Technical information

Rules of good practice for oil installations and boilers using fuel oil

JS-IT2690 **N° ITOE0229-en** **25/03/2020**

1. Oil storage tank

1.1. Tank certification - General

CAUTION : place the oil storage tank in a frost-free place.

France : As specified in the decree of July 1st, 2004, “Any tank […] must be designed and manufactured in accordance with a French standard or any other standard or technical specification of a Member State of the European Union or of Turkey… "

Other countries : the storage tank must comply in all aspects with the recommendations, standards and specifications in force in the country.

The oil storage tank must be certified by a CE or NF standard. It is the assurance of having an equipment that meets technical requirements and that guarantees your safety and that of your family.

1.2. Storage in non-underground tank

Outdoors or in a building, the storage of fuel oil in a non-underground tank must comply with strict installation regulations.

Outdoors

- Outside, your boiler oil storage tank must be opaque and must have a second jacket, or installed in a metallized or masonry retention basin.
- The capacity of this oil-tight bowl must at least be equal to the greater of the following values: 100% of the capacity of the largest tank, 50% of the total capacity of the tanks.
- It is prohibited to store flammable materials within one meter of the tank.
- All water, electricity and gas pipes must never pass under the installation. Only pipes necessary for the storage of fuel oil are tolerated.
- If the tank has a capacity greater than 15,000 liters, it must be surrounded by a 1.75 m high fence.

In a building

The rules are different if you choose to store your fuel oil in your house, on the ground floor or in the basement.

For a storage volume with a capacity of less than 2,500 liters :

- The tanks can be made of metal or plastic and be installed on a level and masonry floor.
- The presence of a retention basin or a secondary envelope is compulsory. If the latter is made of plastic, a fire resistance test must be validated.

- The room hosting your installations must be ventilated. To prevent any risk, the access door must be a quarter-hour flame arrester, and the walls and floors high and low, a half-hour fire barrier.
- The tanks must be located at least one meter from the electric generators.
- If the fuel storage is in the garage, it must be protected from any risk of shock.

For a storage volume with a capacity greater than 2,500 liters:

- A storage room is compulsory.
- The storage room must be well ventilated with an air supply (facing the outside) of at least 1 dm². The room must be equipped with a one hour flame door, opening to the outside, equipped with an automatic closing system and another allowing its opening towards the inside.
- High and low walls and floors must be two hours fire rated.
- No combustible material, other than fuel oil, should be stored in the room.

Storage in a pit

Storage of fuel oil in the pit can be carried out:
- outdoors,
- underground or
- at ground level;
- or indoors, at the deepest level of your accommodation (under the ground floor or the basement), with no other empty space under the pit than that reserved for sanitary facilities.

This type of storage involves:
- The installation of a **metal tank** and a **water and petroleum products tight pit**.
- The pit must constitute a reservoir with a **capacity at least equal to that of the tank** and must not be backfilled in order to be able to check for any potential leak.
- The access to the pit must also be covered with a non-combustible slab.
- As outdoors, no water, gas or electricity pipes must pass through or under the pit.
  Only water, gas or electricity pipes which are necessary for the operation of the tanks are authorized.

1.3. Storage in an underground tank

Fuel storage rules in case you have an underground (buried) tank :

- The tanks can be made of:
  - single wall steel with internal reinforcement
  - in plastics,
  - single-walled steel with concrete outer coating,
  - double wall steel,
  - or in plastics with glass reinforcement.
- To prevent the risk of corrosion, steel tanks must be protected and electrically insulated.
- As with the pit, the tank can be buried outdoors, or indoors, at the lowest level.
- Unless a sufficiently resistant slab or floor is installed, no vehicle passage or deposit of heavy loads is authorized above the underground installations.
- A distance of 0.5 m must be maintained between the walls of the tank and the property lines.
- A safety distance of 0.5 m must be observed, underground, for pipes that pass nearby.
- The tank must be **fixed to a concrete slab** to avoid any displacement linked to water or linked to shocks in particular.

2. Fuel oil storage

Caution : fuel oil can contain up to 7% biofuel. It can therefore degrade if stored for a long time. Fill the tank with the quantity corresponding to a heating season.

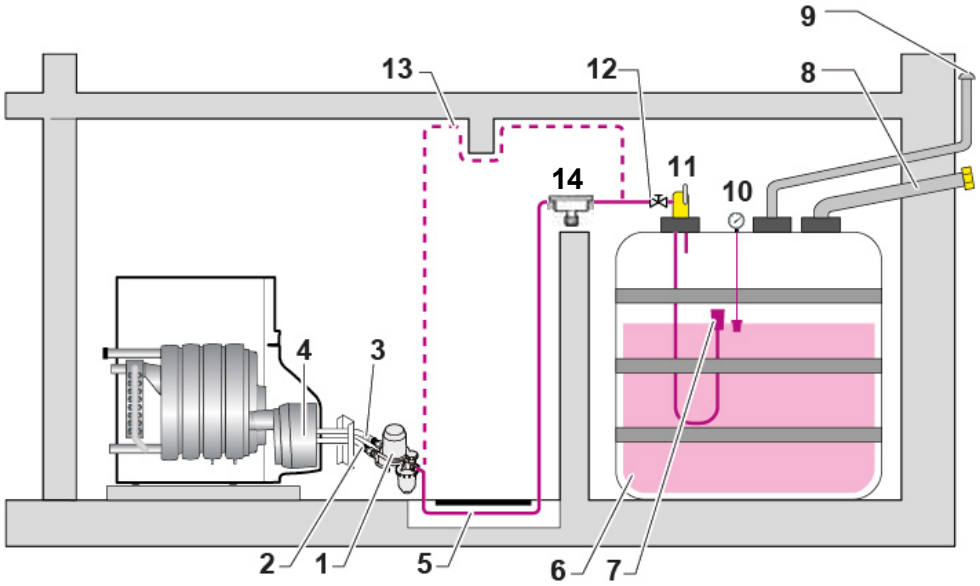
- Respect the regulations (decree of 07/01/2004) regarding new tanks
- In order to avoid premature deterioration, due to the photosensitivity of the fuel, translucent high-density polyethylene (HDPE) tanks must be placed away from UV rays.

3. Storage of non-road diesel

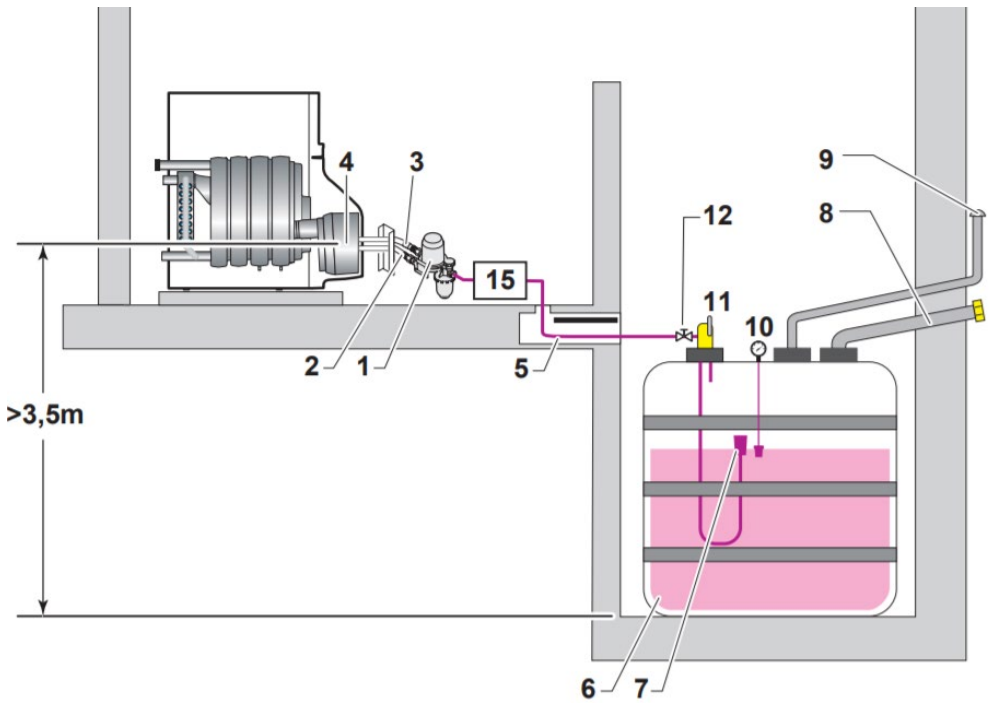
- Reduce storage volumes: It is recommended to limit the storage period of the product to 6 months.
- Consequently, in the event of a tank replacement for the use of non-road diesel, it is advisable to reduce the initial storage capacity.
- UV resistance: The stability of the product and in particular the resistance of non-road diesel to ultraviolet requires the same precautions for use as for domestic fuel oil.

4. Components of a fuel oil installation

4.1 Description of an installation



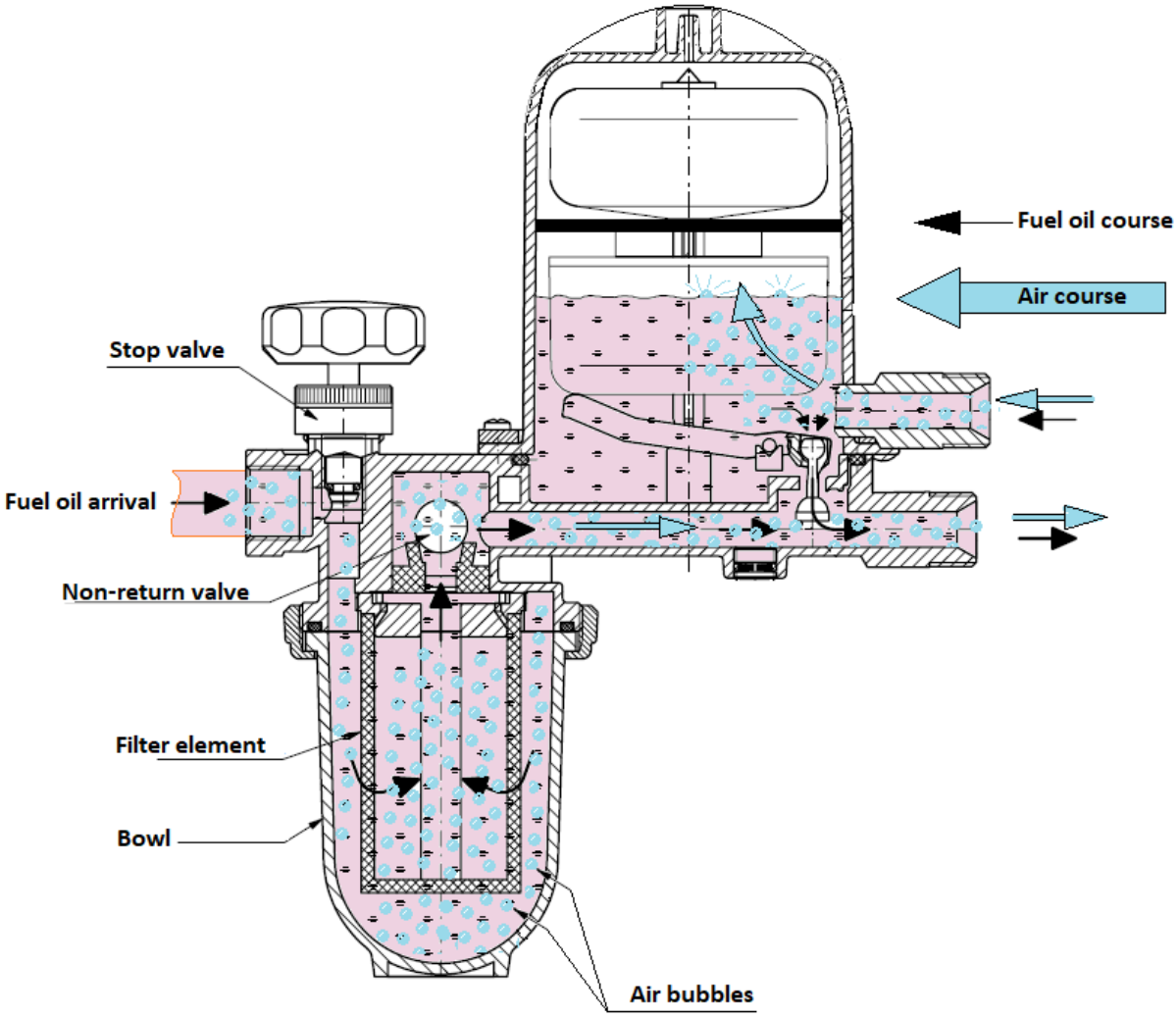
1 FloCoTop oil filter + deaerator + shut-off valve
2 Burner oil return pipe
3 Burner flexible oil supply pipe
4 Oil burner
5 Monotube fuel oil suction line between tank and filter, established from below, in gutter (recommended solution).
6 Oil tank : tank comprising: marks 7 to 12 below.
Caution: if the tank is located **more than 3.5 m below** the level of the oil burner pump, install an oil lifting station (see below).
7 Floating inlet filter (to favour especially when replacing a boiler)
8 Filling hose
9 Ventilation hose (vent)
10 Oil level gauge
11 Police valve
12 Stop valve
13 Avoid: piping established **from above**, on the ceiling (elbows are prohibited) - see item 5
14 Anti-siphoning system if the tank is located above the level of the oil burner pump.
15. Oil lifting station :
Install a lifting station if the tank is located **more than 3.5 m below** the level of the burner oil pump**.**
Note: the **vacuum** measured at the burner pump must not exceed **-0.35** bar (see chapter **7.4** hereafter).



4.2 Deaerator and oil filter

IMPORTANT: a deaerator and oil filter is unable to prevent air from getting to the nozzle.
- The deaerator and oil filter allows the evacuation of air that remains trapped in **the loop materialized by the hoses and the burner oil pump**.
- The air is collected in the upper part of the filter by separation of the excess of oil flow coming from the oil pump, transported by the back hose to the oil filter (section under pressure).
- The deaerator filter therefore recovers the air from the oil only after a first pass through the oil pump.
- Therefore, it is extremely important to guarantee a perfect seal of the oil supply line from the inlet filter to the oil pump, despite the presence of the deaerator.

IMPORTANT: Check the control points indicated in point 5. Hereafter, in case there are air bubbles, even small ones, visible in the deaerator oil filter.



5. Control points on the oil installation

- **In case of boiler replacement**

- Clean and inspect the entire oil suction system from the tank, to do so:
  - Remove the police valve + inlet filter + non-return valve system.
  - In case of doubt replace these components with new parts.
- Check the cleanliness of the oil filter and replace it if necessary.
- If the supply is in twin-tube, **transform it into monotube**, taking care to adapt the diameter (see reasons and dimensions in chapter **6.** hereafter)

- **On a new installation**

- Check the adequacy of the diameter of the oil supply tube (in monotube): chapter **6.** hereafter.

- **Installation compliance**

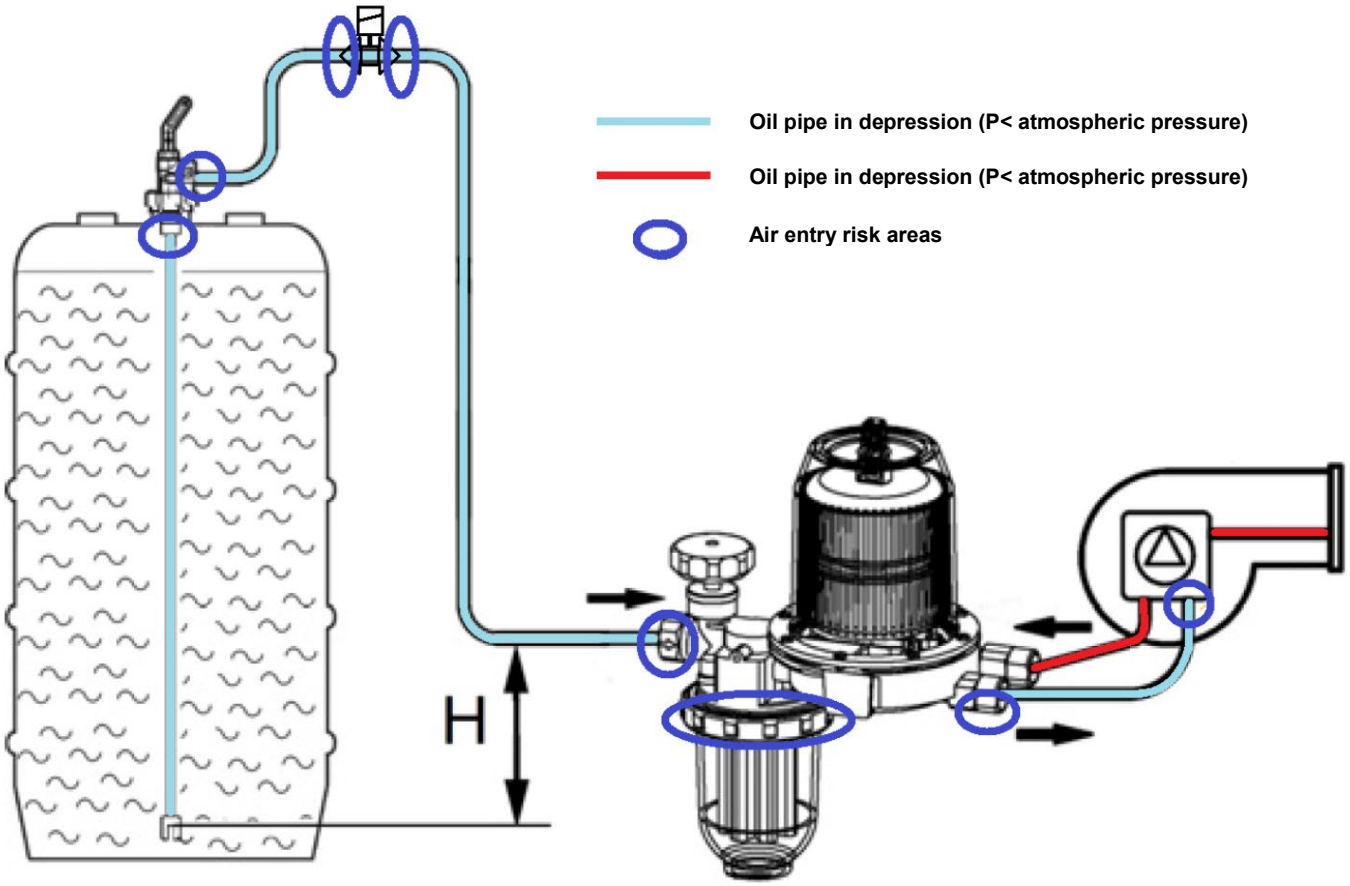
- Check the compliance of the installation with the regulations in force and the presence of all the safety devices: vent, police valve, retention tank, anti-siphonage system if tank located above the level of the burner pump): see chapter **4.** above.

- **Leak test**

Check the oil pipe for leaks over its entire length from the floating inlet filter to the burner pump.
To do so:
- Make sure that the police valve is in the closed position and that all the other cut-off devices are in the open position (solenoid valve or anti-siphonage device, filter stop valve).
- Carry out either a **pressure check** by applying an air pressure of 300 mbar (0.3 bar) using a hand pump and checking all risk points with a "thousand bubble" type leak indicator (see Schematic diagram of critical points).

- Or carry out a vacuum check using a hand-priming pump by applying a vacuum of 300 mbar (0.3bar) and observing after the temperature stabilization time* that the vacuum remains stable or does not drop more than 30 mbar (0.03bar).
  *Temperature stabilization time:
  - 10 minutes if the pipeline is overhead
  - 30 minutes 10 min if the pipeline is buried.

- **Schematic representation of the critical points of air intrusion in an oil supply circuit:**



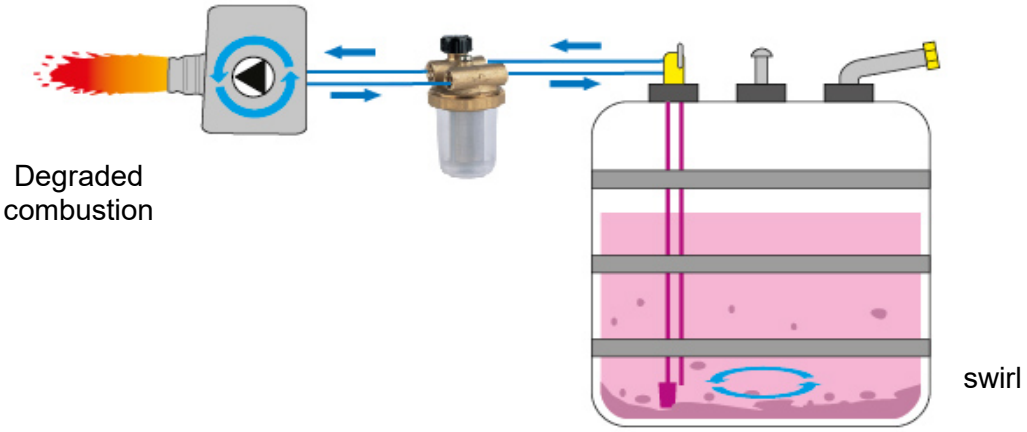
6. Connection of the oil piping

6.1 Connection between the tank and the oil filter :

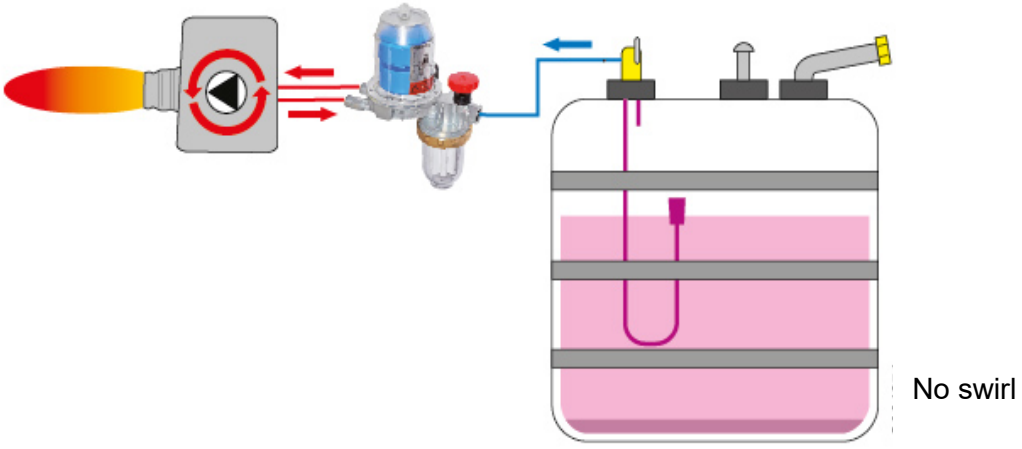
We recommend the monotube installation, for the following reasons:

- Reduces or eliminates the swirl caused by the stirring in the oil tank
- Allows the installation of smaller diameter pipes
- Allows you to heat the fuel that arrives at the nozzle which ensures better spraying therefore less fouling
- Allows to deaerate the fuel oil
- Improves the quality of fuel oil filtration

Cold fuel oil, bad spraying => FOULING



Heated oil, good spraying => NO FOULING



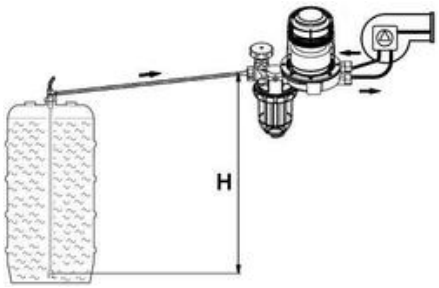
6.2 Diameter and length of the piping :

The diameter and the length of the piping depend on the position of the bottom of the tank with respect to the oil burner pump (static suction height).

- Either the bottom of the tank is located above the oil burner pump (operation under load),
- Either the bottom of the tank is located below the oil burner pump (full suction operation).
- The static suction height (H) can therefore be positive, zero or negative.
  The tables below indicate, for 3 common diameters of copper tubing, the lengths available according to the static suction height.

⚠ **It is essential to comply with the recommendations and instructions supplied with the "Flocotop" deaerator oil filter (or other supplier).**

Tank placed below the level of the oil burner pump:

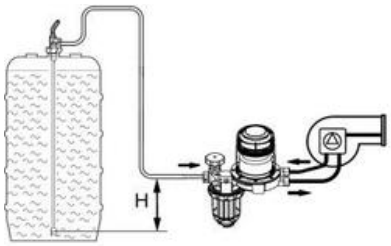


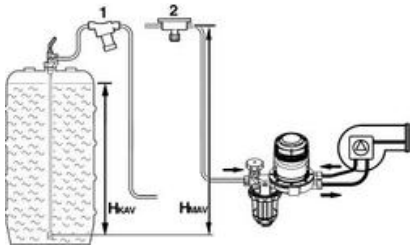
H = suction height

Dimensions to be respected (extract from the Flocotop filter manual):

Nozzle flow	Inside diameter of the tube	Maximum admissible length of the oil supply tube (m)					
		H=1,5 m	H=2 m	H=2,5 m	H=3 m	H=3,5 m	H=4 m
< 2,5 kg/h (3 l/h)	Ø 4 mm	32 m	26 m	19 m	13 m	7 m	1 m
	Ø 6 mm	>100 m	>100 m	>100 m	68 m	36 m	4 m
	Ø 8 mm	>100 m	>100 m	>100 m	>100 m	>100 m	14 m
< 5 kg/h (6 l/h)	Ø 4 mm	10 m	8 m	6 m	4 m	2 m	1 m
	Ø 6 mm	81 m	65 m	49 m	34 m	18 m	2 m
	Ø 8 mm	>100	>100 m	>100 m	>100 m	57 m	7 m

- **The tank is placed at a level higher than the level of the oil burner pump:**



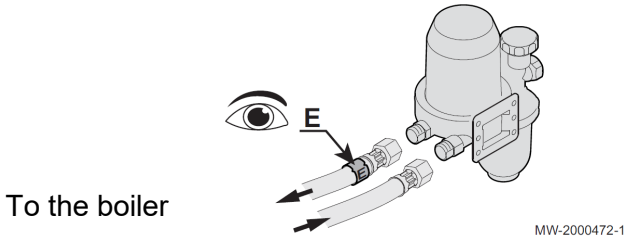


1 Piston type anti-siphon valve
2 Diaphragm type anti-siphon valve
H = hauteur d'aspiration
HKAV Relevant suction height with piston type anti-siphon valve KAV
HMAV Relevant suction height with diaphragm type anti-siphon valve MAV

Nozzle flow	Inside diameter of the tube	Maximum admissible length of the oil supply tube (m)					
		H=1,5 m	H=2 m	H=2,5 m	H=3 m	H=3,5 m	H=4 m
< 2,5 kg/h (3 l/h)	Ø 4 mm	32 m	26 m	19 m	13 m	7 m	1 m
< 5 kg/h (6 l/h)	Ø 4 mm	10 m	8 m	6 m	4 m	2 m	1 m

6.3 Connection between the oil filter and the burner

- The presence of a **deaerator oil filter is strongly recommended**, in order to quickly eliminate air bubbles and possible impurities.
- Do not reverse the hoses: **observe the inlet (with "E" marking) / outlet connections** on the oil filter.

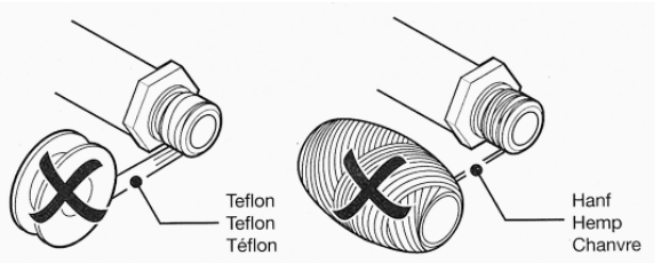


- **Check the tightness** of the hose connections at both ends, filter side and pump side**.**
- Check that the oil hoses are **not in contact with hot parts** (combustion chamber door, etc.).
- Check that the oil hoses are not **twisted** or **pinched**

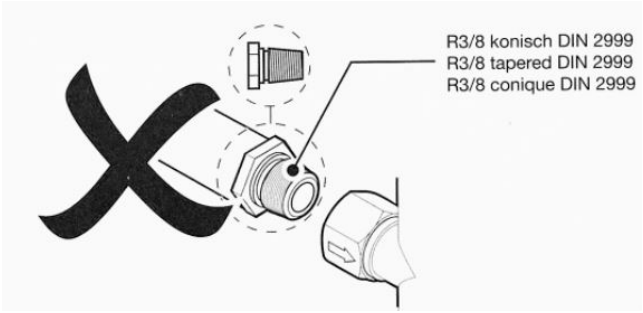
6.4 Connection between the oil filter and the oil tank

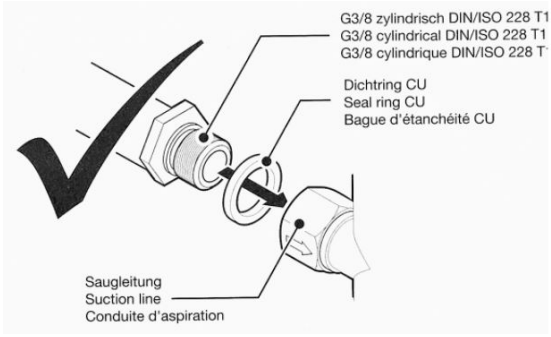
- **Check** the oil supply line from the oil filter to the tank, **for leaks**
- Check that all fittings are properly **tightened**.
- We recommend the use of sealing paste of **Loctite 577** type, except for the connection between the oil filter and te oil supply line (see below).

- The use of Teflon, even fuel oil compatible, or hemp is **prohibited** because their behavior is not long-lasting.



- **The seal between the oil filter and the oil supply line** (to the tank) must be ensured using a flat seal or an O-ring (an O-ring is delivered with the specific kit reference 7753997).
- Sealing via a conical connector is prohibited.

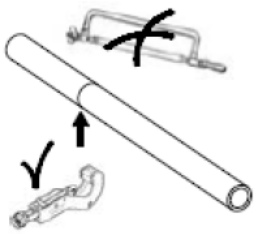




Note: To better guarantee this tightness, a specific **Connection Kit** will be delivered from June 2020 in the deaerator filter package MT11.
This kit will consist of an O-ring adapter on the filter side and an olive on the oil supply pipe side for 3 different copper tube diameters (outside / inside diam. 6/4 mm, 8/6 mm and 12/10 mm).

For Your Information: This specific connection kit will also be available at the Spare Part Centre under the reference **7753997** (availability: from June 2020).

1.



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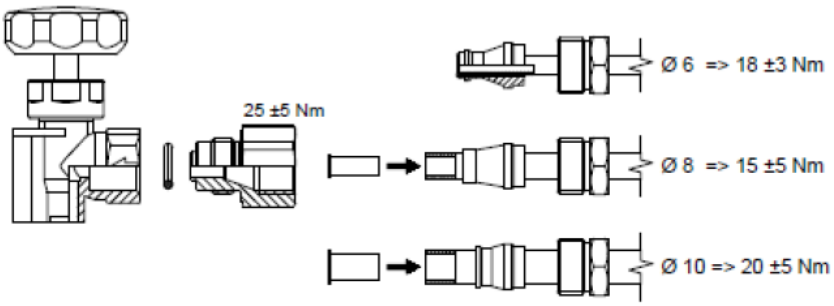


7. Commissioning

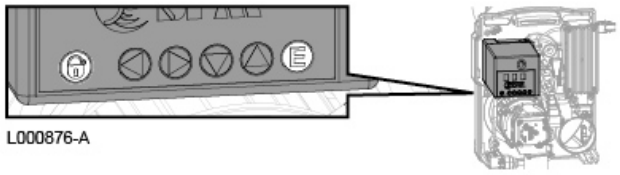
CAUTION: Perform the following procedures only after manually priming the supply line to the filter with an external priming pump.

7.1 Priming - in the case of a non-modulating burner

Before connecting the oil supply tube to the burner: use a priming pump to bring the oil from the tank to the burner,
IMPORTANT: Never use the burner to start the oil supply. The pump would run dry and may be damaged due to lack of lubrication.

7.2 Priming - in the case of a modulating burner

On modulating burners, it is essential to use the available "priming" function.
The procedure below describes priming using the burner's safety and control box functions.



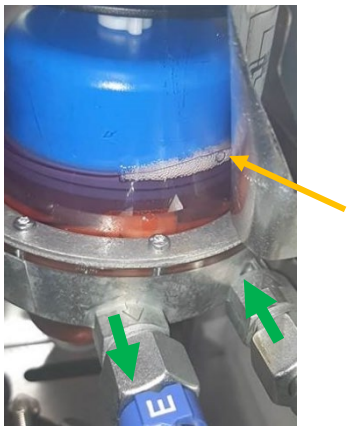
1. To prime the oil pumps, switch off the burner by holding down the ⓘ key on the burner control and safety box.
   ⇨ The E.0L parameter is displayed on the control and safety box.

   Important: Never prime the fuel oil by performing successive starts by resetting the control box: risk of damage to the oil pump.

2. Press and hold the key Ⓔ on the burner control and safety box to start the oil pump. Allow the pump to turn until the oil filter is filled.
3. Press the key ⓘ to reset the burner control and safety box.
4. Reset the error message by following the instruction displayed on the boiler control panel.

   Important :
   Check that the burner does not remain switched off.

7.3 Procedure for checking the presence of air in an oil installation



Air bubbles **=> air inlet** on the oil installation

- Turn off the burner for 10 to 15 min, so that any air pocket can form.
- Start the burner
- Monitor the entry of fuel oil into the filter via the return pipe
- This monitoring must last **at least 5 minutes**, the minimum time necessary for air to arrive.

Caution: on a new installation, filled via a priming pump or other, the air pocket can take a certain time to form: do not conclude too quickly that the installation is airtight following the initial absence of bubbles .
These may only appear after several hours of operation.

In the event of bubbles appearing: see **point 5** to remedy them and ensure sealing!

7.4 Vacuum measurement

Note: the level of fuel oil in the tank (at the time of measurement) influences the vacuum value at the rate of 0.1 bar for 1 m.
Also, a high tank level will reduce the vacuum and a lower tank level will increase it.

The maximum authorized depression value is 0.35 bar (Vacuum = -0.35 bar)
Example: a value of **-0.4 bar** is not acceptable.

Too much depression may be due to:
- The police valve closed or blocked
- The closed or blocked non-return valve
- Floating inlet filter or suction line blocked or stuck.
- A too small pipe diameter compared to the length and compared to the oil flow (see chapter 6.2)
- Tank located too low (<3,5 m) in relation to the burner oil pump (install a lifting station, see chapter 4.1).

Pay particular attention to correctly interpret the vacuum measurement:
- a **low value** can be normal in the event of a short length of pipes or in the event of a long length with a tank in height;
- but a **low value** can also suggest that the line is **leaking** in other cases

Example:
- Tank below **-3m** (we refer to the oil level in the tank at the time of measurement) below the level of the oil burner pump
- and dynamic pressure drop of the power supply equivalent to 0.2 bar
- This is equivalent to a theoretical vacuum of (-0.3) + (-0.2) bar = - 0.5 bar
- If the vacuum measured is lower than this value, for example -0.3 bar: this indicates that there is an air inlet in the oil supply circuit, it must therefore be remedied.