

## CFOP (Cold Filter Obstruction Point) TESTS on various Gas Oil fuels, with and without antifreeze additives from "rb bertomeu"

Tests performed by LABORATORIOS CALEB BRETT IBÉRICA S.A. for rb bertomeu S.L.

Antifreeze products tested: "rb bertomeu" bewax OB/1 and "rb bertomeu" bewax OB/2

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CFOP Temperatures in °C (current specifications as per legislation in Spain: *Real Decreto 1700/2003*)

All samples of Diesel fuels of class "A" correspond to Winter Diesel fuel.

All samples correspond to well-known brands commercially available in Spain at the date of the tests.

### METHODOLOGY EMPLOYED

After being obtained directly from different Service Stations, the various samples of the **automotive Diesel Fuel "A"** and the **heating gas oil "C"** were sent to the Laboratory. At the same time, two samples each of both types of antifreeze for gas oil were sent to the laboratory for testing, namely "**rb bertomeu**" bewax OB/1 and OB/2.

The Laboratory proceeded to prepare test tubes by treating the gas oil samples with the two types of additive to be tested. A sample was set aside without additive treatment in order to perform parallel control tests to enable comparisons.

Dosages of Additive Treatment to be tested with each sample and additive:      **1 parts per thousand (1000 ppm)**  
    **2 parts per thousand (2000 ppm)**

Method of analysis employed: **IP 309/96**

Margin of error: 3° C (K=2)

### RESULTS OBTAINED

The results displayed are the arithmetical mean values of the various results obtained in each case.

Additive used	Dosage used	CFOP of	CFOP of	CFOP of	CFOP of
		Sample No. 1 Type "A" <u>(automotive)</u>	Sample No. 2 Type "A" <u>(automotive)</u>	Sample No. 3 Type "A" <u>(automotive)</u>	Sample No. 4 Type "C" <u>(heating)</u>
<b>Without additive</b>	---	- 14°	- 14°	- 10°	- 9°
		<b>Reduction</b>	<b>Reduction</b>	<b>Reduction</b>	<b>Reduction</b>
		<b>in CFOP</b>	<b>in CFOP</b>	<b>in CFOP</b>	<b>in CFOP</b>
<b>bewax OB/1</b>	1 per 1000	- 18° (4°)	- 16° (2°)	- 16° (6°)	- 14° (5°)
	2 per 1000	- 18° (4°)	- 23° (9°)	- 19° (9°)	- 15° (6°)
<b>bewax OB/2</b>	1 per 1000	- 19° (5°)	- 14° (0°)	- 18° (8°)	- 14° (5°)
	2 per 1000	- 18° (4°)	- 22° (8°)	- 20° (10°)	- 16° (7°)



## CONCLUSIONS

- It is well known that the efficacy of an antifreeze product (a depressor of the CFOP) depends on the type of gas oil and the type and quantity of additive treatment the fuel already contains at source.
- Furthermore, the methodologies used to determine the CFOP (IP-309 and EN-116) are recognised to have a margin of error of  $\pm 3^{\circ}\text{C}$ , which means that many measurements are necessary in order to locate the most probable CFOP by statistical methods.
- The present study has been carried out to verify, once again, the capacity as a depressor of the CFOP possessed by the antifreeze products for gas oil fuels “**rb bertomeu**” **bewax OB/1** and **bewax OB/2** when acting upon some of the most common gas oil fuels on the market in Spain at the time of the trials. To this end, the test included **three samples of Automotive Diesel Fuels** (Samples No. 1, No. 2 and No. 3) **and a single sample of Heating Fuel** (Sample No. 4). Tests were performed using dosages in the proportions of **1 per 1000** and **2 per 1000**, representing common practice (dosages in excess of these do not normally result in further variations in the CFOP).
- The results obtained are not particularly homogeneous due to the different origins of the gas oil fuels and the different regulations for additive treatment at source; nevertheless, the following observations should be taken into account:
  - In the case of **Diesel Fuel “A” (automotive) of the brand corresponding to Sample No. 1**, a reduction in the CFOP of some  $4^{\circ}\text{C}$  was achieved, regardless of the dosage tested and the type of antifreeze product (1 or 2 parts per thousand). **In each case,  $-18^{\circ}\text{C}$  were reached**, starting from an initial CFOP of  $-14^{\circ}\text{C}$ .
  - In the case of **Diesel Fuel “A” (automotive) of the brand corresponding to Sample No. 2**, both the antifreeze products work very well at dosages of 2 parts per thousand, **reaching  $-22^{\circ}\text{C}$**  from a starting point of  $-14^{\circ}\text{C}$ , whilst a dosage of 1 part per thousand has a very slight effect on the CFOP (between 0 and  $2^{\circ}\text{C}$ ).
  - In the case of **Diesel Fuel “A” (automotive) of the brand corresponding to Sample No. 3**, the reduction in the CFOP achieved is much greater, probably because it contains less additive at source (it has an initial CFOP of  $-10^{\circ}\text{C}$  instead of the  $-14^{\circ}\text{C}$  of the other A-grade Diesel Fuels). The reduction in the CFOP is  $6-8^{\circ}\text{C}$  at a dosage of 1 part per thousand and  $9-10^{\circ}\text{C}$  at a dosage of 2 parts per thousand, with either of the two additives. It could safely be said that **at a dosage of 1 part per thousand at CFOP of  $-16/-18^{\circ}\text{C}$  is reached, whereas at a dosage of 2 parts per thousand a CFOP of  $-19/-20^{\circ}\text{C}$  is reached.**
  - In the case of **Gas Oil “C” (heating fuel) of the brand corresponding to Sample No. 4**, the reduction in the CFOP is between  $5$  and  $7^{\circ}\text{C}$  with either of the two additives, and is hardly influenced by the dosage level. Thus, **the CFOP of the gas oil changes from an initial  $-9^{\circ}\text{C}$  to  $-14/-16^{\circ}\text{C}$ .**
- In general, the CFOP temperatures obtained are similar to those indicated in our Table of Technical Specifications for the Antifreeze “**rb bertomeu**” **bewax OB**, which guarantees a substantial improvement of the CFOP in the majority of cases.
- Special caution is required when keeping stores of gas oil of “summer” quality, with a regulation CFOP of maximum  $0^{\circ}\text{C}$  (in Spain), which is to be used in the autumn/winter period with temperatures that could fall below  $0^{\circ}\text{C}$ . In such cases, it is essential to add an antifreeze product before temperatures drop, in order to prevent problems caused by solidification of the paraffin components of the gas oil.