

Summary of 3-point bending tests for HYBTONITE® based composite laminates

Test: Standard 3-point bending tests for HYBTONITE® based carbon fiber laminates and comparison to a leading competitor as a reference.

Test Date(s): February 6.-9. 2006

Material Supplier: Amroy

Test Laboratory: Independent and customer selected test laboratory

Samples: Vacuum injected carbon fiber laminates made by customer. Size of the laminate cuts: 260mmx110mmx12mm.

Method: Materfest mechanical tester associated with standard 3-point bending tool was used for all tests. Distance between bending clamps was 200mm and bending point was located exactly at the center.

Results: 3-point bending results are listed below and average bending graphs are shown in figure 1.

Table 1: Average test results

	Force (kN)	Strength (N/mm ²)	Moment (Nm)	Stiffness (kNmm ² /mm)	Modulus of Elasticity (kN/mm ²)
Reference (competitor) Average of all	1.9	37.0	96	586	4.21
HYBTONITE Average of all	2.3	44.2	114	583	4.26

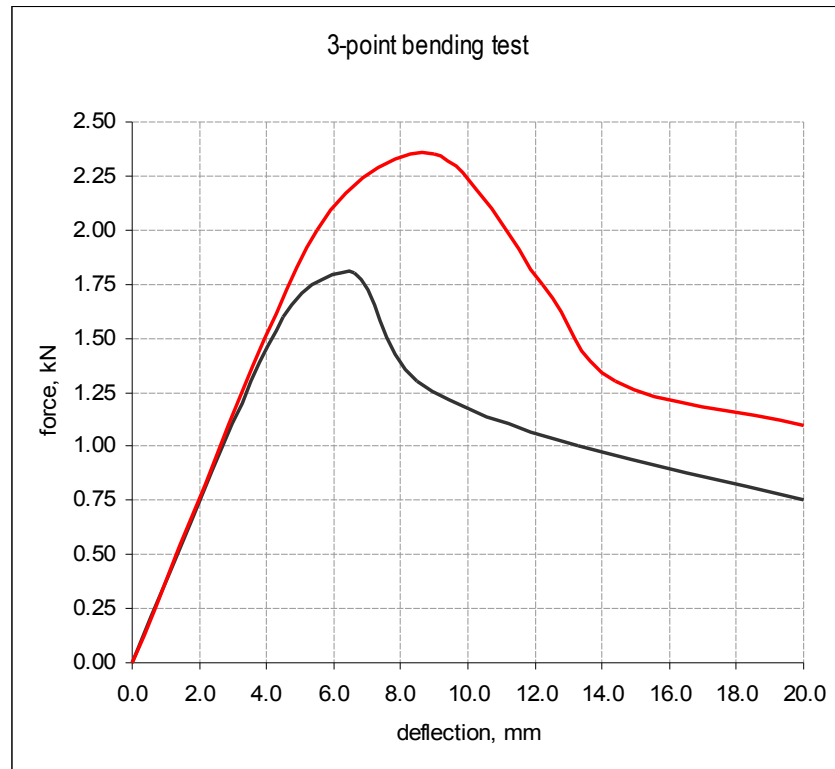


Figure 1. Average bending force as a function of deflection.
HYBTONITE – Red curve; Reference (competitor) – Black curve

Conclusion: Carbon fiber composite laminate made with HYBTONITE® nanoepoxy is about 20% stronger than reference (competitor) laminate. Load carrying capability after break point is increased significantly also. HYBTONITE® nanoepoxy laminate is much stronger and tougher than traditional laminate as expected.

Amroy R&D, Lahti, Thursday 11.2. 2006

Mikko Tilli

Head of R&D
P.O. Box 144
FIN-15320 Lahti
FINLAND
p. +358405080140
email: mikko.tilli@amroyinc.com