

**RB-100 HOMOLOGATION PROCEDURE**

**DEVELOPED TO VERIFY THE ANTI-CORROSION  
AND WASTE ANTI-INCRUSTATION EFFICIENCY OF  
THE ADDITIVE FOR FUEL OIL**

***“rb bertomeu” beco F1/ASF***

**ON DIESEL *DEUTZ* ENGINES INSTALLED IN POWER  
PLANTS**

**rb bertomeu S.L.  
Technical Department**

# **INDEX**

- 1 : INTRODUCTION
- 2 : HOMOLOGATION PROCEDURE
- 3 : PROCEDURE APPLICATION
- 4 : HOMOLOGATION LETTER

# 1 – INTRODUCTION

When in the year 1995 we started the manufacture and commercialization of the additives for liquid fuels "**rb bertomeu**" we did so with the aim of supplying the industry with products capable of **providing solutions and improvements in the key points of industrial combustion of fossil fuels**, mainly fuel oil, which translated into **economic benefits** for the user:

- A- Storage, handling and purification of fuel.
- B- Combustion optimization to reduce fuel consumption and reduce emissions of unburned particles.
- C- POST-COMBUSTION CORROSIONS AND INCRUSTATIONS.

Before starting the supply of "**rb bertomeu**" additives, to carry out the treatment of fuel oil that was being consumed in **Power Plants equipped with Deutz Diesel engines**, we observed the following facts, along with the owners of the plants and the maintenance service of the engines:

- 1- **Corrosion** was occurring in the exhaust valves of the engines, which forced to operate with TBO shorter than the 3,000 hours originally planned and to carry out intermediate maintenance shutdowns to change blown valves. **All this resulted in a lower annual availability of the plant with respect to whether valve corrosion could be avoided or minimized.**
- 2- In the general revisions of the engines, **many exhaust valves had to be replaced** due to having excessive corrosion in the seats and a large part of the non-replaced valves had to be subjected to deep grinding, in order to be reused and extend their useful life somewhat. **This resulted in a higher cost in valve renewal, compared to the possible cost if corrosion decreased significantly.**
- 3- **High incrustations of solid residues** were being detected in the spindles of the exhaust valves, exhaust gas collectors and turbos, which caused greater cleaning needs so as not to diminish the air flow and therefore the production capacity of the engines.

Given that, in that situation, one of the main objectives of treating fuel oil with the "**rb bertomeu**" additive was the one described in point C above, **to reduce corrosion in exhaust valves and fouling in valves and the rest of the exhaust gases**, **rb bertomeu SL** developed a procedure for verification of results, in accordance with the **Deutz Maintenance Service**, so that our users could clearly verify the benefits provided by the additive "**rb bertomeu**" and the engine manufacturer **Deutz**, could APPROVE it under two basic aspects:

- a) **The additive was effective against corrosion and fouling derived from fuel oil combustion in the engine.**
- b) **Furthermore, the additive added to fuel oil did not cause any type of damage to the engine.**

With these premises, the following Verification Procedure was developed in 1996 and applied for more than 3 years, which we later called the Homologation Procedure.

## 2 – HOMOLOGATION PROCEDURE

### 2.1 PURPOSE OF THE PROCEDURE

Verify the effectiveness of the additive "rb bertomeu" beco F1/ASF, applied to fuel oil consumed in diesel engines of power plants, **to reduce corrosion and scale deposits**, which normally occur.

### 2.2 POINT OF VERIFICATION

The verification of anti-corrosion and anti-incrustations results will be carried out **exhaustively** on the engine **exhaust valves**, as it is the most critical post-combustion point. Other controls such as the accumulation of residues in the rest of the exhaust gas circuit, including turbos, can be carried out with less rigidity, controlling the state of cleanliness in each scheduled maintenance shutdown.

### 2.3 PROCEDURE

#### 2.3.1 Frequency of controls

In each revision scheduled by the Maintenance Service

#### 2.3.2 Waste control attached to the valve spindles

- a) Remove all the exhaust valves (Baskets and Spindles).
- b) Order and number all valves according to the criteria used by the owner of the plant and / or the maintenance service.
- c) Using a precision scale  $\pm 0.2$  g, weigh all the extracted spindles, with the residues embedded.
- d) Manually clean all the spindles, to loosen the adhered residues.
- e) Using the same scale, weigh all the spindles again, without any adhered residues.
- f) Calculate the quantity of residues adhered to each exhaust valve spindle, by weight difference between (c) and (e).
- g) Record results on the Control Sheet

#### 2.3.3 Control of corrosion and anomalies in the Valve Seats (Spindles and Baskets)

- a) Carry out a manual cleaning of the surface of the seats of the numbered Spindles and Baskets (to be able to see anomalies) and visually inspect them, qualifying them according to the following scale:
  - a-1 Blown in seat
  - a-2 Seat blowing start
  - a-3 Seat corrosion
  - a-4 Start of seat corrosion
  - a-5 Crushing on the seat
  - a-6 Seat compactions
  - a-7 Corrosion on flat surface (head) of the Spindle
  - a-8 Start flat surface corrosion (head) of the Spindle
  - a-9 Thermal fatigue on flat surface (spindle head)
  - a-10 Start thermal fatigue on flat surface (head) of the Spindle

- b) Record grades on Control Sheet
- c) Label all valves with anti-reflective labels, on the seat part, indicating the following information:
  - c-1 Company
  - c-2 motor
  - c-3 Date of revision
  - c-4 Hours of Review
  - c-5 Basket or Spindle Numbering
- d) Using a suitable camera, equipped with a flash, photograph all the Spindle and Baskets (previously labeled and manually cleaned so that anomalies can be seen), trying to objectively capture all existing anomalies so that they can be related to visual qualifications. described in Point (a).
- e) Perform mechanical grinding of valve seats.
- f) Determine the elements of the valves (basket and / or spindle) that will be reinstalled and those that will be replaced, indicating the reason for the change:
  - f-1 By blown
  - f-2 Corrosion
  - f-3 For being out of measures after successive rectifications
  - f-4 Due to thermal fatigue
- g) Record data on discarded valves and reused valves on the Control Sheet.

#### 2.3.4 Review report

After each review, **rb bertomeu S.L.** made a report, with the data obtained jointly with the Maintenance Service. This report showed, at least, the following information:

- a) Control of **solid residues** detected in the spindles of the exhaust valves.
- b) Control of **anomalies** detected in the baskets and spindles seats.
- c) Control of **changes made** of Baskets and Spindles and reasons for the changes.
- d) **Photographic report** of all the seats of Baskets and Spindles removed from the engine for review.

3 copies of the report will be published:

- 1 for the engine **owner**
- 1 for engine **Maintenance Service**
- 1 for **rb bertomeu S.L.**

### 3- APPLICATION OF THE PROCEDURE

According to the **Deutz Maintenance Service**, 3 power plants, equipped with their engines, were chosen to carry out the Control and Approval Procedure detailed in Section 2.

At the end of the controls in all of them, during the second quarter of 1999, and after jointly analyzing the results obtained, which reflected a high efficacy against hot corrosion and against scale deposits, **Deutz Iberia** awarded **rb bertomeu S.L.** the approval letter of our additive "**rb bertomeu**" beco **F1/ASF** in December-1999.

The chosen plants were the following:

#### MINERA DE SANTA MARTA (Belorado – Burgos)

Equipped with 3 **Deutz BV 16M 640** engines, which were commissioned in early 1995. Total installed power: 18.75 MWhe

CONTROL START Date:	August - 1995
First date Engine revision carried out:	5-November-1995
Last date Engine revision carried out:	26-March-1999
Total time under control:	3 years and 4.5 months
Cumulative hours of operation at the end of the controls	
Engine No. 1:	31,716 H
Engine No. 2:	31,103 H
Engine No. 3:	32,038 H

#### UFEFYS (Aranjuez – Madrid)

Equipped with 2 **Deutz BV 16M 640** engines, which were commissioned in early 1996. Total installed power: 12.50 MWhe

CONTROL START Date:	April - 1996
First date Engine revision carried out:	27-May-1996
Last date Engine revision carried out:	21-May-1999
Total time under control:	3 years and 1 month
Cumulative hours of operation at the end of the controls	
Engine No. 1:	26,572 H
Engine No. 2:	25,721 H

**MINERIA Y TECNOLOGIA DE ARCILLAS** (Orera – Zaragoza)

Equipped with 2 **Deutz TBD 645 L9** engines, which were commissioned in April 1996. Total installed power: 7.00 MWhe

CONTROL START Date:	August - 1996
First date Engine revision carried out:	12-August-1996
Last date Engine revision carried out:	10-May-1999
Total time under control:	2 years and 9 months
Cumulative hours of operation at the end of the controls	
Engine No. 1:	20,900 H
Engine No. 2:	24,718 H

**Documentation related with the Application of the procedure**

- 1- [RB DOC-013E Historical study on the maintenance of the exhaust valves in the Deutz engines installed at the MINERA DE SANTA MARTA \(MSM\) power plant. Volumes 1, 2 and 3.](#)
- 2- [DOC-014E Historical study on the maintenance of the exhaust valves in the Deutz engines installed at the UFEFYS power plant. Volumes 1 and 2.](#)
- 3- [DOC-011E Photographic historical study on maintenance of the exhaust valves in the Deutz engines installed at the MINERIA Y TECNOLOGIA DE ARCILLAS \(MYTA\) power plant. Volumes 1 and 2.](#)

**4- DEUTZ-IBERIA HOMOLOGATION LETTER**

At [this link](#) you can find the homologation letter granted by Deutz – Iberia.