



## The European Approach to Gas Station Drainage

**Jaime Thompson describes the problems with forecourt drainage in often-rainy Europe. He illustrates how the "light liquid separator" is used in England to reduce the release of contaminants into ground water.**

A Draining Experience



I recall first visiting California in the 1980s to experience first hand the developments being made in gas station technology.

I marveled at the designs being produced by industry to respond to the challenges from regulators to ensure that California gas stations were environmentally secure—designs for secondary containment, leak detection and vapor recovery.

There was, however, something different about those stations from those in Europe. The California gas stations had no drainage systems to ensure that the rainwater runoff and spillage during refueling or delivery was contained on the site. When I enquired why this was the case, I was greeted with a shrug and informed that, like the song says, "it never rains in California."

### Continental divide

In Europe it does rain! An important part of the design of European gas stations is the drainage system. It covers both the refueling area and the tank truck unloading area, and is treated just as importantly as the tank and pipe work installation. In addition to handling environmental problems, a good drainage system also prevents gas from leaving the site and heading for sewer lines that (certainly in London) are large enough to drive a bus through and in which people work!

The petroleum interceptor, now more correctly referred to as the light liquid separator, has been in use in London since the late 1890s. Originally constructed in brickwork on a concrete base, the separator consists of three large brick chambers of three feet square and at least three feet deep. Each chamber has an inverted, six-inch diameter pipe going into the chamber. The drainage from the site passes through, and the oil or gas separates from the water. The water stays in the chambers, as the next chamber fills up with the gas/oil. The drainage then goes into the next chamber.

These systems hold about 600 gallons of product. There were thousands of such installations in the

UK; but they do not tend to perform at times of high rainfall when, quite often, the whole contents are flushed out.

Designs were gradually improved, and in 1988 work was started on a European standard for light liquid separators. This was certainly an enlightening experience—trying to get European countries to adopt a common standard on this separator—when they all approached this idea quite differently. If I inform you that when I attended the first meeting in Berlin, the Wall was still up, and we are just now concluding the work, you will understand the length of time it has taken.



### **Approved European Standard for Light Liquid Separator**

#### **Going with the flow**

Research has shown that pollutants need some time to efficiently separate from the water; this time is known as the retention time. The design of the tank must ensure that there is enough time even in high flow situations for the petroleum to separate.

This flow rate is the volume of liters per second that the separator deals with. It is also known as the nominal size (NS) of the separator. Therefore, a separator of NS 15 will efficiently separate oil from water while there are 15 liters per second of flow going through the system. This is typically the size of separators used on gas stations in the UK, and the 15 liters per second also refers to worst storms with a high rain fall.

To ensure that the separator is designed correctly, each design is tested according to a particular European standard (pr. EN 858-1). Here, a third-party test house checks the separator to ensure that, at the designated flow rate, it will operate efficiently. This is done by passing a fixed amount of oil at the maximum flow rate into the separator and measuring the effluent to ensure that the system works.

Under test conditions the separator is proven to operate within one of two classes:

- 1.** Class 1, which will discharge at no greater than 5 ppm; and
- 2.** Class 2, which will discharge at no greater than 100 ppm.

Other design criteria included in the standard are:

- the collection and capacity of silt in the separator;
- the volume of light liquid that can be stored without discharge;
- an automatic closure device to ensure gasoline does not leave the separator; and
- an automatic warning device to ensure the site owner knows the separator needs cleaning.

#### **Precautions**

Designs that operate to class 1 usually have a coalescing filter. This filter encourages extra separation of small globules of oil and enables these globules to discharge into controlled waters. The class 2

designs are normally used when the discharge goes into water that is to be treated (e.g. sewage treatment).

The float valve that prevents oil from discharging from the separator works on the specific gravity of the gas. This valve, therefore, floats at the oil/water interface. As the separator fills with oil, the float lowers; and as the float approaches capacity, it will seal the outlet from the separator. In the UK we normally require the light liquid capacity of a separator to be 7,600 liters. This covers accidental discharge during a delivery.

Jamie Thompson joined the London County Council in 1961 and trained as a Petroleum Inspector and ended up as Principal Petroleum Inspector for the London Fire Brigade the largest petroleum authority in Europe. He has specialised in petroleum standards, construction, legal enforcement, equipment approval and new design of Petrol Filling Stations for well over 40 years. He is currently chairman of European Standards committee (CEN TC 393) dealing with equipment for service stations, which has produced 23 European standards relating to filling stations. He also chairs CEN TC 265 WG8 on underground and above ground storage tanks, and sits as a European contributor to the Underwriter Laboratory standards for fuel tanks and fuel lines in the USA. He was Editor of the APEA Technical Journal "The Bulletin" for 23 years and as Chairman of the technical committee of the APEA he is involved in the publication of the APEA/EI Guidance on design and construction of filling stations known as the Blue Book.