OFG/102

PROCEDURE TO BE FOLLOWED WHEN COMBUSTION PROBLEMS ARE EXPERIENCED WITH APPLIANCES HAVING VAPORISING BURNERS

Registration Services

Cover Price £10 (ex.VAT and p&p)

(Please note this information sheet is available from the OFTEC website free of charge, www.oftec.org)

OIL FIRING TECHNICAL ASSOCIATION

OFG/102

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Very occasionally, problems are experienced with combustion in vaporising burners. It is often not apparent whether this is fuel or equipment related, and a systematic procedure needs to be followed in order to assess the factors included.

If the fuel is suspected of being contaminated, or not of a useable specification, it is important to see that the appliance is in a serviceable condition, and that certain critical points are checked out before any steps are taken to uplift the fuel supply.

Check that there is a sufficient supply of the correct type of oil available. Kerosene, from 1st August 2002, has Euro dye 124 added, resulting in a green/yellow colour. Gas oil will be orange in colour, and it will have a different odour and is more oily to the touch.

It is important to check that the correct fuel has been specified for the appliance burner type. The fuel should be ordered in the following manner:

'Please supply x litres of C2 kerosene to BS 2869 1998
suitable for my vaporising coiler/boiler/stove etc'

1. OIL SUPPLY AND STORAGE

- Are there other sites giving problems associated with this particular oil delivery?
- Is the fuel as ordered of the correct class for this appliance?
- Check that the oil is clean, by discharging oil from the feed pipe at the appliance end into a clear clean container. There should be no particle or water droplet contaminants.
- Does oil flow freely from the supply pipe?
- Is the oil supply tank at the correct height?
- Is the oil supply tank in good order, with the vent and fill ports correctly capped? On metal tanks, is the sludge cock clean running?
- Is there a clean 45 micron filter fitted at the tank and at the appliance end of the oil line?

2. APPLIANCES

(Reference should be made to the appliance Installation/Commissioning Instructions)

All of the following pointers should be to the requirements of the appliance instructions.

- Is the burner base casting level?
- Is the burner base chamber (well) cap seating properly?
- Are the shells (sleeves) sealing on the base casting without gaps?
- Is the oil depth in the burner base correct?
- Is the cold oil flow rate correct (cc/m)?
- Is the flue and flueway clear and free of obstruction?
- Is the float control valve level?

3. PERFORMANCE/RELIABILITY

The following are questions to answer before further steps are taken:

- **Sooting, in the form of soft soot, as opposed to hard carbon inside the base**

  Does it occur on a regular basis, and is it about the outside of the burner assembly? If so, it possibly indicates:

  (a) Insufficient ventilation

  (b) Excess fuel rate

  (c) Burner adjustment and settings incorrect

  (d) Fuel efficiency additive in the kerosene, check with suppler

  (e) Gas oil contamination from wet hose delivery

- **Oil feed pipe carboning internally, as hard carbon**

  Does this occur on a regular basis, and are all the above burner and appliance settings correct? If so, it possibly indicates:

  (f) Oil feed pipe from constant level control to burner made from copper, should be steel

  (g) Oil feed pipe diameter too large, modern appliances have reduced diameter

(h) Fuel specification outside suitable range for vaporising sleeve burners. However, is this an existing appliance, which has suddenly started the problem, or is it new and has shown the problem from the start?

(i) Gas oil contamination from wet hose delivery

(j) Last service, insufficient cleaning of burner oil feed pipe

- **Appliance conversion**

Has the appliance been converted from solid fuel? If so, then the burner settings must be obtained from the conversion kit supplier.

4. FURTHER ACTION

Discuss problem with fuel supplier.

PERFORMANCE CHECKLIST FOR FUEL SUPPLY PIPE BLOCKAGE TO BE USED IN CONJUNCTION WITH OFTEC GUIDELINE DOCUMENT OFG/102

1. Technician's details

Company ……

Address ……

……

Tel No. ……

Technician ……

2. Site details

Name ……..

Address ……..

……..

Tel No. ……..

Cooker make …… Type ……

Conversion kit ……..

3. History ……..

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……..

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4. Appliance check list

Burner base #

Burner base chamber (well) cap seating property #

Continue with the rest of Section 2 in OFG/102

5. Performance checklist

Type of blockage: Soft soot # **XC** Hard carbon #

Location of blockage: ……

Oil feed pipe: Correct material # Correct diameter #

Fuel rate of specification: #

Correct fuel: #

Additive type, if used in fuel: #

Date of appliance check ……..

Technician's signature ……..

OFTEC Registration No. ……..

Renewal date ……..

Registration Services

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FPS BRIEFING NOTE

A PROBLEM WITH VAPORISING BURNERS

PROBLEM The problem occurs with an appliance becoming unable to reach full temperature, even with an increased fuel supply, the flame turns yellow and sooty and the burner eventually fails to ignite at all. A much-increased frequency of servicing is required for the appliance and, at these services, severe coking is evident on the burner and its associated pipework, sometimes accompanied by coloured or gummy deposits. These symptoms are evident in both converted and purpose-built oil-fired appliances.

CAUSES Suggested causes for this problem include:

- Incorrect setting of the appliance controls;
- Water or water/oil emulsion from the storage tank;
- Contamination of kerosene with gas oil, or other long carbon chain material, [as little as one part of gas oil in 1,000 parts of kerosene can affect combustion in these burners];
- Out-of-specification fuel e.g. kerosene with a high 'char value';
- Copper-catalysed degradation, e.g. gum formation, in the fuel;
- Heat cracking of the fuel [extremely high temperatures can occur in and around this type of burner];
- Fuel additives, such as the Euromarker*.

* The EU carried out extensive combustion tests on the yellow dye prior to its acceptance as the European fiscal marker and it is present only in minute quantities. The carrier solvent for the Euromarker concentrate remains unchanged from that used previously when coumarin was the only fiscal marker for kerosene and the excellent solubility of the dye in kerosene precludes the possibility of its precipitation during fuel storage. The yellow deposits, sometimes reported on problem burners, cannot be derived from an organic dye at the temperatures prevailing in these burners.

REMEDIES Remedies that have been tried, *with varying degrees of success*, include:

- Careful readjustment of the appliance controls;
- Dewatering of the fuel and fuel supply system;
- Cleaning or replacing filters;
- Replacing the 'problem' fuel with fuel from a different source, or even from the same source as the original delivery [possibly thereby removing, or dispersing, water or other deposits in the tank];
- Adding 5 – 50% of premium kerosene [C1] directly to the fuel already in the tank [requires careful readjustment of the system controls];
- Replacing C2 entirely by C1 [not acceptable to the appliance manufacturers, this may cause other problems due to altered combustion characteristics];
- The use of commercial additives such as 'Topanol' [actually a long-term storage antioxidant];
- Replacement of copper components in the burner with iron ones or the addition of a copper inhibitor to the fuel;
- Shielding of the fuel inlet piping, e.g. with aluminium foil.

None of these remedies has been proven to have a scientific basis, or to work in all cases, and the char value of kerosene does not provide a sound basis for judgement of the suitability of a fuel for this type of burner [a determined char value of 16 has an identified error potential in the British Standard test method of +/-11, i.e. the true value lies between 5 and 27].

It should be noted that analysis of some uplifted fuels shows that there are cases where water or gas oil contamination is found, caused by poor housekeeping at the premises and/or by the fuel supplier. Wherever possible, distributors should try to identify those customers that have this type of burner and ensure that best practice is followed, particularly where a mixed fuel load is carried on the delivery.

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