ACO Q-Ceptor
Bypass and full retention oil separators

Synergy
WASTEWATER TREATMENT PRODUCTS
ACO
ACO Q-Ceptor bypass oil separators

ACO Q-Ceptor bypass oil separators fully treat all flows caused by rainfall up to 6.5mm per hour which includes the vast majority of rainfall events in the UK.

In this scenario it is deemed acceptable not to treat the full flow, and where the worst pollutants will be carried off by the initial flow, for example car parks, roadways and some commercial areas.

Once 10% of the peak flow rate is exceeded, the flow bypasses the separation chamber and discharges directly into the drainage system.

<table>
<thead>
<tr>
<th>Nominal size bypass (NSB)</th>
<th>Area drained (m²)</th>
<th>Treated flow (l/s)</th>
<th>Peak flow (l/s)</th>
<th>Performance Class</th>
<th>Oil storage capacity (litres)</th>
<th>Silt storage capacity (litres)</th>
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<tr>
<td>5560*</td>
<td></td>
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<td>30 - 100</td>
<td>1 &amp; 2</td>
<td>45 - 150</td>
<td>300 - 1000</td>
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</table>

*NSB 10
ACO Q-Ceptor bypass oil separators – Design principles

ACO Q-Ceptor bypass oil separators are designed to treat 10% of the peak flow into the unit. This 10% is known as the treated flow. Flows in excess of this 10% are allowed to bypass the treatment chamber.

Runoff entering the unit is retained within the treatment chamber for sufficient time to allow the oil carried in it to float to the top and for any silt in the water to settle to the bottom of the tank. The clean water remaining below the layer of floating oil discharges through the outlet.

The ACO Q-Ceptor bypass separator is designed with a bypass chamber around the top of the unit that permits flows in excess of the treated flow to bypass the treatment chamber.

Bypass units are permitted in locations where the risk of pollution is low, and in particular where the risk of a large volume of pollution is low. The reasoning behind this is that most rainfall in the UK is at an intensity of 0.0018 l/s.m² or less, and all runoff from this light rain will pass through the treatment chamber.

In heavier rain, most of the pollution will be carried by the initial first flush of runoff, which will all be treated. As a result of this any pollution in the bypass flow at the peak of the storm will have been massively diluted.

ACO’s design of bypass chamber ensures that no bypass will occur before the designed treated flow is reached. Thereafter, the treated flow will continue to pass through the unit, with excess flow (of up to 9 times the treated flow rate) allowed to bypass the treatment chamber.

ACO Q-Ceptor bypass oil separators are available to BS EN 858-1:2002 Class 1 or Class 2. When Class 1 effluent (better than 5 mg/l) is required, a coalescing filter is fitted to the unit. Without the coalescing filter the separators operate to Class 2 and achieve a treatment standard of better than 100 mg/l.

Maintenance

Regular maintenance is essential to ensure that a separator continues to operate to its full design capability throughout its working life. This maintenance includes monitoring the oil and silt levels, and removing any accumulated waste. Alarm systems are fitted to carry out this monitoring on a continuous basis. BS EN 858-2:2003 requires that a physical inspection must take place at intervals of no more than 6 months. The standard also requires that every five years the separator must be emptied and given a general inspection to test the integrity and performance of the system. The separator must be refilled with clean water following such an inspection.
ACO Q-Ceptor bypass oil separators

How to choose the correct size

ACO Q-Ceptor bypass separators should be sized in accordance with the guidance in PPG3.

The appropriate size of separator is calculated by applying a standard formula to the area to be treated. The precise formula depends on whether a full retention or bypass separator is to be used. In all cases the area to be drained is referred to as A.

The Nominal Size (NS) is the flow rate, in litres per second, which can be treated by the unit to the specified standard, Class 1 or Class 2. Bypass separators are referred to as NSB (Nominal Size Bypass).

Design Example 1: Sizing a bypass separator

Assume you have a car park of 3,000m². This is area A.

The nominal size of a bypass separator for a catchment of area A (m²) is obtained using the following formula:

$$NSB = 0.0018 \times A$$

Applying this formula to the car park of 3000m² gives a result of 5.4. Therefore this car park would require a bypass separator of size NSB6.

**Bypass separator chambers**

<table>
<thead>
<tr>
<th>Product Code A</th>
<th>Product Code B</th>
<th>Nominal Size</th>
<th>Treated Flow (l/s)</th>
<th>Peak Flow (l/s)</th>
<th>Performance Class</th>
<th>Area Drained m²</th>
<th>Oil Storage Capacity (litres)</th>
<th>Silt Storage Capacity (litres)</th>
<th>Length Overall (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Inlet Height (mm)</th>
<th>Outlet Height (mm)</th>
<th>Pipe Internal Diameter* (mm)</th>
<th>Weight (kg)</th>
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<td>2100</td>
<td>1587</td>
<td>1437</td>
<td>375</td>
<td>125</td>
</tr>
</tbody>
</table>

*For optimum performance of each separator the pipe diameter stated in the chart must be used. Using pipe diameters less than those stated will reduce the efficiency of the separator. Stated pipe diameters must not be exceeded. Pipe internal diameters in the chart refer to fluswallow or clay pipe work.

*These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.*
# ACO Q-Ceptor bypass oil separators

## Cover and frame

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Length (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34625</td>
<td>Ductile iron solid cover and frame D 400</td>
<td>-</td>
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</table>

![Cover and frame diagram]

## Extension shaft

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Internal Diameter (mm)</th>
<th>Length (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Extension shaft</td>
<td>Ø716</td>
<td>-</td>
<td>Ø865</td>
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<td>19.1</td>
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</table>

![Extension shaft diagram]

## Ancillaries

<table>
<thead>
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<th>Description</th>
<th>Length (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>700745</td>
<td>Coalescing filter for NSB3</td>
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<td>660</td>
<td>1.2</td>
</tr>
<tr>
<td>700748</td>
<td>Coalescing filter for NSB6, 8 &amp; 10</td>
<td>-</td>
<td>Ø360</td>
<td>790</td>
<td>3.6</td>
</tr>
<tr>
<td>418094</td>
<td>Sampling pump with 4m hose</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
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</tbody>
</table>

![Coalescing filter and sampling pump diagrams]

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.
ACO Q-Ceptor full retention oil separators treat the complete flow caused by rainfall up to 65mm per hour and where there is a high risk of contamination.

These separators hold the contaminated water for a period long enough to ensure that the lighter contaminates separate from the water and rise above it within the separation chamber. Micro particles are collected and combine on the coalescing filter until they are large enough to float free by themselves.

Full retention separators are used for example in vehicle maintenance and refuelling areas or scrapyards.

### Specifications

<table>
<thead>
<tr>
<th>Nominal size (NS)</th>
<th>Area drained (m²)</th>
<th>Peak flow (l/s)</th>
<th>Performance class</th>
<th>Oil storage capacity (litres)</th>
<th>Silt storage capacity (litres)</th>
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</thead>
<tbody>
<tr>
<td>3-6</td>
<td>555</td>
<td>3-10</td>
<td>1 &amp; 2</td>
<td>30-100</td>
<td>300-1000</td>
</tr>
</tbody>
</table>
ACO Q-Ceptor full retention oil separator – Design principles

ACO Q-Ceptor full retention oil separators treat all flows to the required effluent standard, up to the designed flow rate of the unit. Thereafter, in extreme rainfall events and at flow rates in excess of the design flow, the runoff will still flow into the treatment chamber until the maximum hydraulic capacity of the unit is reached.

Runoff entering the unit is retained within the treatment chamber for sufficient time to allow the oil carried in it to float to the top and for any silt in the water to settle to the bottom of the tank.

ACO Q-Ceptor full retention oil separators are available to BS EN 858-1:2002 Class 1 or Class 2. When Class 1 effluent (better than 5 mg/l) is required, a coalescing filter is fitted to the unit. This filter allows very small drops of oil that are too small to float upwards independently to coalesce into drops which are large enough to float up into the retained oil. Without the coalescing filter the separators operate to Class 2 and achieve a treatment standard of better than 100 mg/l.

ACO full retention separators are fitted with an Automatic Closure Device (ACD). This is a float which is weighted so that it floats in water but not in oil. The ACD ensures that if there is a large pollution event that fills the oil capacity of the separator (or if the unit is not being regularly maintained and the oil level builds up) then the outlet of the unit is closed and the oil retained in the unit cannot be washed out into the outflow system.

Maintenance

Regular maintenance is essential to ensure that a separator continues to operate to its full design capability throughout its working life. This maintenance includes monitoring the oil and silt levels, and removing any accumulated waste. Alarm systems are fitted to carry out this monitoring on a continuous basis. BS EN 858-2:2003 requires that a physical inspection must take place at intervals of no more than 6 months. The standard also requires that every five years the separator must be emptied and given a general inspection to test the integrity and performance of the system. The separator must be refilled with clean water following such an inspection.
ACO Q-Ceptor full retention oil separators

How to choose the correct size

ACO Q-Ceptor full retention separators should be sized in accordance with the guidance in PPG3.

The appropriate size of separator is calculated by applying a standard formula to the area to be treated. The precise formula depends on whether a full retention or bypass separator is to be used. In all cases the area to be drained is referred to as A.

The Nominal Size (NS) is the flow rate, in litres per second, which can be treated by the unit to the specified standard, Class 1 or Class 2. Full retention separators are referred to as NS (Nominal Size).

**Design Example 2:**
Sizing a full retention separator
Assume you have an HGV yard of 500m².
This is area A.
The nominal size of a full retention separator for a catchment of area A (m²) is obtained using the following formula:

\[ NS = 0.018 \times A \]

Applying this formula to the HGV yard of 500m² gives a result of 9. Therefore this yard would require a full retention separator of size NS10.

ACO Q-Ceptor full retention separators are available as Class 1 or Class 2 performance types. They are also available with or without a sampling pump pre-fitted to the units.

Part numbers for chambers without a sampling pump can be found in column A.

Part numbers for chambers with a sampling pump pre-fitted can be found in column B.

---

<table>
<thead>
<tr>
<th>Product Code A</th>
<th>Product Code B</th>
<th>Nominal Size</th>
<th>Peak Flow (l/s)</th>
<th>Performance Class</th>
<th>Area Drained (m²)</th>
<th>Oil Storage Capacity (litres)</th>
<th>Silk Storage Capacity (litres)</th>
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<th>Width Overall (mm)</th>
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<th>Outlet Height (mm)</th>
<th>Pipe Diameter (mm)</th>
<th>Weight (kg)</th>
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These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.
ACO Q-Ceptor full retention oil separators

Cover and frame

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Length (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
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<td>Ductile iron solid cover and frame Ø 400</td>
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Extension shaft

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<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Internal Diameter (mm)</th>
<th>Length (mm)</th>
<th>Width Overall (mm)</th>
<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
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</thead>
<tbody>
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Ancillaries

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<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
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<th>Depth Overall (mm)</th>
<th>Weight (kg)</th>
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<td>-</td>
<td>-</td>
<td>3.5</td>
</tr>
</tbody>
</table>

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.
ACO Q-Ceptor alarm systems

BS EN 858-1:2002 and the Environment Agency's Pollution Prevention guidelines (PPG) require that all oil separators must be fitted with an automatic alarm/warning device to provide visual and audible warning when the level of oil reaches 90% of the storage volume under static liquid level conditions. These alarms/warning devices indicate that the separator is in need of immediate emptying for it to continue to work effectively.

In order to meet this requirement, ACO offer a full range of Pepperl + Fuchs visual and audible electronic alarm systems. The alarms are designed to continuously monitor the critical operating conditions of the separator and provide a warning early enough to prevent any discharge of pollutants into the environment. All the alarm systems can be fitted either during installation and commissioning of a new oil separator, or to existing installations.

The standard range of mains powered analogue alarm systems provides high levels of environmental safety, is simple to install and provides an economical solution where the necessary cabling and ducting can be provided. To ensure precise monitoring in any situation, all of the alarm systems can be fitted with up to three sensor probes within the separator for oil, silt and high liquid levels.

SPECIFICATION PROCESS

To simplify specification and ordering ACO provide alarm systems as complete install sets. Each install set consists of the following components:

- Sensor probes
- Control unit (with audible and visual warning)
- Housing for control unit
- Assembly accessories (including cable connector, fasteners and hangers)

ACO Q-Ceptor standard alarm system installation sets

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
<th>Power Supply</th>
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<tbody>
<tr>
<td>34601</td>
<td>Separator alarm set with oil sensor probe</td>
<td>230V AC</td>
</tr>
<tr>
<td>34602</td>
<td>Separator alarm set with oil, silt and high liquid level sensor probes</td>
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</tr>
<tr>
<td>34603</td>
<td>Separator alarm set with oil and high liquid level sensor probes</td>
<td>230V AC</td>
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</table>

Note: All sensor probes of the alarm systems feature ATEX-approval, meaning they are approved for use in explosive areas of zone 0.

Alarm options

ACO can supply digital GSM alarm systems including mains, battery or solar powered units. GSM alarm systems are ideal for areas where people are not present and send an SMS (text) warning message via a GSM mobile phone network, offering 24/7 protection.

Battery and solar powered units give greater installation flexibility where oil separators are used in areas without a readily available power supply. For full details of available options please contact the ACO Water Management Design Services Team on 01462 816666.

- Standard visual and audible warning function
- Standard mains power (230 V AC)
- Optional battery power operation (9 V DC)
- Optional solar power operation (12-30 V DC)
- Optional GSM TEXT warning to mobile phone
Installation notes

This section provides general installation notes for ACO Q-Ceptors that should be followed before installation. These notes should be read together with the recommended installation detail shown in the drawing on the following page.

Site conditions

These recommendations indicate the requirements for installation of ACO Q-Ceptors in typical site conditions. The customer should ensure that the requirements for their particular site conditions and anticipated loadings are met, taking Engineering advice where necessary.

Flotation

These recommendations assume that the unit is to be installed with a concrete backfill. Even with the minimum recommended thickness of concrete, the units, when empty, are vulnerable to flotation if the ground water level is high. Care must therefore be taken during installation, and consideration given as to whether additional concrete should be provided in wet locations.

In lightly loaded situations, the units can be installed without concrete backfill, using a suitable granular material as backfill. However, a concrete slab is likely to be required over the unit and the unit will be particularly vulnerable to flotation in groundwater. Engineering advice should be sought.

The ACO Q-Ceptor range of separators is Environment Agency compliant and conforms fully to the requirements of PPG3. In addition, all ACO Q-Ceptor separators have been designed and independently tested to BS EN 858-1:2002 and BS EN 858-2:2003. The customer (or their client) is responsible for ensuring that the installation of the unit is in compliance with any regulatory requirements of the planning authorities, Building Control, Environment Agency, Water Company, national and European standards, etc.

Installation should only be carried out by an experienced and competent contractor. Electrical work (e.g. alarms) must only be carried out by a suitably qualified electrician.

Contractors are advised to obtain a copy of the full installation recommendations. To do so, please contact the ACO Water Management Design Services Team.

Supplied by

Synergy

Tel: 01278 671927
Installation detail

ACO Q-CEPTOR OIL SEPARATORS

1. The customer should ensure that the requirements for their particular site conditions are met, taking engineering advice where necessary. These recommendations assume that the unit is to be installed with a concrete backfill.

2. Lift using a forklift through the slots under the base or webbing slings fixed through the lifting holes on the sides of the unit. Do not lift the unit using slings around the bypass channel. Take care that the units do not tip during handling. Do not drag, drop or roll the units. Store the units on firm level ground.

3. Excavate a hole to receive the unit, allowing for a minimum of 200mm thickness of concrete below and all around the unit and with sufficient working space for the connection of pipework, ducts and vents. Any unsuitable ground is to be removed and replaced. Engineering advice may be necessary. The excavation is to be kept free of water.

4. All concrete used in the installation is to be of minimum grade C15/20. Where necessary a higher specification of concrete may be required. Engineering advice should be sought. Pour a minimum 200mm thickness of concrete onto the base of the excavation, and whilst the concrete is still wet carefully lower the separator unit onto the concrete. Check that the unit is fully supported by the concrete, is level and at the correct height. Check the orientation. Allow the concrete to harden.

5. Add 500mm depth of water to the inside of the unit. Carefully place additional concrete to the sides of the unit to a level between 400mm and 500mm above the base of the unit. Do not use vibrating pokers. Check that the unit is still correctly positioned and level. Allow this concrete to harden.

5. Add 500mm depth of water to the inside of the unit. Carefully place additional concrete to the sides of the unit to a level between 400mm and 500mm above the base of the unit. Do not use vibrating pokers. Check that the unit is still correctly positioned and level. Allow this concrete to harden.

6. Add water to fill the unit to the invert of the outlet pipe. Carefully place additional concrete to the sides of the unit to a level just below the outlet pipe level, ensuring there is sufficient room left for the installation of the pipework. Allow this concrete to harden.

7. Connect the inlet and outlet pipework, vent pipe and bypass access pipe. The bypass separators have four possible pipe diameter connections. Cut the connection spigot at the appropriate location - see full installation recommendations for further guidance. Using pipe diameters other than those stated in the brochure and guidance will reduce the efficiency of the separator.

8. If an extension shaft is required, cut the shaft to the correct length and fit it to the top of the unit with sealant 8-10mm thick.

9. Install a duct (with drawstrings) for the electrical cabling to the alarm.

10. Place further concrete backfill to the unit, in pours of maximum 500mm height allowing the concrete to harden between pours.

11. Fit the cover and frame.

12. If a sampling pump is to be fitted, fix the top hose clamp near to the underside of the cover and attach the hose to the top hose clamp.

13. Fit the alarm(s). This work is to be carried out by a qualified electrician. The alarm probes are to be hung at the correct levels, as shown in the detailed installation instructions.

14. Ensure any debris is cleared from inside the unit. Top up the unit with clean water. Fit the float (only required in full retention separators) and the coalescing filter (only required in Class 1 separators). Ensure that the float has floated up off its seating, (and if necessary lift it off its seating so that it is floating).

An electronic version of the ACO Q-Ceptor installation detail is available to download from the ACO website. Visit www.aco.co.uk.
Guide to installing the ACO Q-Ceptor

Step 1:
For a bypass separator, cut the connection collar to suit the required size of connecting pipework.

Step 2:
Excavate a hole 200mm wider and deeper than the separator chamber. Set the chamber to required level on a minimum 200mm deep bed of concrete (minimum grade 16/20). Ensure inlet and outlet are at the correct orientation and level. Allow concrete to harden.

Step 3:
Check the level of the inlet and outlet pipes and add approximately 500mm of water to the chamber. Haunch with between 400mm and 500mm of concrete. Once completed, check levels. Allow concrete to harden.

Step 4:
Add more water to the separator and backfill with concrete, keeping the water approximately 500mm above the concrete level. Fill the unit with water to the invert level of the outlet pipe. Backfill with concrete until the concrete is just below the outlet pipe level, ensuring that there remains adequate working room to fit the pipework.

Step 5:
Push connecting pipe into the collar and make good a joint with caulk and a suitable mortar or sealant. Fit bypass access pipe if required. Connect the vent pipe. Connect alarm cable duct through extension shaft (or neck of separator) and seal.

Step 6:
Fit extension shaft if required and cut to correct height, using sealant to ensure a watertight joint between the shaft and the separator. Complete fitting of the sampling pump hose (if required). Backfill with concrete in 500mm steps, allowing concrete to harden between pours. Brace the inside of the extension shaft if necessary to avoid distortion during the concrete pours. Continue until final concrete level is reached (just below underside of cover frame).
Step 7:
Trim extension shaft to correct height. Fit the cover frame. Fit the alarm system in accordance with the manufacturer's installation recommendations – this should be carried out by a qualified electrician. Lower the ACD into position (full retention separators only). Lower the filter into position (Class 1 separators only).

Step 8:
Ensure that the unit is free from all debris and fill with water to the outlet level. Ensure that the float is floating (if applicable) and the filter is correctly positioned (if applicable). Fit the cover.
Maintenance and servicing

In order to ensure the reliable functioning of oil separators and ongoing environmental protection they require regular maintenance and servicing. Unless this is done, environmental damage and the resulting risk of liability cannot be prevented.

ACO service partners work closely with the UK Environment Agencies and are able to offer ongoing maintenance and servicing programmes, waste disposal, inspection, testing and full installation and commissioning of oil separators and alarms. For further details please contact the ACO Water Management Design Services Team on 01462 816666.

Model specification clause

The oil separator shall be an ACO Q-Ceptor Oil Separator supplied by ACO Water Management, [Full Retention or Bypass], [size NS* or NSB*], [Class 1 or Class 2#]. The unit shall be manufactured from High Density Polyethylene and include (for Class 1 separators) a coalescing filter manufactured from polypropylene fibres reinforced with stainless steel wire and include (for full retention separators) a weighted float automatic closure device. The unit is to be designed and manufactured in accordance with BS EN 858-1, and is to conform to the recommendations in the Environment Agency Guidelines PPG3.

The oil separator is to be installed in accordance with the manufacturer’s recommendations.

* insert nominal size as required
# insert the required option

NBS Specifications

ACO Q-Ceptor Oil Separator should be specified in section R12:421. Assistance in completing this clause can be found in the ACO Water Management entry in NBS Plus, or please contact the ACO Water Management Design Services Team.

Note: A specification in NBS format is available to download from www.thenbs.com or www.aco.co.uk.

Recycling

All the components of ACO Q-Ceptor are recyclable. Separate the units into the plastic and metal parts and recycle in accordance with local regulations.

Certification

ACO Q-Ceptor oil separators are fully certified to BS EN 858-1:2002 and BS EN 858-2:2003.

Test certificates are available on request. Please contact the ACO Water Management Design Services Team on 01462 816666 for further information.

BS EN 858-1:2002
BS EN 858-2:2003