

# Defender Fuse™ Snap-Back Solutions

## RISK ASSESSMENT

To support vessel operators through adoption, Samson has pursued a formal Product Design Assessment and Type Approval with the American Bureau of Shipping (ABS). The process undertaken with ABS included a design failure mode and effect analysis (DFMEA), assessment of development test results, witness of full-scale prototype evaluation, and review of all design model parameters. The robustness of this 3rd Party involvement in validating the performance of *Defender Fuse* is intended to streamline the process for any vessel ready to adopt this recoil risk reducing technology within the parameters of their specific mooring system.



PRODUCT REQUIREMENT	POTENTIAL CAUSE OF FAILURE	POTENTIAL EFFECTS	INITIAL RPN
<b>Energy absorption capability results in recoil containment</b>	Catch damaged by trigger and fails following deployment with all stored energy in the system converted to kinetic recoil.	Recoil occurs when the trigger deploys	
	<b>ACTIONS TAKEN</b> ( <i>highest potential failure items</i> )		<b>FINAL RPN</b>
	Full-scale tests confirm that the sizing of catch components achieve full recoil energy absorption without any occurrence of trigger-damaging catch components.		

PRODUCT REQUIREMENT	POTENTIAL FAILURE MODES	POTENTIAL EFFECTS	INITIAL RPN
<b>Capable of integration with existing mooring equipment</b>	Crushing of catch rope through repeated connection / disconnection leads to premature damage of the catch component.	Operation with Defender Fuse not possible	
		Replacement Defender Fuse required upon inspection	
	<b>ACTIONS TAKEN</b> ( <i>highest potential failure items</i> )		<b>FINAL RPN</b>
	Assembly designed to explicitly accommodate cow-hitch connections and protect critical components to avoid any potential crushing.		

PRODUCT REQUIREMENT	POTENTIAL CAUSE OF FAILURE	POTENTIAL EFFECTS	INITIAL RPN
<b>Trigger deployment at target threshold</b>	Fatigue of trigger leads to reduced break strength and deployment due to loads below WLL.	Winch renders or mainline / tail component fails	
		Operation halted to address deployed fuse and/or vessel drift occurs	
	<b>ACTIONS TAKEN</b> ( <i>highest potential failure items</i> )		<b>FINAL RPN</b>
	3-year lifetime set based on Tension-Tension testing and calculated fatigue rate of AmSteel®-Blue trigger for typical mooring frequencies.		

PRODUCT REQUIREMENT	POTENTIAL FAILURE MODES	POTENTIAL EFFECTS	INITIAL RPN
<b>Assessment of condition allows for appropriate retirement</b>	Trigger deployment occurs but remains undetected resulting in material yield with low loads applied for remaining component.	Vessel drift or uneven load sharing across mooring lines as catch component yields	
		Continued use leads to damage of trigger and/or catch components	
	<b>ACTIONS TAKEN</b> ( <i>highest potential failure items</i> )		<b>FINAL RPN</b>
	Create retirement criteria related to the assembly's readily apparent deployment indicator with offset trigger / catch lengths and separated chafe components.		

### RISK PRIORITY NUMBER (RPN) SCALE

1-200	201-400	401-600	601-800	801-1000
Very low or no risk	Low or minor risk	Moderate or significant risk	High risk	Very high or catastrophic risk

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US9056656B2, US8365646B2 and others. Designed, tested and manufactured by Samson.

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