*ECO*SOLUT® 24: Market-leading hydrocarbon oil tank cleaning

Advantages of *ECO*SOLUT cleaners compared to established market products

More efficient cleaning, leading to:

- Significant reduction of cleaning time
- Significant reduction of cleaning waste water
- Significant reduction in cleaning energy costs

Introduction

The most demanding issue for tankers is the cleaning of residual hydrocarbon from non-volatile oils cargos (ULSD, gas oil and kerosene). Residues become trapped inside the surface profile of the zinc silicate coating (a standard inside tank coating) and have to be washed out in order to avoid contamination of the new load, such as methanol. Methanol is a powerful solvent which exhibits turbidity (cloudiness) even with parts-per-million (ppm) hydrocarbon contamination.

Performance comparison of hydrocarbon oil cleaning performance of *ECO***SOLUT** and established market product.

The competing product, incorporating "Protein-Surfactant Synergists", has been one of the leading tank cleaning product used in the industry for years as it already shortened the previously used methanol cleaning time by 50%. Like *ECO***SOLUT**, it is neutral (pH 7–8) and is seen as environmental friendly.

Independent laboratory testing

A comparative test was carried out in 2012 by an independent cleaning service specialising in marine applications. The outline test procedure was:

1) Duplicate zinc silicate coated test panels were fully immersed in D2 diesel (also called Marine diesel) for 72 hours
2) The panels were removed from the D2, flushed with cold freshwater for approximately 1 minute (in order to remove the residual D2 from the surface of the test panels) and then naturally ventilated to dryness
3) The panels were then washed by re-circulation using both tank cleaning chemicals at a concentration of 0.5% in fresh water for 2 hours at 70ºC
4) The panels were then flushed with warm freshwater to remove any residual detergent and then naturally ventilated to dryness
5) Both panels were then wall washed with methanol.
6) Hydrocarbon contamination of the methanol was then tested for APHA colour in accordance with ASTM D1209 and water miscibility (hydrocarbons) in accordance with ASTM D1722

The results are tabulated below showing the superiority of *ECO***SOLUT**

Cleaning solution	Residual hydrocarbon reading	Colour (APHA)
Hot water (negative control)	520	35
Ecosolut	75	7
Comparative product	85	15

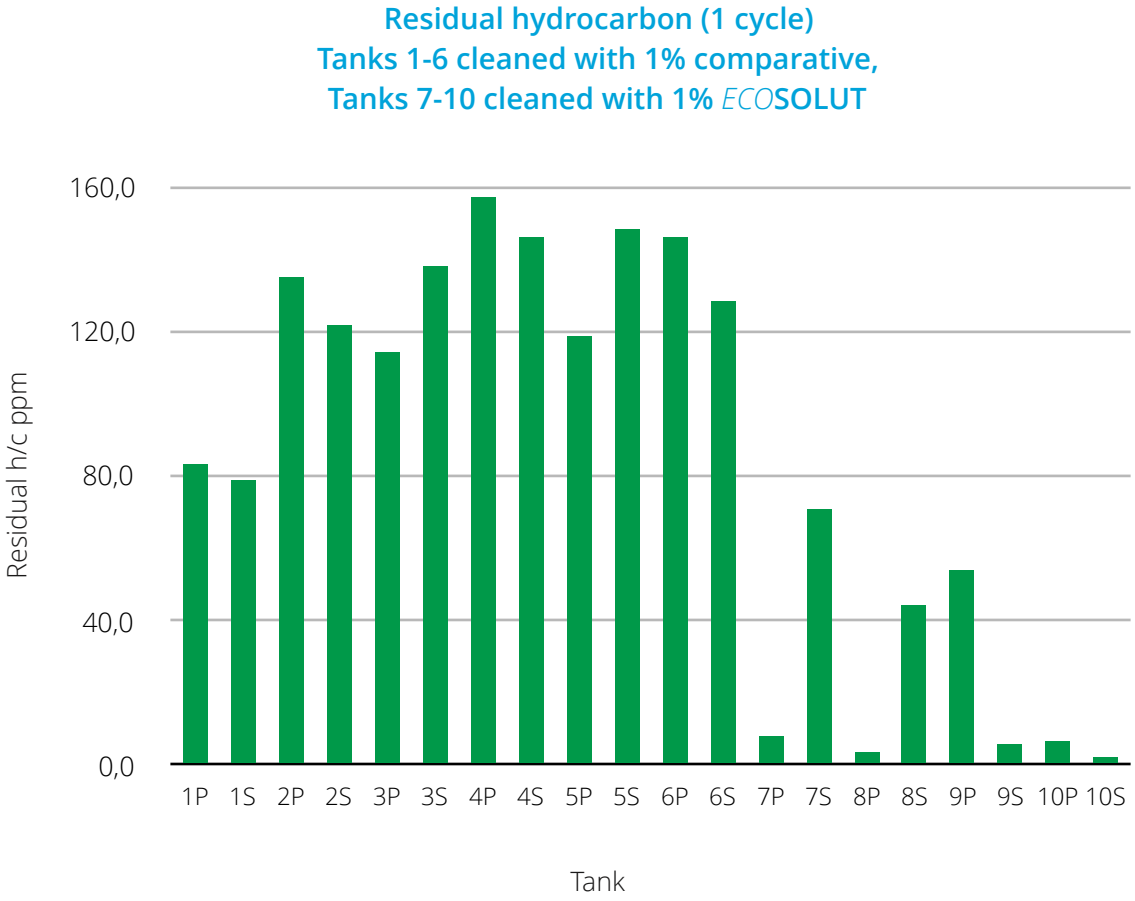
Marine Tank cleaning trial

The test was carried out in October 2012 by an independent cleaning service on a 45.000 DWT tanker with 20 separate tanks: the test layout was that initially 12 tanks were cleaned by the established product and 8 of Uniservice. The layout also imitated the "typical" procedure, i.e. multiple washings.

1) 1hour seawater followed by 4hours heated seawater washing
2) 4hours recirculation cleaning with either the established or Uniservice's product (1% dilution)
3) 4hours 70°C seawater machine wash
4) Ventilation and methanol wall wash
5) Test results
6) Repeat procedures 2) – 4) with Uniservice's product
7) Test results

A residual hydrocarbon reading of <10ppm was required.

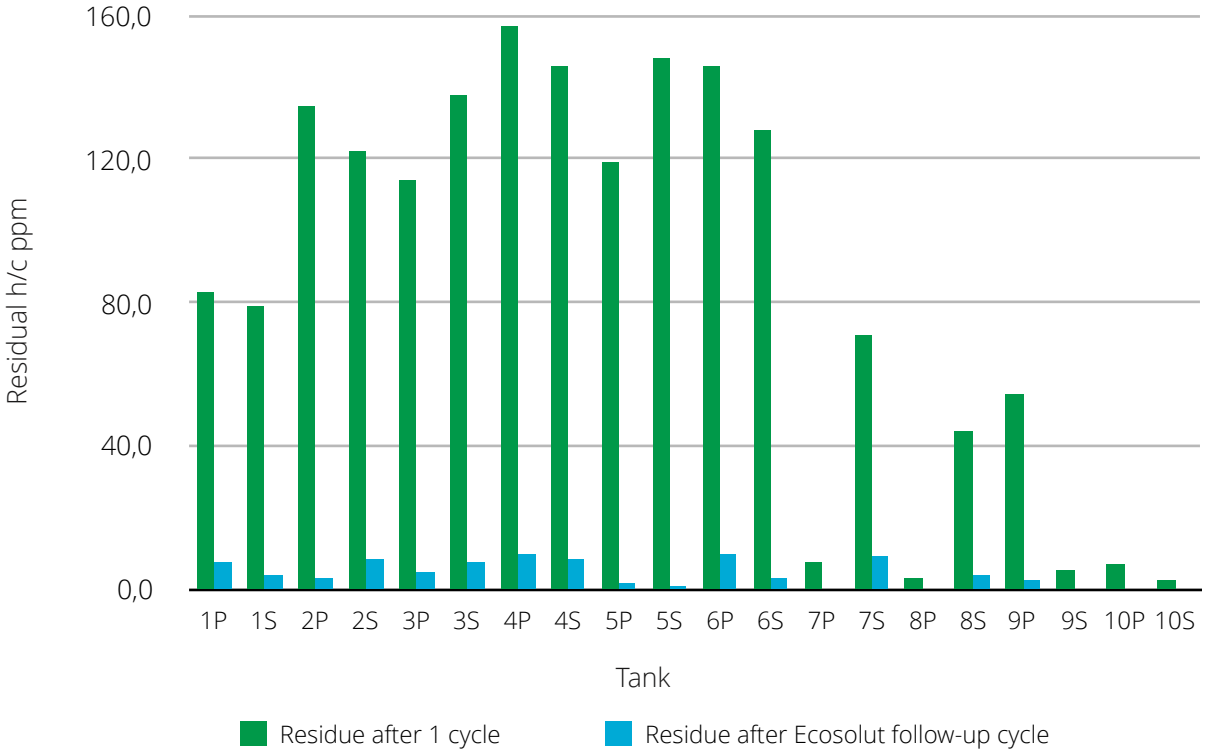
The graph below shows the results illustrating the much greater reduction in the residual hydrocarbon levels for the tanks cleaned with *ECO***SOLUT** (tanks 7-10) relative to those using the comparative product (tanks 1-6).



The majority of tanks cleaned with *ECO***SOLUT** met the <10 ppm requirement after only a single cycle with obvious savings of cleaning time, energy and washing volumes.

For all the tanks that had not met the requirement after 1 cycle, a second cycle of *ECO***SOLUT** was employed. The graph below shows the dramatic reduction achieved, proving the superiority of *ECO***SOLUT** over the comparative. All tanks met the <10 ppm requirement after 2 cycles.

Effect of *ECO*SOLUT cycle 2



In this case it was estimated that *ECO***SOLUT** achieved:

- a reduction of waste water of >50%
- a reduction of time of at least 30%.

Given the costs involved in such differences, the overall costs of Uniservice's solutions were concluded to be vastly superior to those of the competing product.