

Bio Tube Product Briefing – Swiss OECD301F Test

Bio-Tube - Biological Oil Remediation in Interceptors

European OECD Test Success For Bio Tubes

Bio Tubes are designed to degrade oil within Industrial and Forecourt Interceptors.

In Switzerland our distributor was required by Swiss Federal Law to test the Bio Tube for biological efficiency before it could be marketed.

The test protocol used was the OECD 301F Test. The results shown in the enclosed graph demonstrate the efficiency of the Bio Tube to degrade a mixture of diesel fuel and engine lube oils.

Background to the Swiss Market

The Swiss have good effluent control legislation and good compliance.

Motorists are prohibited by law from washing their cars at home, cars are taken to wash stations for cleaning. At these stations effluent water samples are presented regularly to the Federal Laboratories for compliance testing.

Similarly, car repair garages are required to install separate Interceptors both for surface water and effluent water and these too are subject to frequent compliance testing.

Background to the OECD 301F Test

The Swiss Federal Laboratories requested that the test protocol for examining the performance of the Bio Tubes should be based upon the OECD 301F Test.

OECD 301F is a comparative test used to test the biodegradability of chemical residues. It uses a reference bacterial culture in this case a bacterial mixture from a sewage treatment plant.

The chemical residue for this test was a 1:1 mixture of diesel fuel and motor lube oil. This was chosen as being representative of effluent oil residues found in Interceptors. (Such a residue is likely to be long lived and therefore unlikely to be reduced by natural evaporation within the Interceptor system).

The test took 35 days to complete and the % biodegradation plotted against time on the enclosed graph, Figure 1 Test Results.

Bio Tube Design Concept

A typical Interceptor is a moving column of effluent water which facilitates oil to rise to the surface. Additions of oil specific bacteria and bacterial nutrient have very little success in bioremediating retained oil. This is due to the inherent waterflow which flushes out the bacterial/nutrient Interceptor before a bioremediating bio-mass can be established.

Bio Tubes (Pat Pending) are biologically active oil absorbents which offer support for the bacteria and nutrient, because this bacteria/nutrient mix is held by the absorbent degradation is achieved first within the sorbent material. Once a bio-mass has formed bacterial migration from the Bio Tube speeds up the oil degradation process.

OECD 301F Results

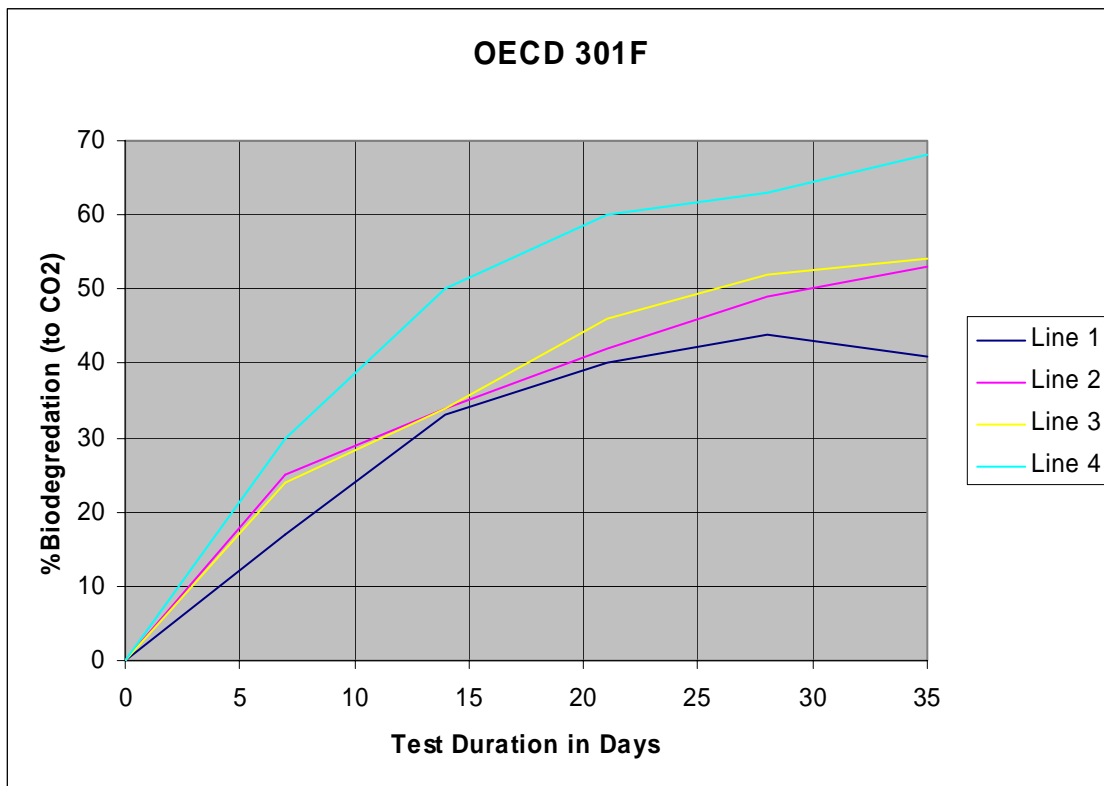


Figure 1 Test Results

1. The OECD 301F Test is a closed bottle test so that all of the system components are retained and have the best opportunity to function as intended.
2. The performance of the sewage treatment bacteria is shown in lines 1 and 2. The increase in bioremediation in line 2 after 28 days is a consequence of the addition of nutrient which, as explained above, would not be possible in an open Interceptor system.

3. Line 3 shows the performance of the bacteria used in the Bio Tube. The performance is only marginally better than the sewage works sourced bacteria.
4. Line 4 shows the performance of the Bio Tube bacteria when tested in the presence of the Bio Tube absorbent. The results show the efficiency of the Bio Tube concept in that a very rapid increase in oil degradation is achieved in the first 14 days **with 60% degradation being achieved within 21 days.**

Conclusion

1. The OECD 301F Test carried out at the Swiss Federal Laboratories facilities showed the Bio Tube very significantly outperformed the reference bacteria **and was the only system that met +60% degradation inside a target 30 day period. (Achieved result -- 21 days).**
2. Because Bio Tube's supply their own nutrient when first deployed, the need to add continuous nutrient is eliminated. The "first feed" nutrient fixation system employed by the Bio Tube design prevents nutrient passage through the Interceptor and through sewage treatment plants, so preventing possible down stream environmental problems such as algal blooms etc.

Additional Information

1. Bio Tubes are registered with the German Environmental Agency UBA and in Switzerland with the Bundes Amt fur Gesundheit.
2. Bio Tubes use only European class 1 Bacteria.
3. Independent tests have shown that once a bio-mass has formed within the Bio Tube, up to 2Kg of oil are converted into CO₂ and water per week per Bio Tube.
4. Bio Tubes are designed to be used in conjunction with OT8 Oil Stain Remover and aqueous degreaser Sobo QB Plus, for the removal of oil contamination upstream of the Interceptor. Both of these products are Biological oil degreasing agents. (See enclosed brochures).
5. Independent tests have shown that the Biological system used in the Oil Stain Remover OT8 also degrades over 60% of its uplifted oil within 30 days so confirming the above OECD 301F Tests above.
6. After use usually 9-12 months, place used Bio Tubes in plastic sacking, leave to complete oil digestion and dispose of as household waste.