



**Reducing NOx, CO and dust emissions
on a 38 MW boiler firing heavy oil and natural gas
for SDCC (Sté de Distribution de Chaleur de Clichy), Group ELYO Ile-de-France, in Clichy
(F)**

By : Ph. Larzillière, Operations Manager
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SDCC Clichy (France)
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Mr. Larzillière says : "Our boiler house is fitted with 3 superheated steam boilers (15 bar, 235 ° C): Total power 87 MW, supplying a 20km heat network, the equivalent of 16000 homes.

SDCC entrusted Fives Pillard with the upgrading of boiler No. 2 to current standards - which is a 38 MW SEUM Riley Rx22mx type boiler.

The upgrading included not only the replacement of 4 dual fuel register burners by 4 dual fuel LONoxFLAM[®] Fives Pillard burners (heavy oil-natural gas), but also the supply of a BMS cabinet comprising an operator console, a Schneider TSX57 PLC meeting standards NFEN 61131-1,2,3, enabling, in addition to the "management" functions (sequences and safeties), to carry out a 'measuring type' combustion control."



Fig.1 : Boiler n°2 before upgrading



Fig.2 : Partial view of the boiler after upgrading

Mr. Fauvel, Operations Manager, adds : "The specific design of the dual fuel GRC LONoxFLAM burners has enabled them to be fitted in place of the old burners without having to enlarge the diameter of the existing boiler tube bends (see Figures 3 and 4), the only replacement has been the refractory part replacing the obsolete conical refractory quarl.

Because of this, our investment has of course been significantly reduced".



Fig.3 : Inside view of boiler n°2




Fig.4 : Inside view of boiler n°2

with the old burners

with GRC LONoxFLAM burners

"Furthermore, when putting back into operation, combustion optimisation, with heavy oil - natural gas, did not give any particular problem, emission values were below the guaranteed levels, as shown by the Apave report below :

| 07 507 107 01073 00 P-R01-Rév0 SDC Clichy | | Date des essais : 23, 24 et 25 janvier 2007 | |  | | | |
|---|--|--|------|---|------|-------|-----------------|
| 6) COMMENTAIRES | | | | | | | |
| Texte de référence : Garantie Pillard suivant devis 050534-7 en date 14 avril 2006. | | | | | | | |
| Fonctionnement au fioul lourd sans injection d'urée : (le 24/01/2007) | | | | | | | |
| Désignation | Unité | Charges | | | | | Valeur Garantie |
| | | 40 % | 50 % | 60 % | 75 % | 93 % | |
| NOx | mg/Nm ³ à 3 % d'O ₂ | 361 | 401 | 393 | 384 | 390 | 440 |
| CO | mg/Nm ³ à 3 % d'O ₂ | < 6 | < 6 | < 6 | < 6 | 52 | 100 |
| Poussières | mg/Nm ³ à 3 % d'O ₂ | 18.4 | 21.3 | 26.0 | 18.4 | 34.9 | 50 |
| Fonctionnement au gaz naturel : (le 23/01/2007) | | | | | | | |
| Désignation | Unité | Charges | | | | | Valeur Garantie |
| | | 40 % | 50 % | 60 % | 75 % | 100 % | |
| NOx | mg/Nm ³ à 3 % d'O ₂ | 69 | 70 | 75 | 79 | 88 | 100 |
| CO | mg/Nm ³ à 3 % d'O ₂ | < 7 | < 6 | < 6 | < 6 | 10 | 50 |
| Les teneurs en NOx et CO mesurées le 23 janvier 2007 sur la chaudière n°2 aux différentes charges en mode de fonctionnement gaz naturel respectent les valeurs garanties. | | | | | | | |
| Les teneurs en NOx, CO et poussières mesurées le 24 janvier 2007 sur la chaudière n°2 aux différentes charges en mode de fonctionnement fioul lourd sans injection d'urée respectent les valeurs garanties. | | | | | | | |

The combustion quality as well as the new measuring type control system has enabled a reduction in excess air. As a result, the efficiency measured with both fuels by Apave is very good, higher by 2 points compared to efficiency readings measured with the old burners. In addition, when oil firing, we notice a significant drop in the number of soot bags under the dust collector (50% less).

With regard to boiler operation, the GRC LONoxFLAM allows a very flexible operation because of the large modulation range, with a very low technical minimum. It also allows a linear and very gentle increase in boiler temperature. Brutal plateau levels and thermal shocks are a thing of the past. Load modulation is even more appreciated off-season, as it facilitates driving the steam network.

Finally, the use of these LONoxFLAM burners has not lengthened the flame and has not created any particular additional obligations.

In conclusion, we are very satisfied with our investment".

Ph. Larzillière
Operations Manager

R. Fauvel
Production Manager