight</u>	<u>"New"</u> <u>Max LD</u> <u>Thrline</u>	<u>"Fluttered"</u> <u>Max LD</u> <u>Thrline</u>
PE15- 1.5m Triply	\$ 11.32	4.00 oz	111	66
PX15- 1.5m Triply	\$ 7.83	4.10 oz	77	56
PX15- 1.5m Taffeta	\$ 10.01	5.20 oz	90	56
FXP5- 1.5m Fibreplex	\$ 9.50	5.10 oz	94	78

The column labeled "Fluttered Max LD Thrline" shows the relative strength of these four samples after the cloth strip has been "impact fluttered". Our flutter test is quite a bit more severe than the "air stream flutter" used by the manufacturers, and better represents actual loss of strength with usage. Comparing these four samples after flutter reveals a much different result than above. Although the Pentex is still stronger than the standard PX15- 1.5m Triply, and the PX15- 1.5m Taffeta, the increase has dropped to only a 17% improvement. The FXP5- 1.5m Fibreplex, on the other hand, is actually stronger after impact flutter than the Pentex!

Finally, a comparison of the relative loss of strength after impact flutter shows the Pentex laminate loses 40%, the PX15 Triply loses 27%, the PX15 taffeta loses 38%, and finally the FXP5 Fibreplex loses only 17%.

So which cloth is best? The Pentex is stronger than the two PX15 Mylars, both new and after flutter, but loses the highest percentage of its original strength after flutter - 40%. This would indicate that the Pentex sail's shape will change the most with usage. The Taffeta backed PX15 also starts out strong, but loses 38% of its original strength. The PX15 Triply loses only 23% of its original strength, to end up tied with the PX15 Taffeta after flutter. This cloth will show more change of shape with wind velocity changes, but less change with usage. Finally, the fxp5 has the lowest loss of strength with usage, and is closest to Pentex's strength when new, and is actually better with usage.

All things considered, I like the FXP5 1.5m Fibreplex. While it's not as strong when new, it loses the least amount of strength when impact fluttered, and would thus show the least shape change with use. It's too bad the Pentex fibers can't be used in a Fibreplex construction, as I believe this would make a truly superior laminate. However, the Fibreplex construction was discontinued by dimension for 1998. Apparently this substrate is no longer available from the company that manufactures it for Dimension, and it would now be very expensive to produce. (I think this type of construction got a bad rap from it's Kevlar version, which did not hold up well in use, as the small Kevlar threads deteriorated quickly with ultraviolet exposure, became brittle, and broke. this is a common result with Kevlar constructions that use these small 400-440 deniers, but as Polyester is much more tolerant of UV exposure, we have not had this type of breakage problem with the Polyester versions of Fibreplex constructions).

Finally, how much more will Pentex genoas cost? Obviously this depends on the cost of the current cloth that Pentex replaces and the yardage used. When our supply of fxp5 Fibreplex runs out, and Pentex becomes legal in the J/24 class, we will switch over to the Pentex cloth, which should increase the retail price of our genoas about 3.6%.