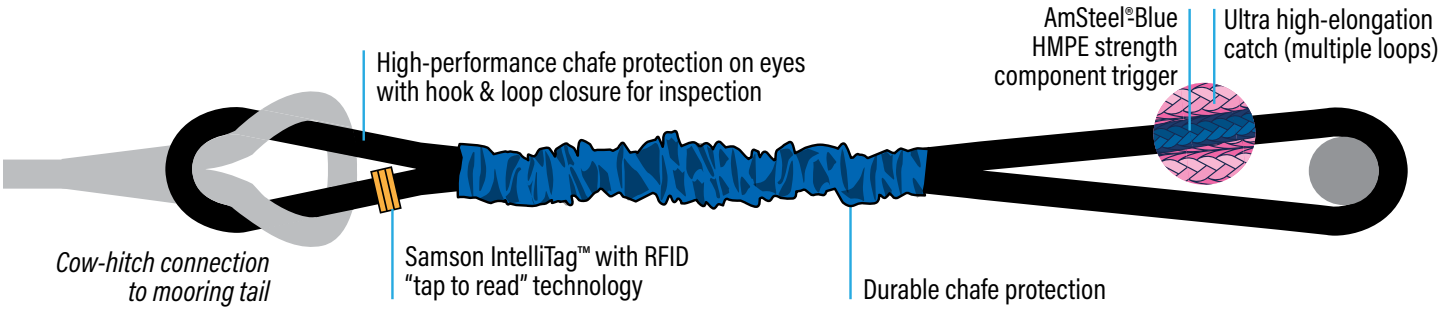
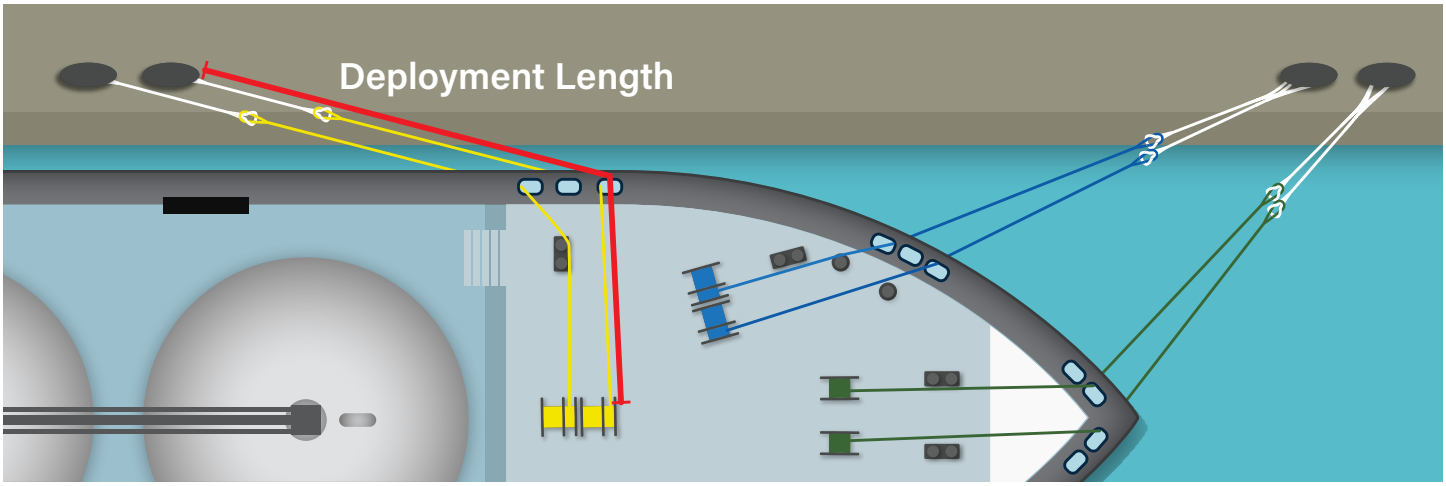
Defender Fuse™ USE & RETIREMENT

DEFENDER FUSE ANATOMY:



SELECTION

Samson's Defender Fuse™ is designed to reduce the risk of recoil in alignment with the MBLsd of the vessel it will be utilized on. The corresponding sizing is based on the amount of energy that can be stored in the mooring configuration and is influenced by the total deployment length, mainline material, and mooring tail specifications.



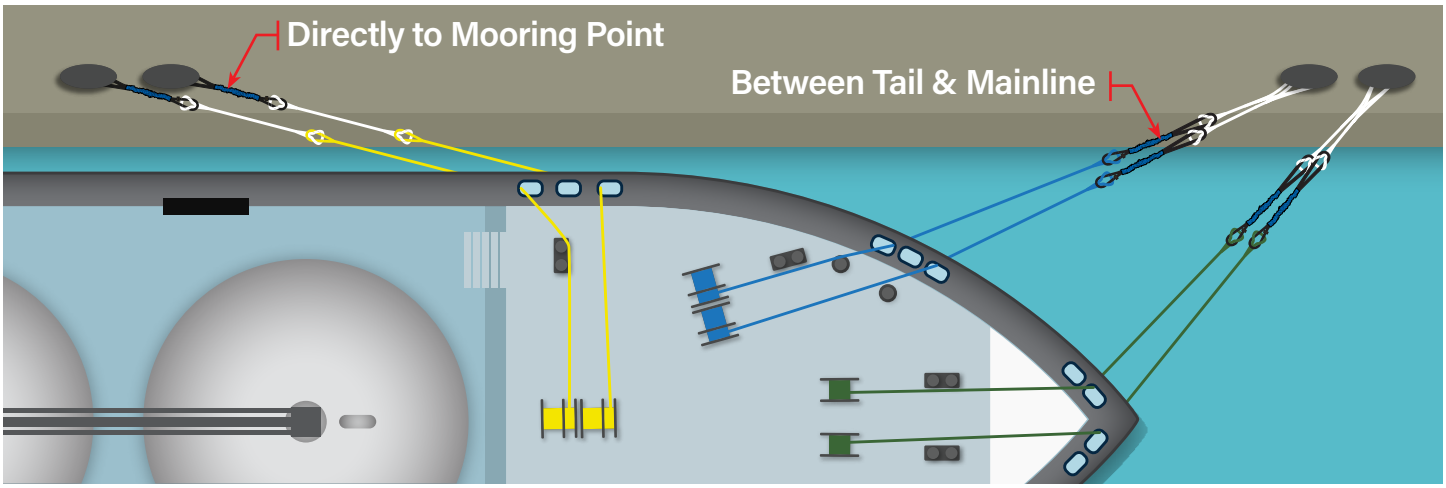
Defender Fuse™ is designed to reduce the risk of recoil that can result from release of the energy storage in high-performance mooring lines with various mooring tails and total deployment lengths up to 100m. In cases where a Fuse solution is desired in systems where traditional fiber mainlines are employed or in cases where longer deployment lengths are required, contact Samson for recommendations.

Vessel operators select mooring tail designs to reduce peak loads in a mooring system. As tail lengths increase or materials are selected with higher elasticity, the corresponding energy that can be stored in the system similarly increases. As such, the required catch component for a mooring fuse must be scaled appropriately to capture the associated energy. Samson provides two specifications to accommodate these potential mooring configurations, both standard and High Recoil Control (HRC).

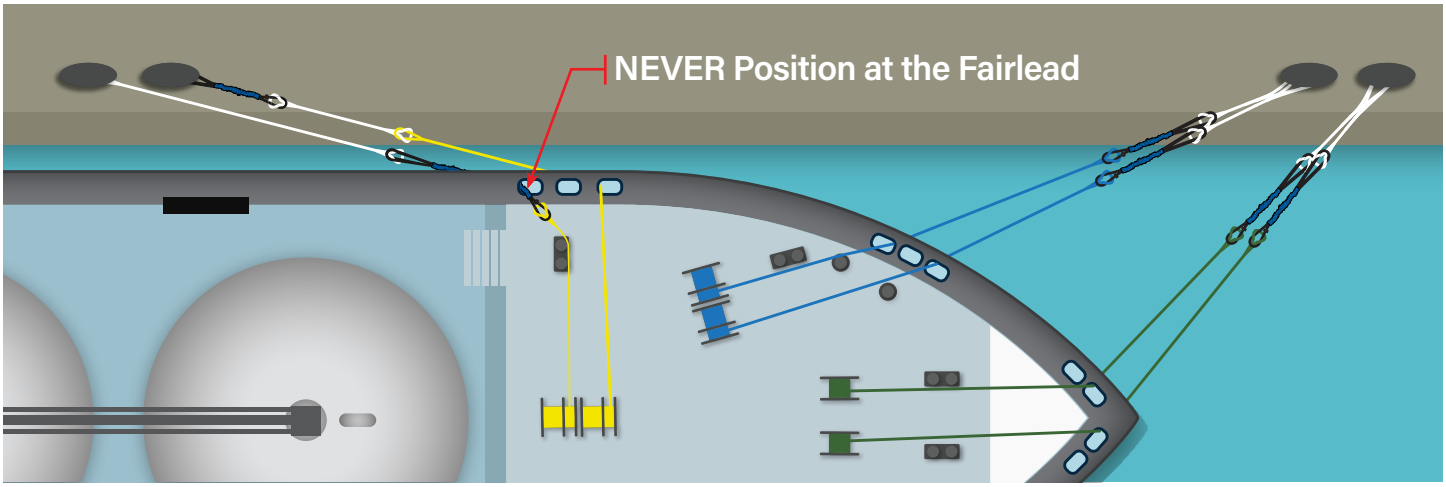
- **Defender Fuse™** — energy absorption capability to accommodate up to 11m non-Nylon tails
- **Defender Fuse™ HRC** — energy absorption capability to accommodate up to 22m Nylon tails

POSITIONING

Defender Fuse™ can be connected either between the mainline and tail or at the end of the existing mooring configuration, With a 2-meter eye, Defender Fuse can connect directly to a quick release hook or bollard on shore. Connection to mainline or tail eyes can be accomplished via a common cow hitch.



When electing to position Defender Fuse in one of these two locations, it is critical to consider where this component will be located while the vessel is moored and lines are under tension. Never bend Defender Fuse around a fairlead while under tension; this redirection can impact the trigger deployment load.



COW HITCH CONNECTION

MEG4 recommended method for connecting two ropes / assemblies:

5.8.4.2 Cow hitch

Tails can be attached directly to HMSF mooring lines using a cow hitch (see fig. 5.21). The cow hitch is a method of joining two fibre ropes without using connection devices. Worked cow hitch connections can become very tight and the inclusion of a pigtail is recommended to help separate the tail and mooring line for replacement or inspection. Most pigtails are manufactured with small diameter conventional fibre ropes. If required, further guidance should be sought from the mooring line and/or tail manufacturer.

Using the cow hitch between correctly sized single leg tail and mooring line does not significantly affect the strength efficiency of the mooring line assembly. When connecting to a grommet tail the strength reduction can be higher due the larger influence the D/d ratio has on tail strength. More details on the design and specification of grommet tails is provided in appendix B in section B5.6.8: Grommet break force.

Oversizing of tails to account for the potential loss of strength is not recommended due to the consequent effects on termination integrity and tail stiffness.

Cow hitch connections should never be used to connect steel wire mooring lines to synthetic tails.

Figure 5.21: *Cow hitch connection — HMSF line to polyester tail.*

Figure 5.22: *Cow hitch connection with pigtail included.*

SOURCE: Mooring Equipment Guidelines (MEG4), Section 5, Mooring Lines.

COW HITCH INSTRUCTIONS

1 Start with the mooring line (Rope A) and mooring tail or Defender Fuse (Rope B).

Mooring line (ROPE A)

Mooring tail or Defender Fuse (ROPE B)

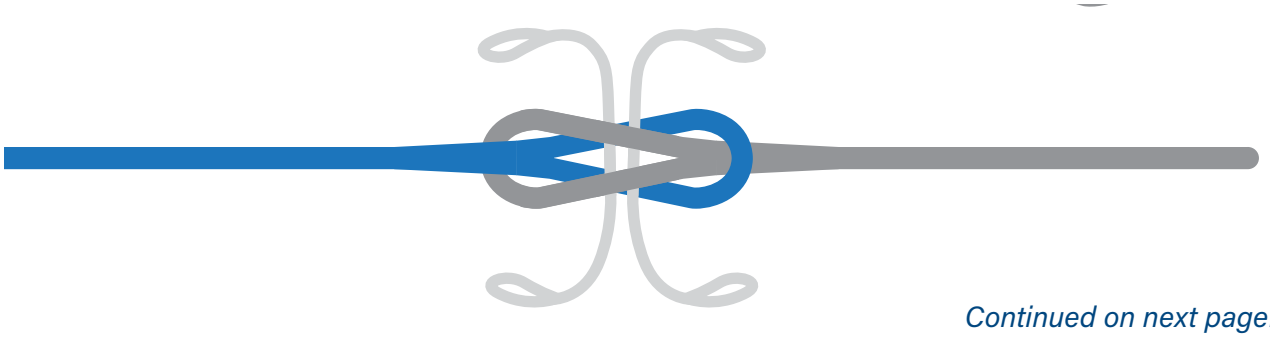
2 Insert the eye of rope A into the eye of rope B.

3 Insert the end of rope B into the eye of rope A.

Mooring line (ROPE A)

Mooring tail or Defender Fuse (ROPE B)

4 Insert the pig tails between the cow hitched eyes as shown here:



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COW HITCH INSTRUCTIONS *CONTINUED*

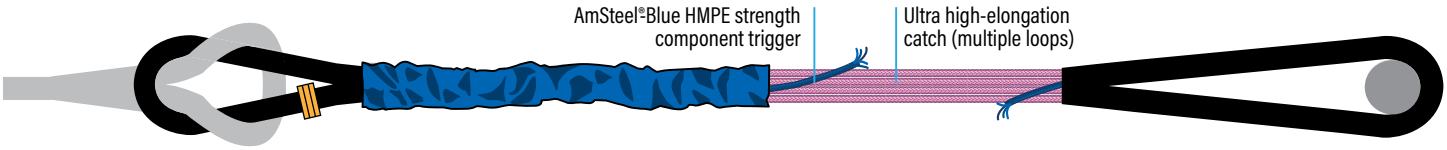
5 Tighten the cow hitch and attach the loose ends of the pig tails to each side.

6 Use the pig tails to disconnect the cow hitch by pulling in opposite directions.

RETIREMENT

In the event that a peak load in the mooring system exceeds the trigger deployment load, the HMPE trigger component in tension will separate, transferring tension to the ultra-high elongation catch component. With energy released by the tail and mainline, the catch component will elongate significantly as it absorbs the corresponding energy. This deployment is an indicator requiring immediate action to address the overload condition as the catch will continue to stretch, and will eventually fail if elongation is left unchecked.

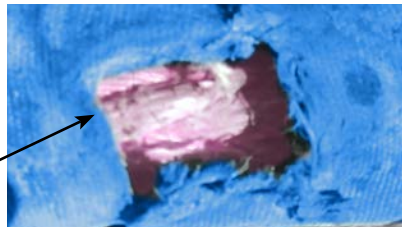
DEFENDER FUSE TRIGGERED



Once the Defender Fuse is triggered, the internal rope structure is exposed as a visual advance warning of the overload. The ultra-high elongation rope will continue to elongate, up to 150% additional length, until complete rupture.

RETIREMENT *CONTINUED*

In addition, damage to the Defender Fuse resulting in chafe deterioration must be monitored during routine inspections of mooring equipment. If the chafe is worn to the point where internal components become visible, the Defender Fuse must be removed from service until it can be repaired, should validation of core components confirm no internal damage, or it is replaced.



DEFENDER FUSE CHAFE DAMAGE

If the chafe is worn to the point where internal components become visible, the Defender Fuse must be removed from service until it can be inspected and the chafe gear repaired if the core components are undamaged.

EXPECTED SERVICE LIFE

The standard expected lifetime for Defender Fuse units is 3 years in service unless dedicated evaluation specific to the vessel or mooring pattern has validated an alternate lifetime.

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