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# Creep resistance of UHMWPE fiber from DSM Dyneema

## UHMWPE fibers from DSM Dyneema prove to have the lowest creep rate compared to all commercially available UHMWPE fiber types.

In general, Ultra High Molecular Weight Polyethylene (UHMWPE) fibers are sensitive to long-term static loads and ropes made with UHMWPE fiber will elongate proportionally with time. This phenomenon is known as creep, and is a process in which the long molecular chains slide along each other. Most UHMWPE rope applications are not subjected to constant loads or are used at low average temperatures. For those, the creep property is not relevant.

The creep of UHMWPE fibers is influenced by the ambient temperature and the applied load: very high loads or a high temperature will accelerate the creep process. Over the majority of time, the creep rate is constant and ultimately the fiber will fail. The time at which an UHMWPE rope should be discarded is dependent upon load, temperature and rope weight.

Amongst the UHMWPE fiber types there is a difference in the creep resistance – each UHMWPE fiber type has its own creep characteristics. UHMWPE fibers from DSM Dyneema offer a low creep rate at a low rope weight.

Ever since the commercialization of the UHMWPE fiber back in the 1990s, DSM Dyneema has recognized the importance of creep in customer applications and has since run a multiyear research program to determine which variables have a bearing on an UHMWPE fiber's resistance to creep. This led to the introduction of SK78 fiber grade which offers good creep properties for most of the applications in which UHMWPE is used.

Further research led to Dyneema® Max Technology and the introduction of the DM20 fiber. This grade is a step change in creep performance compared to all other UHMWPE fiber grades. Dyneema® Max Technology is designed for long-term permanently loaded systems, like mooring offshore production platforms.

Over the course of the multiyear research program DSM Dyneema has developed the Creep Performance Model; with this model and tool DSM Dyneema is capable of predicting creep rate and elongations and estimating creep lifetime of applications made with their UHMWPE fibers.

### Comparing UHMWPE from DSM Dyneema in a 1000 kN break strength rope

| Fiber Type | Rope Core Weight (1000 KN BS) | Creep Load | Temperature | Creep Rate* | Creep Lifetime |
|---|---|---|---|---|---|
| DM20 | 650 g/m | 200 kN | 16 °C | 0.0 %/yr | 250 years |
| SK78 | | | | 0.5 %/yr | 15 years |
| SK75 | | | | 2.3 %/yr | 7 years |

**: Rope creep is dependent on UHMWPE fiber type, tension, time and temperature. Therefore these values are only indicative. For any other combination DSM Dyneema shall be consulted.*



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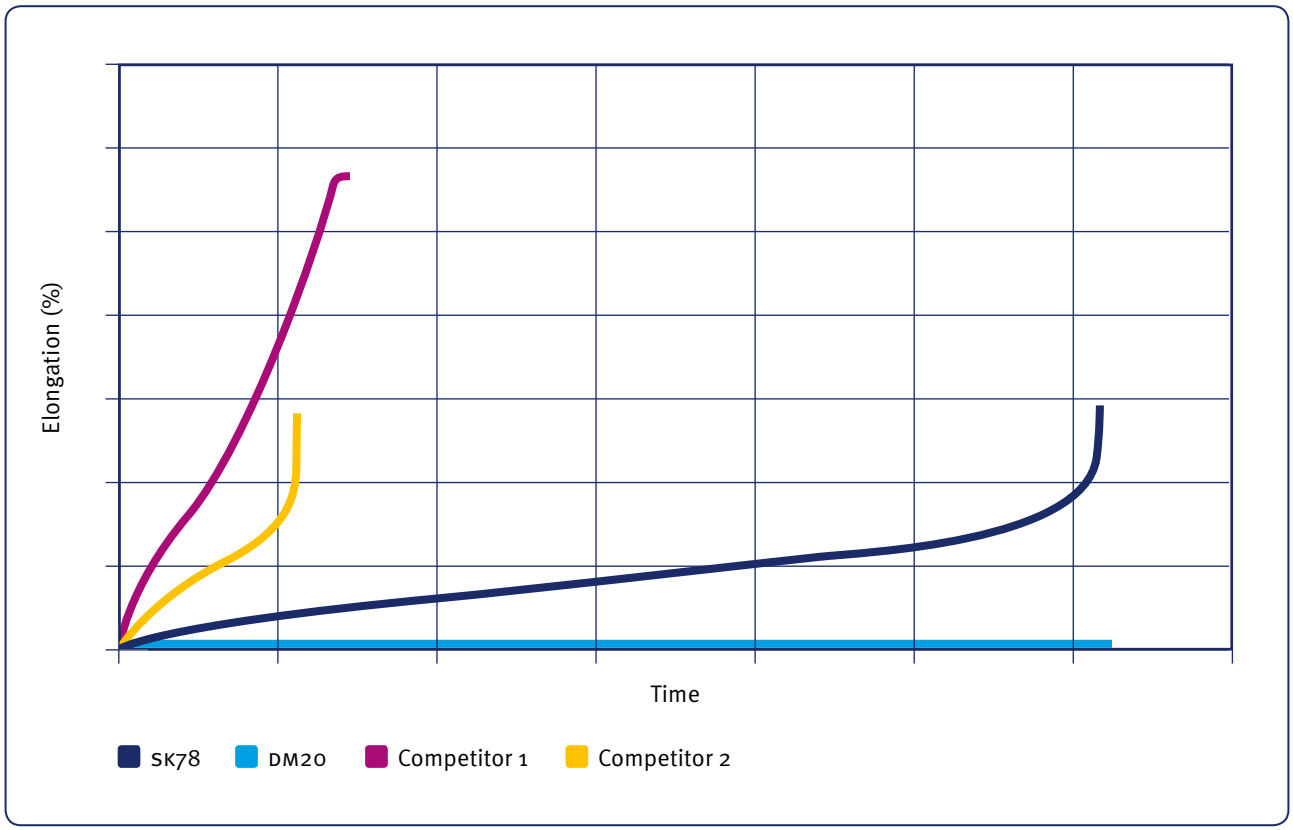
**Compared to all commercially available UHMWPE fiber types, UHMWPE fibers from DSM Dyneema prove to have the lowest creep rate with DM20 as the best performer on creep rate and lifetime.**

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