

Fact Sheet: FS-1018

STABILITY ADDITIVES FOR VLSFO BLENDS

IMO 2020 will be a major challenge to global refiners. New regulation restricts sulfur level in marine fuel oil to $\leq 0.5\%$. The industry has yet to fully indicate a clear path forward to ensure all fuel oils are compliant. Blending fuel oils to make very low sulfur fuel oil (VLSFOs) is deemed a favorable route as this approach meets the immediate demand and does not require capital investment. Refiners and traders who opt for blending to make compliant fuel oils are likely seeing instability and incompatibility due to asphaltene dropout. These challenges require effective stability additives to ensure fuel oil blends remain stable and compatible over time. Nalco Water heavy fuel oil stabilizers are designed to improve stability and compatibility of fuel oil blends.



POTENTIAL SOLUTIONS FOR NEW IMO 2020 REGULATION AND FUEL OIL DEMANDS

Over the last decade both Industry and government efforts have focused on regulating the sulfur levels in bunker and marine fuels used whilst ships are operating in defined areas (ECAs - Emission Control Areas). These tend to be designated in areas close to Europe and North America and the maximum permitted sulfur levels in these zones have systematically been reduced to the current 0.1% sulfur level since 2015. The new 0.5% sulfur content specifications for bunker fuel oil will take effect on January 1, 2020.

The available options are:

- Installation of Scrubbers
- Alternative fuels- 0.1% Marine Gas Oil or Liquefied Petroleum Gas (LPG)
- Blended low sulfur fuel oils to meet 0.5% S
- CAPEX expenditure for heavy oil hydrotreaters or cokers
- Low Sulfur crude oil blends

A few refiners have invested in hydro-processing or coking capacity. Installation of scrubbers on ships is an option but will take time to fulfill. Blending fuel oils to make VLSFOs is the most cost-effective and quickest solution to meet specs and demand.

IMO 2020 CHALLENGES

Blending different streams of fuel oil can create challenges in compatibility and stability of the final products due to different paraffinic and aromatic components being present in the blends. Nalco Water with unrivalled experience in blended crude oil instabilities has developed a new range of additives to combat these problems. Our chemistries are formulated to improve stability of heavy fuel oils and help with fuel oil compatibility refineries may be seeing to meet 0.5% Sulfur blends. These NEW heavy fuel oil stabilizers are designed to prevent asphaltene precipitation which can cause formation of sludge in tankage.

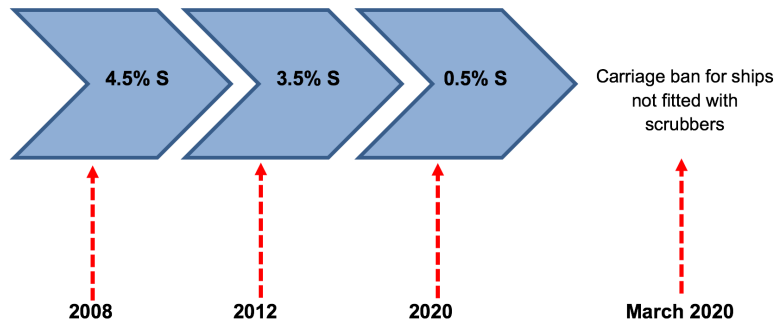


Nalco Water stability additives support an economic approach to fuel oil blending and ensure the final compositions of VLSFOs remain stable.

TEST PROTOCOLS

Nalco Water additives have been tested using the following key tests:

- Spot test [ASTM D4740]
- Turbiscan Reserve Stability Number [ASTM D7061]
- Total Sediment Potential [ISO 10307-2]
- Flocculation Point Analysis [Modified ASTM D7060]
- Asphaltene Dispersant Test
- Accelerated Stability Analysis [ISO/TR 13097]



IMO sulfur emissions limits over the last 12 years in open waters

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