

HumeCeptor[®] Class I Technical manual

Issue 1



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HumeCeptor® Class I

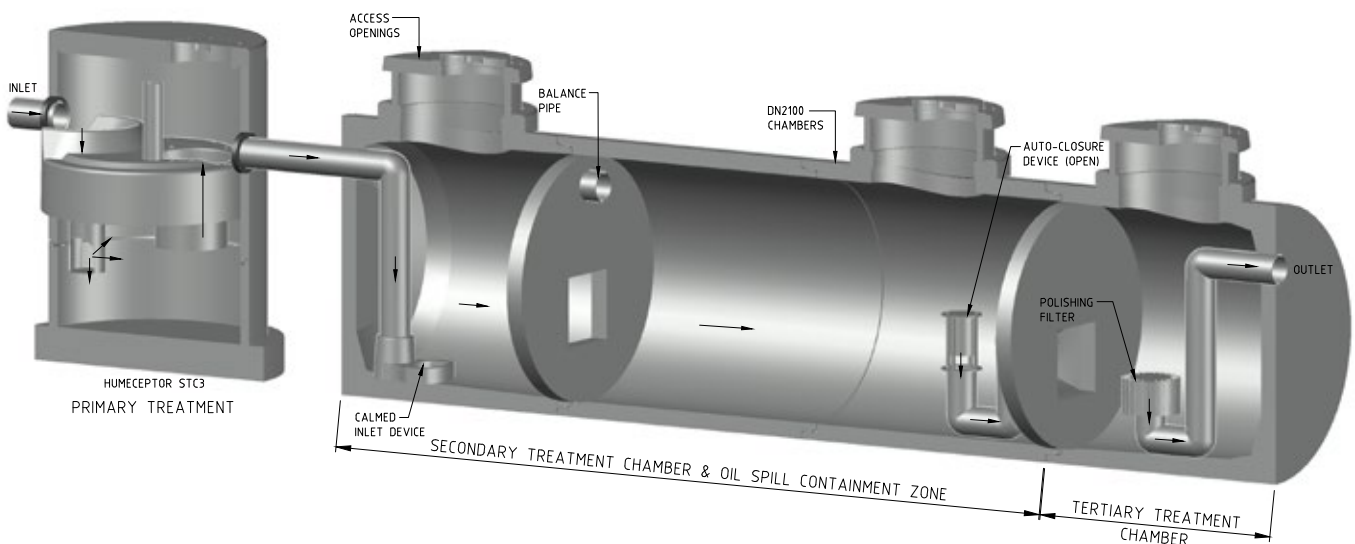
The HumeCeptor® Class I system is an underground, modular, precast concrete stormwater treatment train that utilises hydrodynamic and gravitational separation to efficiently remove Total Suspended Solids (TSS) and entrained hydrocarbons from stormwater runoff.

The HumeCeptor® Class I system is installed on sites where there is a higher risk of environmental contamination from stormwater runoff, or where a spill might occur. It is sized for a specific treatment flow rate, and installed on line at sites such as; refuelling stations, fuel distribution stations, car servicing workshops, electrical transformer pads and substations, etc.

The HumeCeptor® Class I system is an evolution of the original HumeCeptor® (Class II) hydrodynamic separator, with this version specifically modified to remove hydrocarbons to less than 5ppm in line with EN/BS858.

The HumeCeptor® Class I separators are full retention two chamber systems that incorporate primary treatment utilising a HumeCeptor® Class II, an automatic closure valve for emergency oil spill containment, an oil level monitoring unit and alarm, and a coalescing filter for final polishing of the discharge water.

The HumeCeptor® Class I is designed and tested to meet the stringent European Standard EN/BS 858-1 for installations for separators of light liquids. They ensure a maximum hydrocarbon concentration in the outlet of 5mg/litre (5ppm), which is suitable for discharging into a surface water drain. Laboratory testing in strict accordance with EN/BS 858-1 showed that the HumeCeptor® Class I achieved an average effluent oil concentration of less than 1mg/L (<1ppm), (Drapper, D. D., 2020, EN/BS858 and Stormwater Quality Lab Testing Final Report).



Features and benefits

- It captures and retains hydrocarbons**
 Each system is specifically designed to maintain low treatment chamber velocities to capture and retain hydrocarbons. Laboratory tests showed that it removed 99.9% of hydrocarbons when tested in accordance with EN/BS 858-1.
- The system reliably removes a high level of TSS**
 The HumeCeptor Class I system was developed specifically to remove fine suspended solids and hydrocarbons from stormwater, and has been shown to achieve high pollutant removal efficiencies for TSS (>90%) in laboratory tests.
- Minimum 50 year design life**
 The Humeceptor Class I is manufactured with a minimum 50 year design life; however, this can be if required (for example 100 yrs.).
- The system is completely modular**
 While a “standard” range of models exist (see Table ##), the unique design of the HumeCeptor Class I units ensures that most site constraints can be met and problems overcome. The secondary treatment chamber can be supplied in a range of diameters and lengths. Consideration needs to be given to this point: if the diameter of the secondary treatment chamber is reduced, it will necessarily need to be longer. The models in Table ## indicate a minimum oil spill storage capacity. If a greater spill storage volume is required, it’s as simple of adding more spill storage modules to the system until the required volume is achieved.
- Fully trafficable to suit land uses up to class G**
 The Humeceptor Class I system is a fully trafficable solution, it can be installed under pavements and hardstands to maximise above ground land use (loading up to Class D as standard).
- High groundwater table or aggressive soil conditions**
 As the Humeceptor Class I system is manufactured from precast concrete, it can also be designed to address other site issues such as a high groundwater table or aggressive soil conditions. The weight of the system can be increased or its diameter changed to avoid uplift due to buoyancy, and it can also utilise special concrete mixes to address possible issues related to acid sulphate soils or other aggressive soil environments. Contact your local water solutions manager for further assistance.
- We are experienced in the provision of world class treatment solutions**
 Humes has a team of water specialists dedicated to the advancement of economical sustainable solutions, and the provision of expert advice and support. Moreover, the Humes business has been in operation for over 110 years, and our experience goes well beyond our range of standard products.

Table 1 – HumeCeptor® Class I performance summary

Humeceptor Class 1 Model	Treatment Flow Rate (TFR L/s)	Oil Storage Volume (Minimum L) TBC	Additional Oil Spill Volume per Module (L)	Sediment Volume (m ³)
HC2 - NS7 - 4k	7	4,000	1,800	TBC
HC3 - NS13 - 7k	13	7,000	3,100	TBC
HC3 - NS17 - 12k	17	12,000	3,600	TBC
HC9 - NS25 - 16k	25	16,000	4,700	TBC
HC18 - NS35 - 25k	35	25,000	7,400	TBC
HC18 - NS45 - 32k	45	32,000	7,400	TBC
HC27 - NS55 - 47k	55	47,000	10,700	TBC
HC27 - NS65 - 58k	65	58,000	10,700	TBC

System operation

The Humeceptor Class I stormwater treatment system is configured as a treatment train, where a standard Humeceptor is used as a primary treatment device, which is then followed by a second two compartment chamber.

The first compartment of this chamber acts as the secondary treatment zone and also as the spill storage volume. Water enters at the invert (base) of the first module, and is directed vertically upwards to enhance and improve the rise rate of the entrained oils. An internal baffle wall is also fitted in the centre of this compartment to ensure the effective capture of sediments and litter. The water flows through an opening in the baffle wall into the next segment of this chamber. This compartment also houses the auto closure valve and oil level monitoring and alarm equipment.

The automatic oil level monitoring and alarm unit is fitted for continuous monitoring of the separator contents. It alerts when the light liquid within the separator has filled to a range of predetermined levels (25%, 50% etc. or others as required), and will alarm in the event of a spill and the auto closure valve closes as a result.

The auto closure valve is a precisely engineered ballasted float that is sensitive to any change in the water density as a consequence of light liquids build up. When an oil spill occurs, the float loses buoyancy as the oil level increases until it finally seats into the outlet pipe from that chamber, confining and isolating the spill.

The final compartment of this chamber houses a filter that coalesces residual very fine hydrocarbons droplets into larger droplets that then rise to the surface of this section of the chamber. The treated water is then legally discharged to the stormwater drainage network.

System maintenance

The design of the Humeceptor systems means that maintenance is conducted with a vacuum truck which avoids entry into the unit.

A significant advantage of utilising a standard Humeceptor (Class II) as the primary treatment device means that only minimal additional maintenance is required on the secondary treatment compartments of the Class I components.

The primary treatment Humeceptor is performing the majority of the treatment requirements, while the secondary treatment chambers are only separating residual concentrations or capturing emergency spills. Maintenance of the primary treatment Humeceptor unit is simple and only requires a low cost vacuum truck extraction, while the secondary treatment chambers only require a skim of the surface of the water to remove the residual oils that have accumulated.

Similarly, the base of the secondary treatment chamber can also be skimmed to remove accumulated sediments near the inlet. The coalescing filter can be easily removed, cleaned and reinstalled.

The secondary treatment chambers will only require complete emptying in the event of an oil spill.



Appendix

HumeCeptor® Class I technical drawings

Precast solutions

Top:
StormTrap® system

Middle:
RainVault® system

Bottom:
Segmental shaft

Stormwater

Stormwater treatment

Primary treatment

HumeGard® Gross Pollutant Trap

Secondary treatment

HumeCeptor® hydrodynamic separator

Detention and infiltration

StormTrap® system

Soakwells

Harvesting and reuse

RainVault® system

ReserVault® system

RainVault® Mini system

Precast concrete cubes

Segmental shafts

Stormwater drainage

Steel reinforced concrete pipes – trench

Steel reinforced concrete pipes – salt water cover

Steel reinforced concrete pipes – jacking

Box culverts

Uniculvert® modules

Headwalls

Stormwater pits

Access chambers/Manholes

Kerb inlet systems

Floodgates

Geosynthetics

Sewage transfer and storage

Bridge and platform

Tunnel and shaft

Walling

Potable water supply

Irrigation and rural

Traffic management

Cable and power management

Rail



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