

Date : Sep,21,2016  
Doc. No. : Y03-4036

Messrs. : AKTAS GROUP

Dear Sirs,

**Re : Suitability Test Results of REXOIL BIO S 100**

The above mentioned oil test for judgement of suitability to our stern tube seal rings, has been carried out, in view of sludge formation and change of physical properties as confirmation of oil's affection for rubber materials.

1. Tested oil :  
Brand Name : REXOIL BIO S 100
2. Test conditions and Results :
  - 2.1 Rubber materials : FR (VITON)  
Fluoro-rubber (BIO SEAL RING. Hereafter called "BIO SEAL")
  - 2.2 Oil :
    - (A) Neat oil  
Temperature and term of test :  
FR, BIO SEAL : continuously 24 hours at 150°C

Test method:

After rubber materials are dipped into the sample oil adjusted under 150°C for 24 hours continuously, confirmation as to generation of sludge and investigation for physical characteristics of the rubber in accordance with JIS K 6250, K 6251, K 6253 and K 6258 (Testing methods of the effect of liquids for vulcanized rubber) shall be carried out.

Result of test:

Rubber material	FR	BIO SEAL
Generation of sludge	none	none
Variation of hardness (points)	0	0
" of tensile strength (%)	-3.8	4.9
" of elongation (%)	-2.6	-2.0
" of volume (%)	0.5	0.1

- (B) Emulsification oil  
Temperature and term of test : continuously 672 hours at 80°C

Result of test:

Rubber material	FR	BIO SEAL
Judgment	failure	pass

3. Judgment of acceptance:  
For FR material, this oil is unsuitable with unacceptable physical characteristic.  
For BIO SEAL material, this oil is suitable with acceptable physical characteristic.

Your very truly  
Wärtsilä Japan Ltd.



Tatsuo Matsumoto  
Manager of Design Engineering