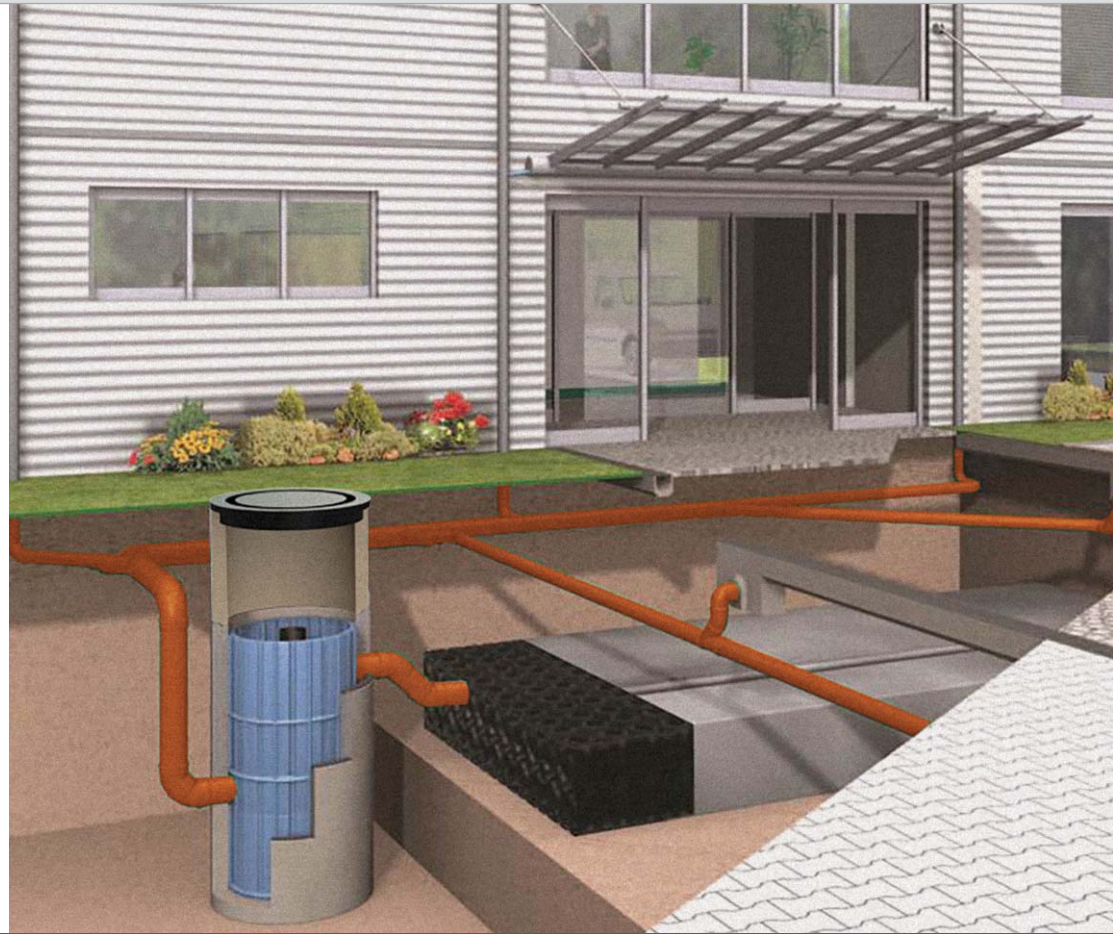


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ACO Water Management: Civils + Infrastructure

ACO QuadraCeptor



ACO QuadraCeptor

Four Stage Surface Water Treatment Unit



Introduction to ACO QuadraCeptor

ACO QuadraCeptor is a specialist rainwater and surface water runoff filtration system for the removal of sediment and harmful pollutants.

Surface Water Management

ACO QuadraCeptor is an efficient and reliable system for the treatment of surface water run-off from roofs, car parks and roads, even in heavily trafficked areas, before discharge in to ground (infiltration) or to a surface water feature.

The system has been designed to remove, in a four stage process, heavy particles, silt and nutrients and dissolved materials, such as heavy metals, from the surface water as part of an integrated Sustainable Drainage Solution. ACO QuadraCeptor will improve the water quality ensuring pollutants are not infiltrated into the soil.

Where infiltration is not feasible, the surface water discharged from site needs to be treated to an acceptable level.

Where this is to a watercourse, the Environment Agency (in England), the Scottish Environmental Protection Agency or Natural Resources Wales in line with legislation and guidelines such as the Water Framework Directive, will determine the levels of pollutants that can be discharged from site based on a number of factors such as the sensitivity of the receiving water, the dilution, etc.

Using the ACO QuadraCeptor at some point in the SuDS treatment train before discharge ensures clean surface water run-off is discharged from site meeting discharge consent limits on pollutants.

ACO's Water Management solutions team's technical expertise and knowledge of current best practice is your assurance of an affordable, long term sustainable solution.

Source control

Source Control: Changes in the Planning process for new developments from April 2015 will require all development, except the most minor, to have a SuDS solution for managing surface water runoff on-site. The first objective of any SuDS scheme is to manage surface water runoff at source and, where feasible, not to allow surface water runoff to discharge from the site.



What is ACO QuadraCeptor?

The ACO QuadraCeptor uses an upflow filtration process, resulting in minimal head loss between the inlet and the outlet. The rainwater is treated within the unit by the following 4 processes: sedimentation, filtration, adsorption and precipitation. The cleaned water is of an outstanding water quality.

The initial treatment steps take place in the hydrodynamic separator stage, where sedimentation of solid particles occurs within a radial flow regime.

To prevent remobilisation, settled material passes through a funnel trap into the silt chamber at the base of the unit.

Secondary treatment of raw water occurs via a suite of filters located above the separator unit. These filtration units cover the entire diameter of the unit's housing. As water flows upwards through the removable filter elements the filtration media is kept saturated. Such saturation maximises filter efficiency by minimising the rate at which filter units clog.

The filter elements can be cleaned when required and are easy to exchange when the media is exhausted.

ACO QuadraCeptor is supplied in a plastic housing and is safe and easy to fit on site. It is designed for installation within load bearing shafts and can be installed in standard concrete or plastic chambers.

Why choose ACO QuadraCeptor

An integrated approach to surface water quantity and quality

By using ACO QuadraCeptor in conjunction with attenuation and flow control devices from ACO's water management solutions, surface water run-off can be discharged from site at an agreed rate, at a permitted quality.

Low maintenance

There are no moving parts in the ACO QuadraCeptor, meaning the only maintenance required is occasional emptying of the silt chamber (an ACO silt level alarm can be fitted) and cleaning or replacing of the filters when required.

Easy to install

The ACO QuadraCeptor is supplied as a standalone unit, easily installed in a load bearing shaft, either standard concrete or plastic chambers.

How it works

Step 1

Surface water run-off from the catchment area drains into the lower section of the QuadraCeptor shaft. A deflector plate initiates radial flow.

Step 2

Sedimentation of particles, especially the larger and denser fractions, takes place in the hydrodynamic separator due to turbulent secondary flows within the radial flow regime.

Step 3

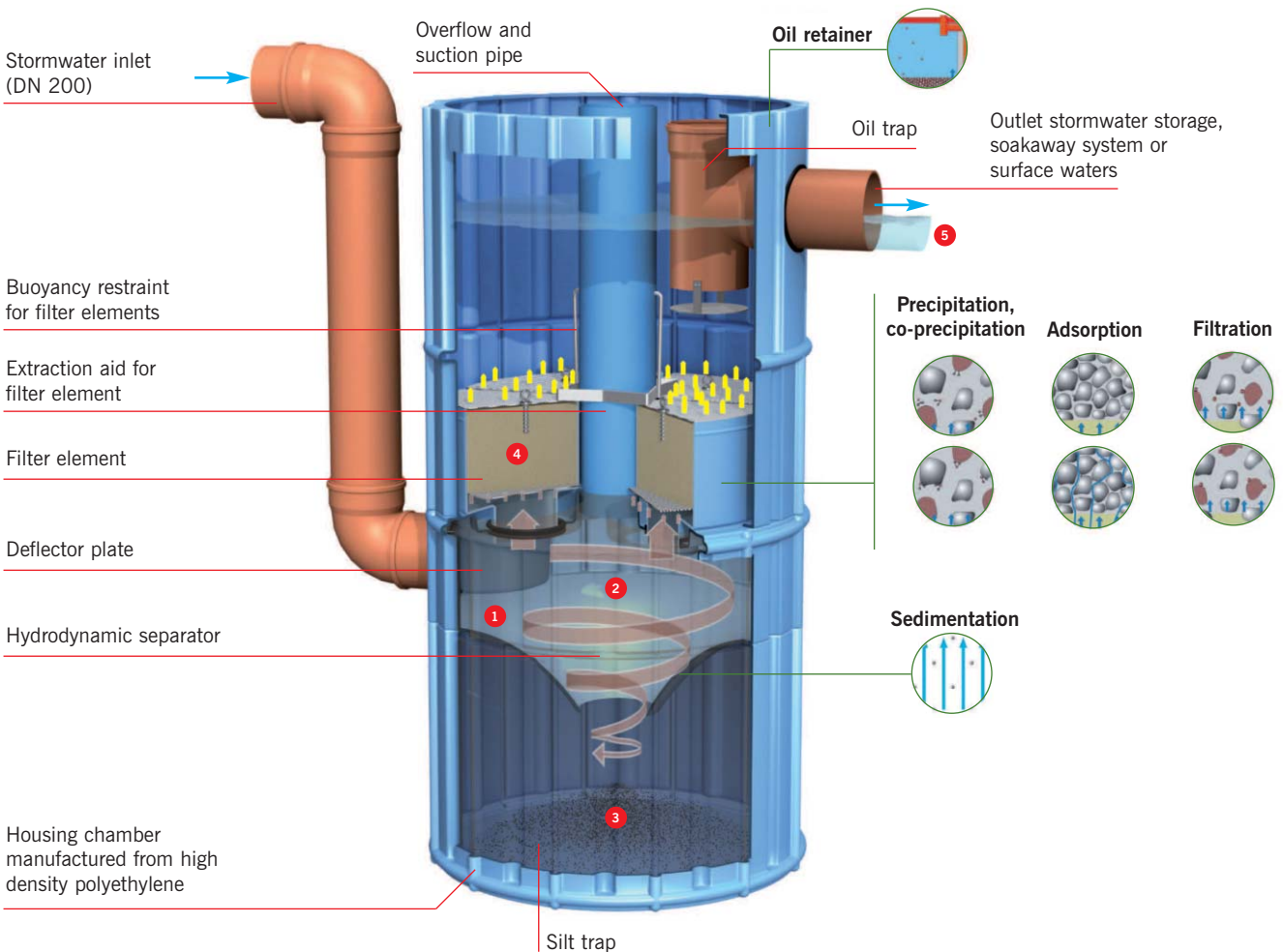
The settleable solids are retained in the silt trap chamber. This chamber should be emptied periodically, via the central by-pass tube.

Step 4

Four filter elements are located within the filter shaft. As water flows upwards fine particles are filtered out and dissolved pollutants are precipitated and adsorbed. Filter units can be backwashed simply and, if completely clogged or exhausted, can easily be replaced.

Step 5

Clean water above the filter elements passes to discharge to a soakaway or watercourse. Normal concentrations of dissolved oils are retained within the filter elements but any free floating oil that does pass through the filters is retained in an integrated oil trap.



ACO QuadraCeptor Range

The ACO QuadraCeptor is available with various filter types, depending on the usage of the connected area. The three options are:

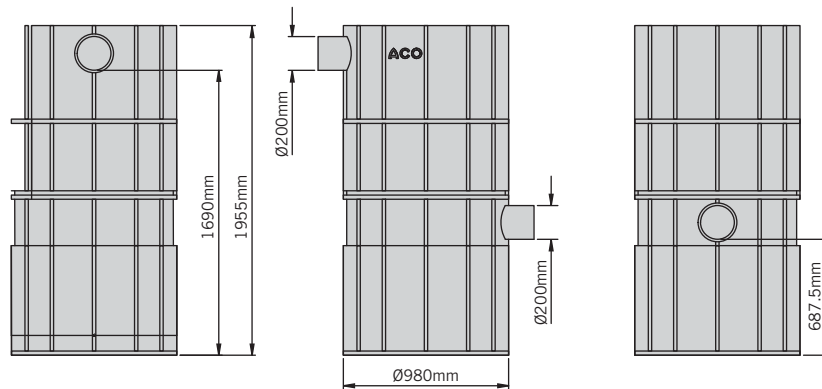
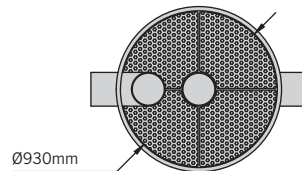
R1000 (Roof)	<p>Application: Roof areas that do not have a significant proportion of uncoated metals*</p> <p>Material: Filter Substrate: Roof</p> <p>Weight of filter element: 34kg</p> <p>Total weight of ACO QuadraCeptor unit including polyethylene housing: 220kg</p>
T750 (Traffic)	<p>Application: Trafficked areas with normal levels of pollutants, such as staff car parks and side streets.</p> <p>Material: Filter Substrate: Traffic</p> <p>Weight of filter element: 34kg</p> <p>Total weight of ACO QuadraCeptor unit including polyethylene housing: 220kg</p>
HT 500 (Heavy Traffic)	<p>Application: Heavily traffic areas, such as main highways and supermarket car parks with high vehicle turnover. This option has DIBt approval.</p> <p>Material: Filter Substrate: Heavy Traffic</p> <p>Weight of filter element: 54kg</p> <p>Total weight of ACO QuadraCeptor unit including polyethylene housing: 300kg</p>

*QuadraCeptor solutions are available for removal of high levels of copper or zinc: please contact technical@aco.co.uk or 01462 816666.

ACO QuadraCeptor

Product code	Description	Nature of the surface to be drained	Size of the surface to be drained (m ²)	Replacement filter element (set of 4)
26650	R1000 (Roof)	Roofs without a significant proportion (<5%) of uncoated metals	1000	26654
26651	T750 (Traffic)	Trafficked areas with normal levels of pollutants, such as staff car parks and side streets	750	26654
26652	HT500 (Heavy traffic)	Heavily traffic areas, such as main highways and supermarket car parks with high vehicle turnover	500	26555

Dimensions



Water quality performance

Parameter	Unit	Typical values from surface run off					Standards		
		Roofs			Traffic		Drinking Water ¹	Infiltration ²	ACO QuadraCeptor output ³
		Non metal	Copper	Zinc	Low vehicle turnover ⁴	High vehicle turnover ⁵			

Physico-chemical parameters

Conductivity	uS/cm	25 to 270	25 to 270	25 to 270	50 to 2500	110 to 2500	2500	-	< 1500
pH		4.7 - 6.8	4.7 - 6.8	4.7 - 6.8	6.4 to 8.0	6.4 to 8.0	6.5 - 9.5	-	7.0 - 9.5

Nutrients

Phosphorous, P	mg/L	0.06 to 0.5	0.06 to 0.5	0.06 to 0.5	0.09 to 0.3	0.23 to 0.35	no limit set		0.2
Ammonia/ammonium, NH4	mg/L	0.1 to 6.0	0.1 to 6.0	0.1 to 6.0	0 to 1.0	0.5 to 2.3	0.5	-	0.3
Nitrates, NO3	mg/L	0.1 to 5.0	0.1 to 5.0	0.1 to 5.0	0 to 16	0 to 16	50	-	*6

Heavy metals

Cadmium, Cd	µg/L	0.2 to 2.5	0.2 to 1.0	0.5 to 2	0.2 to 1.7	0.3 to 13	5	5	<1.0
Zinc, Zn	mg/L	24 to 4900	24 to 900	1700 - 44000	15 to 1500	120 to 2000	no limit set	500	<500 ⁷
Copper, Cu	mg/L	0.6 to 3.5	2000 to 8500	11 to 900	21 to 140	97 to 100	2	50	< 50 ⁷
Lead, Pb	µg/L	2 to 500	2 to 500	4 to 300	70 to 170	11 to 525	10	25	<25
Nickel, Ni	µg/L	2 to 7	2 to 7	2 to 7	4 to 70	4 to 70	20	50	<20
Chromium, Cr	µg/L	2 to 6	2 to 6	2 to 6	6 to 50	6 to 50	50	50	<50

Organic substances

Polycyclic aromatic hydrocarbons, PAH	µg/L	0.4 to 0.6	0.4 to 0.6	2 to 7	0.2 to 17	0.2 to 17	0.1	0.2	<0.2
Total petroleum hydrocarbons, TPH	µg/L	0.1 to 3.0	0.1 to 3.0	2 to 6	0.1 to 6.5	0.1 to 6.5	-	0.2	<0.2

Quadraceptor Model	R1000 (Roof)	Contact ACO ⁸	T750 (Traffic)	HT500 (Heavy Traffic)
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¹ Water Supply (Water Quality) Regulations 2000. Maximum values shown

² Control values for infiltration of surface water according to the German Federal Soil Protection Act (1999) and used as the basis for DIBt approval. Maximum values shown.

³ Output values based on average annual loads.

⁴ e.g. residential streets, office car parks.

⁵ e.g. highways, supermarket car parks, distribution yards.

⁶ Nitrate levels are not significantly reduced

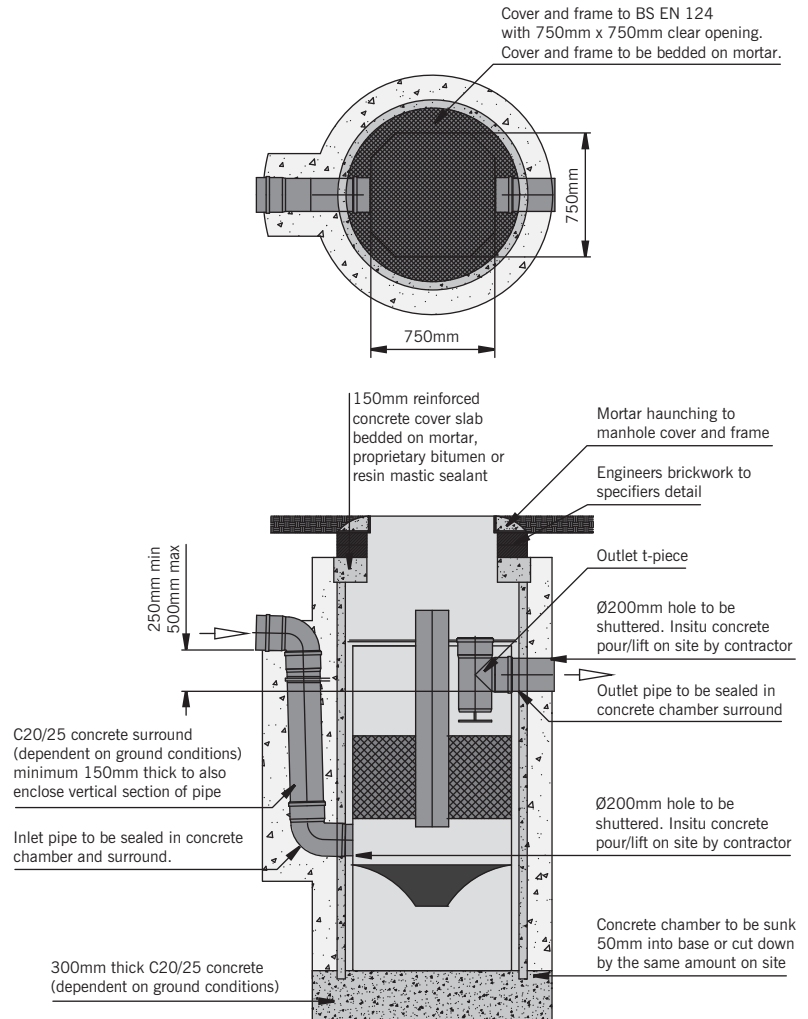
⁷ Values shown are not applicable to copper or zinc roofs where a second treatment stage is required

⁸ QuadraCeptor solutions are available for removal of high levels of copper or zinc: please contact technical@aco.co.uk or 01462 816666.

Installation detail

Specifiers and Contractors are advised to obtain a copy of the full installation recommendations from www.aco.co.uk, or the ACO Design Services department at technical@aco.co.uk or telephone 01462 816666.

1. This outline guidance assumes that the ACO Quadraceptor unit will be installed with a concrete backfill. Engineering advice should be sought to ensure any site specific conditions are addressed.
2. Quadraceptor units should be stored on firm level ground. Do not drag, drop or roll the units.
3. Excavate a hole to receive the unit, allowing a minimum 300mm thickness of concrete below the unit and 150 mm around the sides, allowing sufficient space for concrete surround to encapsulate the vertical inlet pipework. Allow sufficient working space for the connection of all pipework. Any unstable ground should be removed and replaced. Engineering advice may be necessary. The excavation is to be kept free of water.
4. Prior to installation all filter elements should be removed or covered to prevent contamination or fouling during installation.
5. All concrete used in the installation process must be of minimum grade C20/25. Where necessary, a higher specification concrete mix may be required and engineering advice should be sought. Pour a minimum 300mm thickness of concrete onto the base of the excavation. Whilst the concrete is still wet carefully lower the Quadraceptor unit onto the concrete. Check that the unit is fully supported by the concrete, and that the unit is level, at the correct height and in the correct orientation. Allow the concrete to harden.
6. The vertical distance from the bottom of the incoming pipework to the bottom of the outlet pipework must be a minimum of 250 mm and a maximum of 500 mm (see outline installation drawing for guidance).
7. Prior to back-filling the excavation, using appropriate concrete mix, all pipework should be connected and sealed to prevent contamination of the system, and any additional shaft rings and top cover put in place.



8. After installation filter elements should be re-installed, or anti-fouling covers removed. The end cap maintenance cover and other buoyancy protective devices should be checked for correct insertion. The T-Piece on the outlet pipework should be connected from the inside of the drainage line (see outline installation drawing for guidance).
9. Prior to commissioning and operation the ACO Quadraceptor must be inspected for proper installation by a competent person.



Maintenance and servicing

To ensure the ACO Quadrceptor surface water runoff treatment system provides continuous and reliable environmental protection it needs appropriate maintenance and servicing. Where a system is correctly maintained in accordance with supplier recommendations the environmental performance will be maintained, otherwise environmental damage and increased liability are likely to be experienced. ACO service partners work closely with the relevant UK Environment Agencies and are able to offer ongoing maintenance and servicing programmes, waste disposal, inspection, testing and full installation and commissioning of water treatment systems and alarms. For further details please contact the ACO Water Management Design Services Team on 01462 816666.

Model specification clause

The water treatment system shall be an ACO Quadrceptor water treatment system, supplied by ACO Water Management. The unit shall be manufactured from High Density Polyethylene and incorporate a filtration system appropriate to the intended end use.

The ACO Quadrceptor surface water treatment system is to be designed and manufactured in conformity with German DIBt requirements and shall be installed in accordance with the manufacturer's recommendations.



NBS Specification

ACO Quadrceptor should be specified in section R12 327. Assistance in completing this clause can be found in ACO Technologies product entries in NBS Plus or a model specification can be downloaded from www.aco.co.uk. For further assistance, contact the ACO Water Management Design Services Team.

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- ACO Water Management
Civils + Infrastructure
Urban + Landscape
- ACO Building Drainage
- ACO Sport
- ACO Wildlife

ACO Water Management: Civils + Infrastructure

A division of ACO Technologies plc
ACO Business Park,
Hitchin Road,
Shefford,
Bedfordshire
SG17 5TE

Tel: 01462 816666
Fax: 01462 815895

e-mail Enquiries: awmenquiries@aco.co.uk
e-mail Sales: customersupport@aco.co.uk
e-mail Technical: technical@aco.co.uk

website: www.aco.co.uk

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