6.1.3 Elasticity

Figure 6.2 shows the typical broken-in load extension characteristics for steel wire, conventional synthetic fibre and high modulus synthetic fibre ropes. The broken-in characteristics are determined by cycling the ropes ten times to 50% of their rated strength following procedures recommended in the OCIMF *Guidelines for the Purchasing and Testing of SPM Hawsers* (Reference 7). This accelerated test procedure approximates the change in elasticity that might occur over many more cycles under lower tensions in typical service.

Conventional synthetic ropes such as polyamide, polyester and polypropylene are considerably more elastic than high modulus synthetic fibre ropes. High modulus synthetic fibre ropes are marginally more elastic than steel wire ropes. However, the ratio of extension is significantly closer to that of steel wire than conventional synthetic ropes.

Accepted mooring practice requires all lines in the same service, i.e. breast lines, spring lines, etc., to be of the same size and type. While the load extension characteristics of high modulus synthetic fibre ropes approach those of steel wire ropes, the use of different materials in the same service should be avoided.

Steel wire ropes should not be led through the same chocks as soft ropes as it may cause chafing damage (see also Section 6.4.7.2).

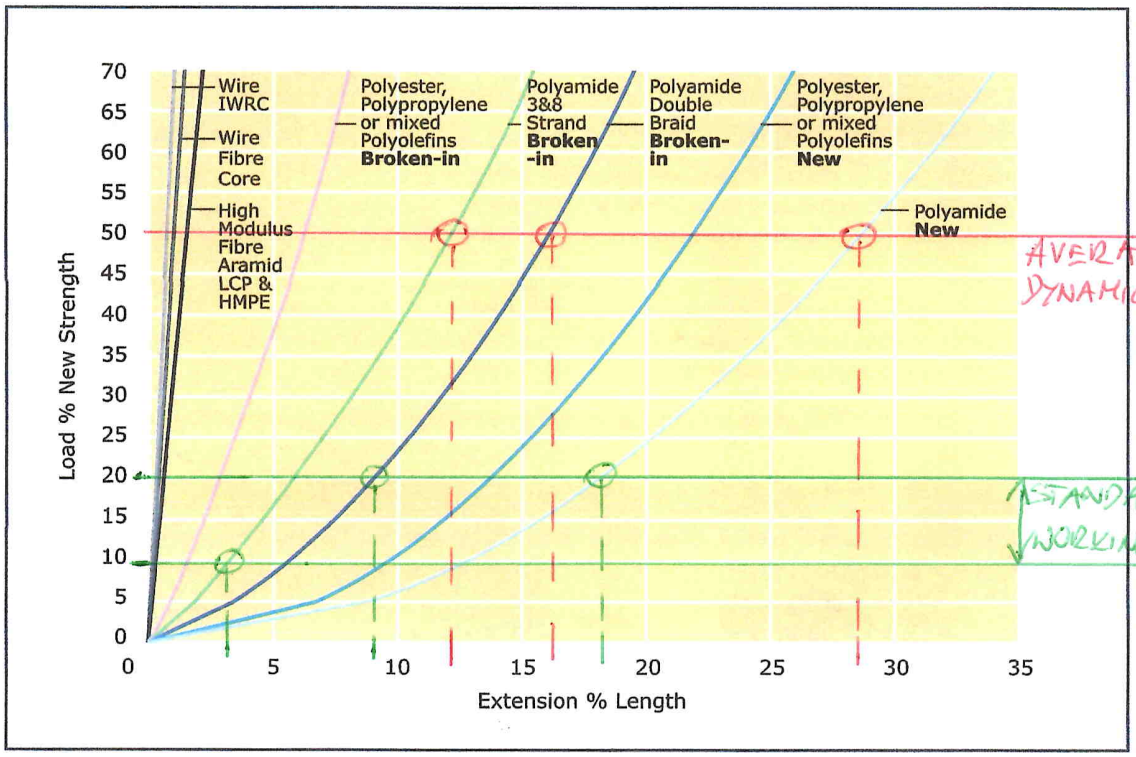

Figure 6.2: Load-Extension Characteristics
Wire and Fibre Ropes, New and Broken-In
(Reference 8 and 9)

The synthetic fibre rope test data used in developing the load-extension characteristics were determined from tests conducted using OCIMF's hawser test procedures (Reference 7). For example, the broken-in characteristics are measured on the tenth cycle to 50% strength. Most ropes will approach these characteristics within a few cycles and will not change significantly even after many more cycles. These load extension curves apply to a loading rate of over a minute or more rather than typical wave loading periods of 10 seconds. This will apply to most sheltered mooring situations.

If the same ropes had been tested by some other procedure, the resulting load-extension characteristics might appear to be considerably different. Some of the variables that affect rope load-extension characteristics are the number of cycles, cyclic load range, relaxation time, rate of loading and whether the rope is wet or dry.

For exposed moorings when vessel wave induced motions may be present, constant cyclic loading will occur and a significantly stiffer curve will result, especially at higher mean loads.