Technical white paper

Automatic warning devices for light liquid separators

Recommendations for the Installation and Operation of Light Liquid Separators

This White Paper presents European directives and standards concerning mounting, installation and operation of light liquid separators. It quotes and explains the relevant regulations and summarizes how these regulations can be put into practice.

Using practical examples, installation, supervision and operation of light liquid separators are explained.

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Automatic warning devices for light liquid separators

Water is the very basis of life and a valuable resource that must be protected from pollution. Therefore, the protection of the ground water and the sewage system from mineral oil pollution is crucial.

In filling stations, car repair shops and in industrial applications, light liquid separators prevent the discharge of hazardous substances into the environment and consequently the pollution of the water cycle.

Labkotec Oy is a leading Finnish manufacturer and supplier of electronic level gauges, flow detection devices and alarms, automation and detector technology, and web-based data transmission solutions.

Labkotec has over 50 years of experience of the industry, and has pioneered several new solutions. Our diverse and comprehensive expertise enables us to supply solutions tailored to each customer’s needs.

Labkotec Oy is a member of the international Indutrade Group.

Today, Labkotec produces a broad portfolio of warning devices and sensors for light liquid separators.

Contents

1 Administrative background ........................................................................................................................................ 3
2 Standards and directives ........................................................................................................................................... 3
  2.1 Standard and Comment on the standard ........................................................................................................... 3
  2.2 Responsibility, as defined by the standard ........................................................................................................ 4
3 General alarm equipment ......................................................................................................................................... 4
4 Potential risks of installation ................................................................................................................................... 5
  4.1 Height differences: The drain cover is situated higher than the top edge of the light liquid separator ................................................................. 5
  4.2 Height differences: The drain cover is situated lower than the top edge ............................................................. 5
5 Risks during operation ................................................................................................................................................. 5
  5.1 Reaching the maximum oil layer thickness ....................................................................................................... 5
  5.2 Contaminated coalescing element ..................................................................................................................... 6
  5.3 Leakage ............................................................................................................................................................ 6
  5.4 The sludge layer has reached its maximum ..................................................................................................... 6
6 Automatic closure device .......................................................................................................................................... 7
7 Summary .................................................................................................................................................................... 7
1 Administrative background

For many years, the European construction industry was characterized by regional differences which caused substantial barriers to trade. Even in 1985, the Council of the European Union published a white paper which had the aim of removing these barriers with the establishment of common regulations accepted all over Europe, and therefore creating a single market for construction products.

A few years later, the Council's Construction Products Directive 89/106/EEC (CPD) of December 21, 1988 followed with the same goal of harmonizing legal and administrative regulations of the member states.


For the purposes of this directive, construction product means construction materials, components and systems that are produced for incorporation in a permanent manner in the construction of buildings and civil engineering works. Construction products include prefabricated installations produced from construction materials or components that are fixed to the ground, such as prefabricated buildings, prefabricated garages and silos. Building equipment products are also included.

2 Standards and directives

Light liquid separators are construction products for the purpose of the above-mentioned Directive 89/106/EEC. For these systems, the relevant standard is EN 858-1: 2002 Separator systems for light liquids (e.g. oil and petrol). This was modified by A1:2004.

Annex ZA of this standard details the conditions that must be fulfilled in order that a light liquid separator can receive a CE mark.

The standard covers Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

While drawing up the standard, it transpired that there is always a potentially high risk for leakage, overflow or exceeding the maximum layer thickness, even if a high quality light liquid separator is used.

Furthermore, the EN 858-1 specifically requires that an automatic monitoring system, i.e. an alarm system, be installed in light liquid separators.

2.1 Standard and Comment on the standard

3 Terms and definitions

3.12 Automatic warning device

Device to warn of excessive depth of light liquid or waste water or low level condition.

Definition of an automatic unit or alarm system that monitors and warns of:
- exceeding a specified oil layer thickness, or
- exceeding the overall liquid level, or
- falling below the liquid level.

6.5 Functional requirements

6.5.4 Automatic warning devices and additional devices

Separator systems shall be provided with automatic warning devices.

NOTE Local authorities may allow the use of separators without automatic warning devices.

A light liquid separator must be equipped with an alarm system.

In the note, it is indicated that local authorities may allow the use of light liquid separators without alarm systems. However, it is important to note that a certificate from the approval-issuing authority must be available, which clearly documents the exemption from installing an alarm system in the light liquid separator with CE marking.
6.6 Marking

6.6.2 Automatic warning devices
Warning devices shall be marked to indicate that they have been approved for use in hazardous areas.

Because an explosive atmosphere exists in light liquid separators continually for long periods or frequently, the area of the plant is classified as Zone 0.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of EU Construction Products Directive

The Clauses of this European Standard shown in this Annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

This Annex establishes the conditions for CE marking of separator systems for light liquids intended for the use indicated in the relevant Clauses applicable (see Table ZA.1).

Essential Characteristics Requirement Clauses in this Standard

Effectiveness 4, 6.3.1, 6.3.3 to 6.3.8, 6.5

All requirements of clause 6.5 (Functional requirements) and clause 6.5.4. (Alarm system) must be fulfilled in order that a light liquid separator can receive a CE mark.

3 General alarm equipment

Although the standard stipulates that an alarm system must be installed which monitors oil layer thickness, and that the liquid level should not exceed or fall below a specified value, it does not describe all the requirements of an alarm system.

However, there are certain aspects to be taken into consideration:

- The alarm must warn the person responsible for the light liquid separator audibly, visually or in some other way.
- The person or persons who are warned must know what needs to be done.
- An alarm system must be installed in a way that its correct function can be verified. Alternatively, permanent monitoring of the individual installation can be ensured via a central monitoring unit.

However, alarm equipment can never replace monitoring by a person. It provides additional reliability in monitoring the processes in a light liquid separator, which is active around the clock and seven days a week.

On the other hand, repeated, daily, weekly or monthly checks do not replace continual monitoring via an alarm system.

The frequency of checks by authorized persons depends on the requirements of the relevant authorities. The alarm equipment itself must be checked at least every six months.

2.2 Responsibility, as defined by the standard

Responsibility for equipping a light liquid separator with an alarm system which fulfils the requirements is that of the manufacturer.

It should be noted, however, that in a number of countries the company that installs the system and the building owner/consultant can also be held responsible for non-compliance with CE marking of a light liquid separator.
4 Potential risks of installation

4.1 Height differences: The drain cover is situated higher than the top edge of the light liquid separator

The drain of the light liquid separator is blocked. The cause may be the automatic closure device, or there may be a backlog from other parts of the drain installation.

The consequences can be serious, as the collected oil or petrol products flow upwards out of the light liquid separator and come into contact with the ground, where they can ultimately penetrate rainwater pipes, for example.

In this case, an alarm system warns of too high a liquid level. An opportunity to intervene is provided, significantly reducing the danger of contamination.

4.2 Height differences: The drain cover is situated lower than the top edge

The drain of the light liquid separator is blocked. The cause may be the automatic closure device, or there may be a backlog from the rest of the drainage installation.

The consequences can be very serious. As drainage is not possible, sooner or later overflowing around the drain cover will occur, where rain water may mix with oil products and can flow through the ground into the ground water, rainwater pipes or into the cellars of houses.

An alarm system sends a warning in the case of a high liquid level, so an opportunity to intervene is provided and the probability of contamination is greatly reduced.

5 Risks during operation

5.1 Reaching the maximum oil layer thickness

Every light liquid separator has a design-dependent maximum sump capacity for oil products. If this volume is exceeded, the oil products are channelled to the sewerage system, whereby the system is de facto out of operation.
The alarm system (oil layer sensor) must therefore be installed at the correct height so that an alarm can be sent in time. National laws of certain countries regulate at which percentage of the sump capacity the alarm must be sent.

5.2 Contaminated coalescing element

A class 1 light liquid separator normally has a coalescing element. This element converts small drops of oil (emulsion) into larger drops which can be separated more easily. However, the coalescing element often functions as a contamination filter. A contaminated element has a lower liquid permeability so the liquid accumulates upstream of the coalescing element. This means there is a high risk that the collected oil/petrol products escape via the filter and the oil and petrol enter the sewerage system directly.

Here also, an alarm system sends a warning in the case of a high fluid level, so an opportunity to intervene is provided and the probability of contamination is greatly reduced.

5.3 Leakage

Experience shows that old light liquid separators can leak with age. For this reason, leak testing at certain intervals is obligatory in some countries. However in others, it is not. Newer systems typically have a monolithic construction which reduces the risk of leakage. However, there are examples where light liquid separators, including newer ones, are damaged in transport, installed incorrectly, or there are deficiencies in the foundations. This can lead to the separator leaking and contaminated drain water escaping and contaminating the ground water.

The sludge trap should also be checked regularly. However, this is not explicitly explained in EN858-1. If the sludge trap is not emptied in time, the flow rate in the sludge trap increases so that the sludge may be channeled into the light liquid separator. This can impair the oil separation which damages the coalescing element or even destroys the whole light liquid separator.

By means of a sludge level alarm, the sludge level is monitored continuously and the separator can be emptied if required.
6 Automatic closure device

The automatic closure device was the first safety device for light liquid separators. This is calibrated so that it floats in water but sinks in oil products.

Automatic closure devices can be calibrated in order that they close depending on the density of the oil products. Various designs are available. Typically, a piston with a float is connected via a rod to a stop device in a valve seat.

An automatic closure device should block the drain. As soon as a certain oil layer thickness is reached, no more liquid is directed to the sewerage system.

![Figure 7: Automatic closure device in positions open and closed](image)

A float stop is required as an alarm system in order that the light liquid separator can receive a CE mark.

An automatic closure device alone cannot safeguard a separator. The collected oil is not channelled to the sewerage system, but elsewhere. However, this does not resolve the problem of disposal.

But what if it is discovered that the drain of a separator system is not working? An automatic closure device is only effective if a backlog alarm is installed.

One version of the automatic closure device is an inflow blocker, which blocks inflow to the light liquid separator via various rods and mechanisms. However, its installation is not without expense, and it does not replace a continuous monitoring by an alarm system.

7 Summary

Light liquid separators fall within the scope of the Construction Products Directive. A harmonized EN standard (EN 858-1) exists, which specifies the construction, design, etc. of such a system.

The storage and handling of mineral oil products always present a potential source of danger, as the products are explosive and there is always a considerable risk of contamination.

As a conclusion to the above, it can be ascertained that it should be a clear requirement to install an alarm system in a light liquid separator from both the point of view of the standard as well as CE marking.
Labkotec Oy reserves the rights to alterations without prior notice. Due to policy of continuous improvement in R&D, technical specifications may change. Installation shall always be made as documented in manufacturer’s instructions.