



**LFG COLLECTION**



**FLARE UNITS**



**LFG UTILIZATION**



**We specialize in products and technical support for :**



- ◆ Landfill Gas
- ◆ **Landfill Gas Utilization**
- ◆ **Biogas Plants**
- ◆ Water Treatment
- ◆ Geotechnical Instrumentation
- ◆ Groundwater
- ◆ Geothermal
- ◆ Geosynthetics
- ◆ Drilling
- ◆ **Alternative to Soil Cover Materials**
- ◆ Hydroseeding
- ◆ Odour Control
- ◆ After-sales Service



*Highest quality products at the most competitive prices.*



# Alternative to Soil Cover Materials

## *The Value of Daily Cover*

In sanitary landfill design and operation, there are Daily, Intermediate and Long term needs of soil cover material , thus from 15 to even 50 centimeters of compacted soil.

The use of 15 cm of compacted soil as daily cover continues to be used extensively today. This layer represents the practical minimum depth that can be placed over solid waste to prevent the emergence of adult flies from landfilled solid waste mass. When implemented properly, this achieves a basic objective of protection of human health and several other beneficial functions as follows:

**Fire Control** – 15cm of compacted soil reduces the potential for, and movement of, fires within a landfill.

**Additional Vector Control** – 15cm of compacted soil reduces available breeding sites for mosquitoes serving as an attractant to domestic/feral and wild animals.

**Litter Control** – 15cm of compacted soil helps to control blowing litter.

**Odor Control** – 15cm of compacted soil serves as an odor barrier/or filter for odors emanating from solid waste.

**Aesthetics** – 15cm of compacted soil covering at the end of each day working face, improves the aesthetics for site users and neighbors.

**Run-on / Run-off** – 15cm of compacted soil serves to reduce the infiltration of storm water run-on into the filled mass of solid waste and helps to increase run-off of precipitation.

**Driving Surface** – A minimum of 15cm of compacted soil provides a driving surface for the disposal vehicles to unload.

Still there are and not just a few occasions that there is a complete lack of appropriate soil cover material or it has to transport this from a distance.

In either case the operator have to use excavators & trucks and additional personnel and man hours to cover the working face.



**And it isn't just that .....**

# Alternative to Soil Cover Materials

## A New Concept in Cover Material

**"We can help you save money, time and air space."**

Use of Soil turns to be a very expensive cover, for a various but also significant reasons.

**Operating costs** – When landfill owners/operators do not have sufficient soil on-site for daily cover and must purchase and import cover material, it can represent significant increased operating costs.

Hauling cover from off-site also increases traffic, road wear and tear, increase fuel consumption and increased emissions.

Alternate daily cover materials, which are less expensive than importing soil to a site, could significantly reduce the overall operating costs for landfill operators.



**Value airspace** – In many cases to find a location and built a landfill site isn't a very easy procedure and in many cases this takes many years because of neighbors who doesn't want this near them.

Always landfill sites are in the business of utilizing space for many reasons.

Even if there is soil on-site, think the lost air space over the total life-time of the landfill site that you could benefit (Cover Ratio), and how less soil is used as a cover that much space can be used for more waste.

Even if there is soil on-site consider why fill your landfill's valuable space with soil when there is an alterative cover material?

The increasing need to reduce operational costs plus the need to increase the life time of landfill sites led to use advanced materials that could replace or minimize the use of soil as a cover material but also keep up with the environmental needs.

Slurry-based, non-toxic, bio-degradable, and environmentally friendly neutral materials made primarily of food grade polymers and clays, mixed with water and sprayed forms a dry component providing an alternative to soil cover material.

**We've got you covered**

# Alternative to Soil Cover Materials

## Daily & Intermediate Covers

### PG II B.

- ◆ 1 unit = 1 chemical bag [A] & 5 mulch bag [B]
- ◆ 1 unit mixes with 1416 litres of water
- ◆ 1 unit covers 743 - 882 m<sup>2</sup>
- ◆ Duration: 14 to 60 days (application dependent)  
& even 3 months with SS 40



### PG II B Plus.

- ◆ 1 unit = 1 chemical bag [A] & 3.75 mulch bag [B]
- ◆ 1 unit mixes with 946 litres of water
- ◆ 1 unit covers 557 - 668 m<sup>2</sup>
- ◆ Duration: 14 to 60 days (application dependent)  
& even 6 months with SS 40



### CC SW.

- ◆ 1 unit = 1 chemical bag [A] & 1 mulch bag [B]
- ◆ 1 unit mixes with 378 litres of water
- ◆ 1 unit covers 112 - 135 m<sup>2</sup>
- ◆ Duration: 6 to 8 months (application dependent)  
& even 12 months with SS 40



# Alternative to Soil Cover Materials

## Long Term, Additives & Custom Covers

### CC 180.

- ◆ 1 unit = 3 chemical bag [A] & 1 mulch bag [B]
- ◆ 1 unit mixes with 189 litres of water
- ◆ 1 unit covers 102 - 79 m<sup>2</sup>
- ◆ Duration: 12 to 24 months (application dependent) & even 3 years months with SS 40



### SS 40.

Is a Dry Chemical that is comprised of a matrix of acrylic polymers and other chemistries to resist moisture and create a more durable rain resistant film over the surface what is being covered. It can easily be added to any of the above products increasing their durability and denser.

- ◆ PG II B : ½ unit 3.407 litres of water
- ◆ PG II B Plus : 1 unit 3.407 litres of water
- ◆ PG SW : 1 unit 3.407 litres of water
- ◆ PG 180 : 1 unit 1.703,81 litres of water

A bag weights 15.8 kg



## COVERS DESIGNED FOR SPECIAL SITUATIONS

CB products are custom blends of polymers and recycled fibers, specifically tailored to your specifications, providing the additional performance properties required to meet your special needs. The colour, durability, water impermeability, VOC & gas suppression capabilities can all be modified, creating a custom product for ANY situation, and all at a minimal cost per sq. meter.

chemical bag [A] weights 22,5 kg  
mulch bag [B] weights 15,9 kg

# Alternative to Soil Cover Materials

## Daily Covers

In all waste landfill sites in EU up today we use a layer of minimum compacted soil 15cm height as a daily cover so that waste remains covered until next day or more.

Our company supplies a range of technological materials in versions of one or two components, made of recycled paper with polymers that mixed with water forms a ecological thick viscous slurry, non flammable which then we can spray on top of the working area of waste at the end of the day.

The patented two-component system forms a very thin layer that covers the waste and provides an effective barrier for H<sub>2</sub>S gases, and other odors emanating from landfills or contaminated sediment. Its polymeric film-forming capability works wells at creating a barrier that suppresses radon gas and other volatile organic compounds.

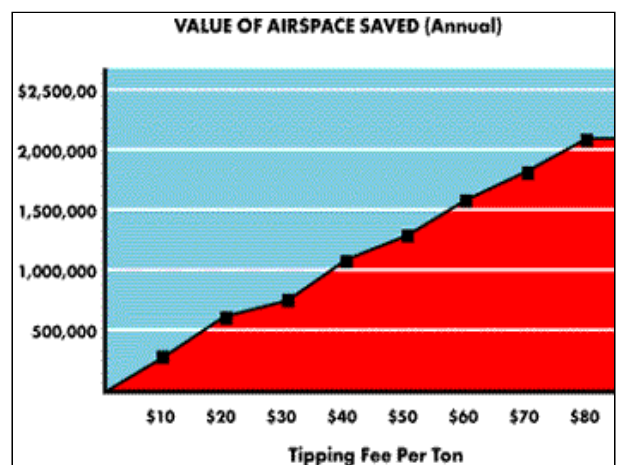
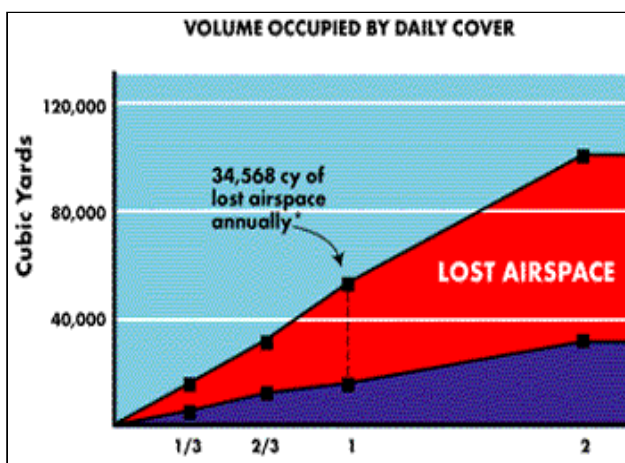


Before.



After.

A thin layer of only a few cm thickness covers the waste without the need placing soil. This reduce the operating costs of currying & applying soil but also increases the lifetime of the landfill site by improving the Cover Ratio of the landfill site.



The charts above show us the lost air space we earn by using alternate to soil products as daily cover.

# Alternative to Soil Cover Materials

## Daily Covers

### “PG” Daily Cover

This product range is the ideal solution where we need an economical cover material for daily coverage of the working area in a landfill site.

The daily cover materials consists of two Components, either each in a two separate bag or mixed together in a single bag.

The two components are recycled fibers (paper mulch) and a unique chemical formula of engineered polymers.

When blended with water forms are combined into a single component; a thick viscous slurry that forms a thin layer when sprayed on the waste.

- ◆ 1 Single Bag unit mixes with 250 - 380 litres of water
- ◆ 1 Single Bag unit covers 100 - 175 m<sup>2</sup>
- ◆ 1 Two-Bag unit = 1 chemical bag & 3 or 5 mulch bag
- ◆ 1 Two-Bag unit mixes with 950 or 1.416 litres of water
- ◆ 1 Two-Bag unit covers 560 to 880 m<sup>2</sup>



Depending the quantity of the chemical formula we will add in the mix we improve the features of the daily cover material.

The Daily Cover Products Duration is from 14 to 60 days depending on application.

#### Designed to Use as :

- **Two-Component System Allows For Variability Of Mix Ratios**
- **Low Cost Odor Suppression System**
- **Low Cost Radon Gas Suppression**
- **Excellent Fire Suppression Tool In Landfills**
- **Adheres To Vertical Surfaces**
- **Control Blowing Litter Throughout The Day**
- **Fugitive Dust Control Media On Hazardous Site**
- **Vector And Bird Control In Landfills When Integrated With Other Products**

Reducing operational costs, saving valuable air space, and increasing the specific density of the waste are the additional benefits of using daily covers as opposed to soil.

# Alternative to Soil Cover Materials

## Intermediate Cover

### “SW” High Performance Cover Material

This product developed as a cover for an intermediate use.

Intermediate covers have traditionally consisted of a layer of soil, that was often graded for encouraging surface water run-off, however, this method was rather inefficient and time consuming.

SW is a much better Daily Cover during moderate rain weather conditions. Is better to use for steep slope stabilization where lots amounts of soil would be needed to cover the waste and perfect erosion control under most adverse and difficult environments. It is advantageous for suppressing VOC's & radon gas, controlling odors from contaminants, blowing litter, vectors and fires.

Covering inactive areas of the landfill's working face with SW will economically reduce the amount of soil being used for cover, thus decreasing the amount of fuel, maintenance and labour used to operate heavy equipment for excavating, moving and placing this soil covering.

This are to be placed on active working faces of the landfill that won't be covered with waste for an extended period of 14 to 60days (daily covers) or longer. Creates a uniform, encapsulating barrier that can last upwards of 6 to 8 months and can also integrated with SS40 additive, further extending the designed life of this intermediate use.

Is stronger and more durable than daily covers, and also less expensive than our long term cover material. Is biodegradable, non-flammable, and non-toxic to workers. It is rated 0 (non-hazardous) for health, fire, and reactivity.

- ◆ 1 unit = 1 chemical bag & 1 mulch bag
- ◆ 1 unit mixes with 378 litres of water
- ◆ 1 unit covers 112 - 135 m2
- ◆ Duration: 6 to 8 months  
& even 12 months with SS 40



#### Designed to Use as :

- **Steep slope stabilization & erosion control**
- **Excellent Daily Cover during moderate rain weather conditions**
- **VOC suppression**
- ***Odor suppression during contaminated sediment excavation***
- ***Odor suppression during excavation of old waste***
- ***Radon gas suppression***
- ***Fire Suppression tool in landfills***
- ***Adheres to vertical surfaces***
- ***Control blowing litter and dust control on hazardous waste sites***
- ***Material Neutral allows grass seed and seeding***
- ***Encouraging vegetation growth***

# Alternative to Soil Cover Materials

## Intermediate Cover



*Before*



*After*

*Reducing operational costs, saving valuable air space, and increasing the specific density of the waste are the additional benefits of using daily covers as opposed to soil.*

# Alternative to Soil Cover Materials

## Long Term Cover

### “CC180” World’s Longest Lasting Cover Material

When your landfill or waste areas won't be used for 8 to 24 months or longer then it's time for the CC180 cover material.

CC180 arrives at your site as a Two-Component System, consisting of 3 chemical 'A' bags and 1 recycled paper and wood fibre matrix blend 'B' bag. Is a technologically advanced 'Air Entrained' Sprayable Slurry. When applied it **creates a consistent, impervious barrier up to 7.6 cm in thickness**

When the chemical agents of CC180 are mixed in our machines, its special components are activated - with a slight exothermic reaction taking place, **driving off moisture until setting and curing on the landfill surface**. The advantages of using this type of technology is that CC180 can be applied in the middle of rain storms, without losing its water repelling properties.

However, due the special properties of CC180, even though the cover cures and hardens within 90 minutes of mixing, it will rehydrate when exposed to rain. This allows it to resist cracking and drying out, due to instances when the underlying surface changes shape.

Ideally suited for suppressing odors from contaminated sediments, this high performance cover excels at minimizing ingress of oxygen into methane collecting cells, as well as restricting water access with its impermeability Tested by an independent laboratory rating of  $10^{-6}$ .

This means the CC180 can be a **far more cost effective replacement** as a temporary cover on landfills or remediation piles than plastics or geotextiles.

Plus, as with all our other covers, CC180 is **100% green**. Its **material neutral** construction significantly encourages vegetation growth for controlling erosion.

◆ **1 unit = 3 chemical bag & 1 mulch bag**

◆ **1 unit mixes with 189 litres of water**

◆ **1 unit covers 102 - 79 m<sup>2</sup>**

◆ **Duration: 12 to 24 months  
& even 3 years months with SS 40**



#### Designed to Use as :

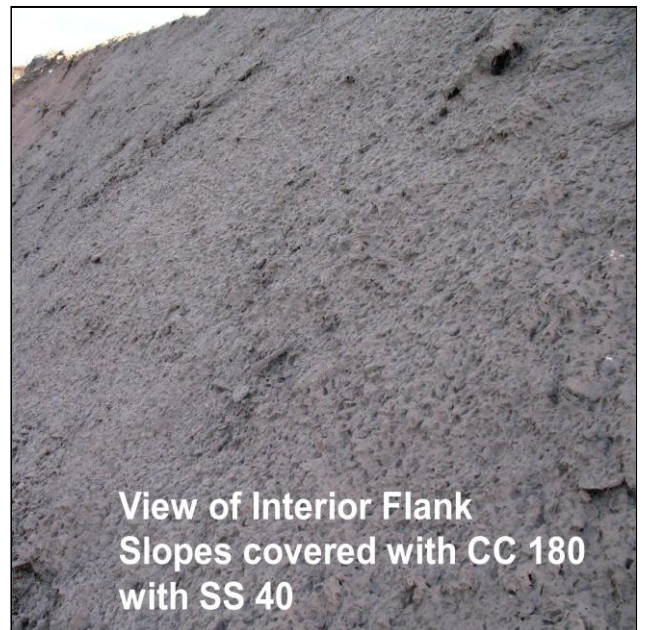
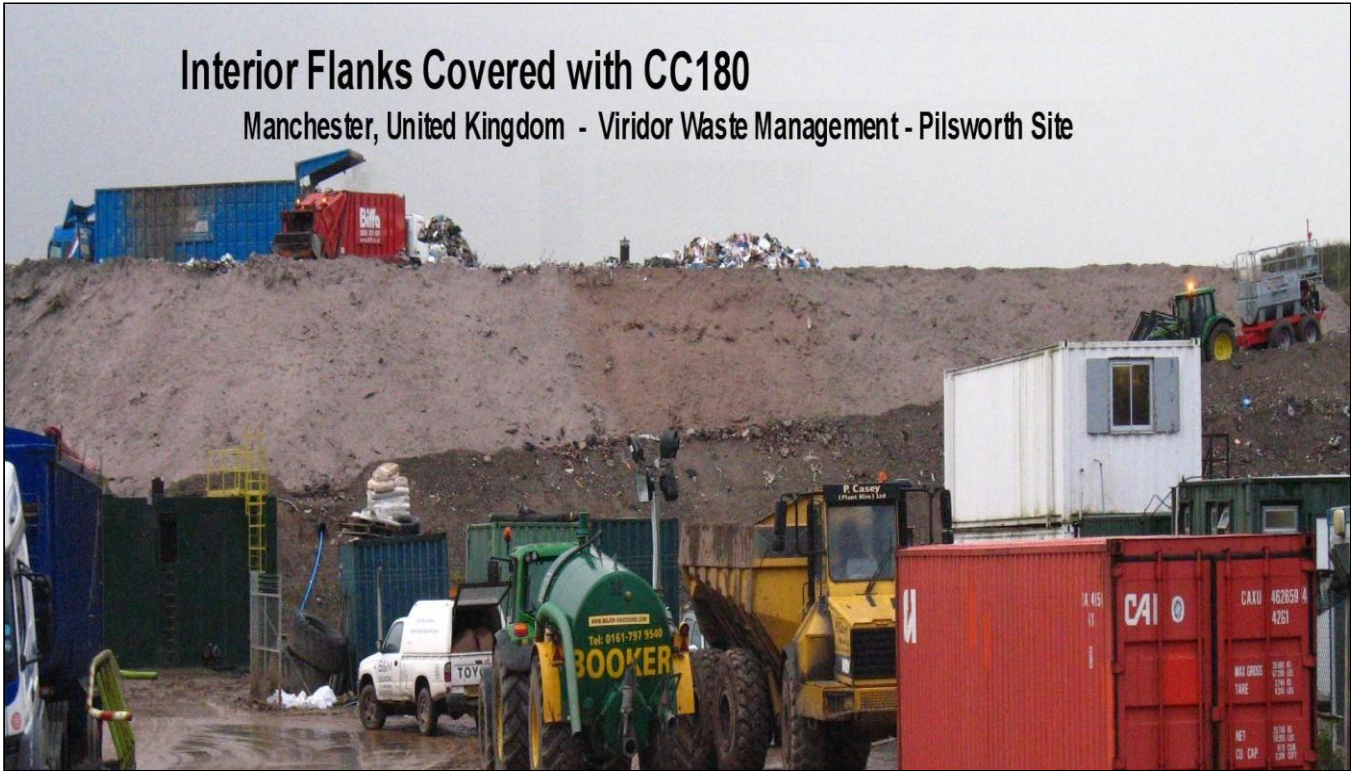
- **Steep slope stabilization & erosion control**
- **Cover Material during extreme weather events, flooding & torrential downpours**
- **Alternate to geotextile covers**
- **Horizontal cover layer; Minimizes the penetration of oxygen**
- **Odor suppression even in sludge ponds**
- **Fugitive dust control on hazardous sites**
- **Cover for contaminated sediment & hazardous waste excavation**
- **Protects seeds from brought and heavy rain events and support seed growth**

# Alternative to Soil Cover Materials

## Long Term Cover

### Interior Flanks Covered with CC180

Manchester, United Kingdom - Viridor Waste Management - Pilsworth Site



View of Interior Flank Slopes covered with CC 180 with SS 40

# Environmental Control For Landfills

## IDR 1000 A



*The IDR1000A machine is ideal for any Alternative Daily Cover Material product application.*

**Versatile & Economical.** The *IDR1000A* unit is the most economical unit ever. You can easily manage professional quality seeding, fiber mulching, straw tacking, and much more.

**Feature Filled Operation.** The *IDR1000A* unit features a durable, 1100 lt capacity HD Polyethylene tank, a hydraulically driven and reversible mechanical agitator for fast and thorough mixing, simple controls for economical one-man operation, a progressive cavity pump that handles the thickest of slurries with ease.

**All Around Performance.** The *IDR1000A* unit can fit onto a trailer, pick up truck or any other unit that suits the clients demands.

# Environmental Control For Landfills

## IDR 1000 A

### *IDR1000A MODEL TECHNICAL SPECIFICATIONS*

POWER .....	22 hp (16.5 kw), 900cc, electric start, air cooled gas, reversible hydraulic engine, oil guard protection.
ENGINE SAFETY .....	Low oil pressure, high water temperature shutoff.
SYSTEM	
TANK SIZE .....	1,100 liter liquid capacity.
DIMENSIONS mm .....	2600 x 1400 x 1600 .
PUMP .....	Progressive Cavity Pump 200 l/m @ 10 bar total head, inside slurry recycle,
PUMP DRIVE .....	Direct drive through electric clutch, pump drive is independent of agitator operation, reversible hydraulic engine,
AGITATION .....	Hydraulic paddle agitation and liquid recirculation, speed regulation.
AGITATOR DRIVE .....	Reversible, variable speed hydraulic motor.
DISCHARGE .....	Up to 35 m from end of hose.
DISTANCE	
NOZZLES .....	(1) narrow fan, (1) wide fan, (1) long distance
HOSE ATTACHMENT .....	two 25-50 mt each
EMPTY WEIGHT .....	820 kg
WORKING WEIGHT * .....	1.980 kg

\*Working weights are approximate and do not include options or stored materials.

TECON has a policy of continuous product improvement, and reserves the right to change design and specifications without notice.

*The same equipment can be used for Dust Control and Fire Extinguishing, something very useful for landfill sites to have, but also for many small municipalities as an excellent fire fighting equipment.*

# Environmental Control For Landfills

## 2000A HDI



*The 2000A HDI machine is ideal for any Alternative Daily Cover Material product application.*

**Versatile & Economical.** The 2000LH unit is easily covers a 1000m<sup>2</sup> areas. You can easily manage professional quality seeding, fiber mulching, straw tacking, and much more.

**Feature Filled Operation.** The 2000A HDI unit features a 2000 lt capacity hot galvanized tank, a hydraulically driven and reversible mechanical agitator for fast and thorough mixing, simple controls for economical one-man operation, a progressive cavity pump that handles the thickest of slurries with ease.

**All Around Performance.** The 2000A HDI unit can fit onto a trailer , pick up truck or any other unit that suits the clients demands.

# Environmental Control For Landfills

## 2000A HDI

### *2000A HDI MODEL TECHNICAL SPECIFICATIONS*

POWER .....	35 hp, 13720cc, electric start, water cooled gas, reversible hydraulic engine, oil guard protection.
ENGINE SAFETY .....	Low oil pressure, high water temperature shutoff.
SYSTEM	
TANK SIZE .....	2,000 liter liquid capacity.
DIMENSIONS mm .....	L2700 x W1600 x H2340 .
PUMP .....	Progressive Cavity Pump 370 l/m @ 10 bar total head, inside slurry recycle
PUMP DRIVE .....	Direct drive through electric clutch, pump drive is independent of agitator operation, reversible hydraulic engine,
AGITATION .....	Hydraulic paddle agitation and liquid recirculation, speed regulation.
AGITATOR DRIVE .....	Reversible, variable speed hydraulic motor.
DISCHARGE .....	Up to 40 m from cannon.
DISTANCE	
NOZZLES .....	(1) narrow fan, (1) wide fan, (1) long distance
HOSE ATTACHMENT .....	50 m each
EMPTY WEIGHT .....	1470 kg
WORKING WEIGHT * .....	3.500 kg

\*Working weights are approximate and do not include options or stored materials.

TECON has a policy of continuous product improvement, and reserves the right to change design and specifications without notice.

*The same equipment can be used for Dust Control and Fire Extinguishing, something very useful for landfill sites to have, but also for many small municipalities as an excellent fire fighting equipment.*

# Environmental Control For Landfills

## CGF-200M Trailer



*The CGF-200M trailer is ideal for transportation of IDR1000A machine.*

Platform trailers are manufactured in three weight ranges, 2 tons, 2.6 tons and 3.5 tons and body lengths from 2.5 metres to 5 metres and up to 7 metres as specials. Trailers 4.3 metres and longer are available with a sloping beaver tail, or with full hydraulic tilt and ramp door.

Trailer chassis are welded in one piece and hot dipped galvanised and have a phenol coated plywood floor with level side rails and sockets for a removable headboard, centre posts and rear corner posts. A 25mm side chock rail is fitted on beaver tail models and is available on other trailers if sides are not required.

All trailers have Avonride softride fully independent rubber suspension axles for a smooth silent ride, both empty or fully laden. The hydraulically damped hitch has a lockable cast coupling and power assisted hand brake.

Steel sides, Mesh extensions, winch and loading ramps are all available as options..

Written Certificate of Conformity provided for every of our models.

# Environmental Control For Landfills

## CGF-200M Trailer

### TECHNICAL SPECIFICATIONS

Max gross weight:	3000kg
Unladen Weight approx	650kg
No of axles:	2
Axle centres:	710mm
Axle type/capacity:	Avonride 1000kg
Brake type/size:	Knott KFG35
Hitch type/capacity:	Bradley HU3HE 2750kg
Max drawbar load:	100kg
Hitch report no:	CD87/001 EXT 1
Tyre size:	10" (195/55)
Tyre pressure:	5.2 Bars
Body length:	3600mm
Body width:	2100mm
Bed height:	0.53 & 0.60m
O/A Length	5091mm
O/A Width	2100mm

**Optional Equipment:** 300mm high headboard and galvanised steel hinged sides, Mesh extension sides, front and rear gates, Headboard only, 1.8m Loading ramps and carrier, Rear loading legs, 2000kg manual winch and bracket, 1800kg 12v electric winch, Ladder rack ( not required with mesh sides ), Alloy treadplate covered floor, 4 Recessed deck rings, Wheel clamp, Extra body width, 1.8m Alloy ramps & carrier.

\* Carrying capacity will vary with optional specification.

TECON has a policy of continuous product improvement, and reserves the right to change design and specifications without notice.

# Landfill Site

## ODOR CONTROL

Landfills, Compost operations, Animal Processing Facilities, Waste water treatment plants, transfer stations, and recycling centers are some of the most odorous and difficult to control facilities. Remediation Projects and Hazardous Clean ups with dangerous VoC's can be just as volatile.

And when it comes to the waste industry and environmental remediation issues, controlling odors and VoC's ranks as one of the top concerns. Our Odor line of odor control products have helped many of the types of facilities and projects mentioned above successfully control their odor problems, and stay in regulatory compliance.

The complexity of these specialized environments often means that only a combination of specifically tailored products & delivery systems will be able to effectively solve the root cause of your odor problem.



Our odor control products go after what is causing the odors, as opposed to encapsulating them. This technology is by far more effective than usual neutralizers and absorbents, because it actually eliminates the source of the problem. Application of these materials are done topically on the waste, and can be applied daily or as required.

Our odor control products & equipment form the most reliable and flexible integrated odor control system on the market today.



We have developed several products that meet the needs of the market segments we serve. However, not every situation or odor problem is the same. We are continuously working with clients in developing custom blends of odor control agents.

# Landfill Site

## ODOR CONTROL

Landfills are a complex system of naturally occurring chemical and biological reactions that break the waste materials down into its basic components.

The base odors are the result of these biological and chemical processes taking place in an environment of moisture, heat and pressure. In an anaerobic (low oxygen) reaction phase the biological processes release methane and carbon dioxide gases that slowly make their way to the surface of the landfill.

Attached to the methane molecules, as they rise to the surface, are other odorous substances resulting from materials with varying states of decay, which can compound the odor problems. Hydrogen sulfide, mercaptans and ammonia are just some of the other odorous and toxic gases that are produced in a landfill. The most common and easily identifiable odor problems in a landfill occur at or near the surface. Materials that are moist and wet can emit substantial amounts of odors as the moisture evaporates.

Our products are designed to support and enhance microbial action already occurring that is breaking down waste organics. The genetic capabilities of the microbes that comprise the biomass control the ability of the system to breakdown specific components of the waste.

The purpose of using bacteria for odor control is to immobilize and transform the odor causing organics to other chemical forms that no longer release or carry odor.

The three odor control products are:

- **Odor SGT (neutralizer), Mixing Ratio: 0.25% - 2% active solution.**
  - Designed to tackle specific problems that may arise in a landfill, transfer station, composting facility or other waste industry facility.
  - These blends of odor control also have the flexibility to be misted, topically applied or mixed into any of our cover products.
  - SGT has a grape fragrance as part of the product is made from cactus plants and grapes.
- **Odor LT (neutralizer) Mixing Ratio: 0.25% - 2% active solution.**
  - Designed specifically to target alkaline odorous compounds like ammonia, butylamine, trimethylamines, amines, skatoles and other similar compounds.
  - Odor LT can be applied topically or mist it, on a time programmed basis, and all odors can be eliminated.
  - Odor LT has more of a lemon fragrance and it's very popular used at landfills and composting facilities.
- **Odor MAJ (bacteria) Mixing Ratio: 0.25% - 2% active solution.**
  - Designed to be ultra effective against a variety of Sulfur and Nitrogen containing malodorous components, including Hydrogen Sulfide odors, Ammonia, Amines, and volatile fatty acids. Odor Major lets you say good bye to rotten eggs once and for all.
  - Odor MAJ can be applied topically or misted.
  - Odor MAJ contains no fragrance.

# HYDRO-SEEDING

## Erosion Control

Hydro seeding is a great way to grow grass. Ideal to seed areas such as steep hill sides and road embankments. Labor costs are reduced. One man can easy run most of our machines.

The basic materials for the hydroseeding are water, seed, fertilizer, mulch, organic tackifier, but other materials can be added to the basic mixture according to environmental conditions and customer objectives (including hormones, water absorbent gels, lime for pH balance, growth stimulants, synthetic fibers, enzymes, etc.).

Hydroseeding process can be carried out in conjunction of other bioengineering techniques (like reinforced earth, geotextiles, etc.).

We provide a wide range of environmental friendly products to meet the need of any specific hydroseeding application: mulches, tackifier, seeds, fertilizer, non-woven mats, grass growth stimulants and more.

Besides, this is a very versatile system in that contractors can customized the mixtures according to soil conditions, particularly the use of fertilizers to increase the rate of organic matter into the soil and create the optimal bed seed for grass growth and to sustain permanent vegetation.

Organic tackifier or synthetic binder should be used to give more strength to the mixture and bind it to soil particles, while we recommend a good customized application of mulch because it also provides erosion resistance, it is a moisture source for the ground and, it provide a better chance for establishing a more uniform coverage of grass.

In cooperation with our suppliers, we also offer technical assistance and consulting to our customer in order to help them regardless the problem is:

Stabilization of land slide, slopes, roads banks etc., preventing erosion or controlling pre-existing erosion, reinforcing containing walls or simply seeding the grass on recreational areas.

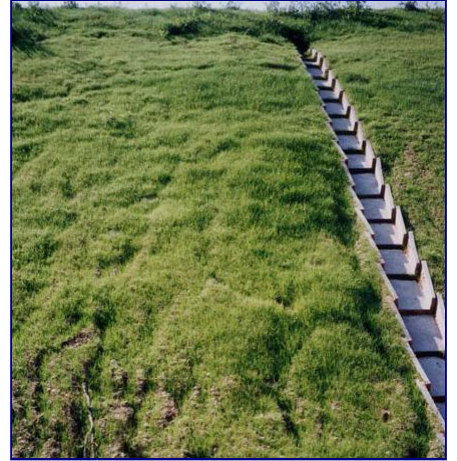
We may also offer solutions and services for Dust Control, through the marketing of several products that can either stabilize unpaved roadways or prevent emission of fugitive dust.



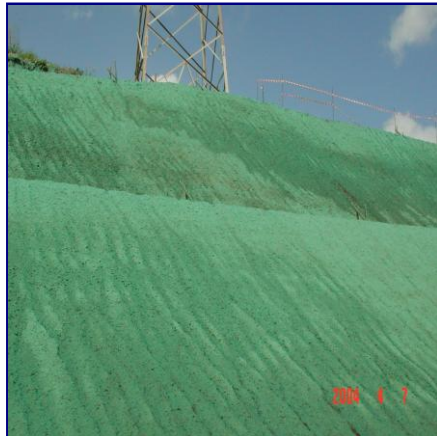
# HYDRO-SEEDING

## Erosion Control

*Landfill side steep slope*



*Road embankment*



# LANDFILL GAS

## Degassing Systems

Our company specializes in the supply of a complete range of HDPE slotted and perforated pipe for landfill leachate and gas collection plastic fabrication designed to meet the specific needs of landfill gas extraction systems.

- ◆ Perforated or slotted HD-PE gas or leachate collection pipes .
- ◆ Condensate traps,
- ◆ Manifold & Field Regulation Stations.
- ◆ Wellheads.

HDPE (High Density Polyethylene), P80 & P100 is the industry's recognized material for use within landfill for gas and leachate extraction.

### HDPE SLOTTED PIPE

For vertical and horizontal gas collection.  
Sizes from 63 to 630 mm.

Different connection types including:

- ◆ Threaded
- ◆ Telescopic
- ◆ Push connection
- ◆ Welded



### CONDENSATE TRAPS

An essential part of any gas extraction system to prevent the built-up of condensate within the pipe line.

- ◆ Made from HDPE
- ◆ Syphon or Pumped type
- ◆ Automatic draining
- ◆ Choice of size and connection type
- ◆ Simple and easy to maintain



### MANIFOLD & Field Regulation Stations

Used to divide the landfill site into different fields for maximum efficiency and ease to control and balancing.

- ◆ Made from HDPE or galvanized pipe
- ◆ Open or IN-BOX option available
- ◆ Multi-way valves and controls
- ◆ Made to suit project's requirements



# LANDFILL GAS

## Degassing Systems

### WELLHEADS

To place on top of any gas extraction well.  
A wide range to suit application.

- ◆ Made from HDPE
- ◆ Allows for settlement
- ◆ Choice of measuring points for gas and leachate
- ◆ Choice of size and connection type
- ◆ May accommodate pump or not
- ◆ Self dewatering option available



### PNEUMATIC PUMPS

Ideal for landfill gas wells & Groundwater remediation wells.

- ◆ Can be placed even to an 2" gas well
- ◆ Intrinsically safe (ATEX II 1G,c T6)
- ◆ Completely automatic

Ideal for pumping :

- ◆ Leachate
- ◆ Condensate
- ◆ Hydrocarbon recovery
- ◆ Total fluids



### BIOFILTERS

Designed to reduce odors and VOC from :

- ◆ Municipal and industrial wastewater treatment facilities
- ◆ Landfills
- ◆ Chemical manufacturing
- ◆ Food Processing Industries
- ◆ Breweries
- ◆ Tobacco Industry
- ◆ Paper and Cardboard Processing



# LANDFILL LEACHATE

## HDPE LEACHATE DRAINAGE PIPE

### ***Basal Drainage, Up Slope Risers, Junctions, Couplings***

Complete range of HDPE slotted and perforated pipe for landfill leachate and gas drainage systems.

Standard ATV 127 static calculations

- ◆ Sizes from 63 to 1000 mm
- ◆ Slotted or perforated
- ◆ Solid invert
- ◆ Push fit couplings
- ◆ Junctions & fittings
- ◆ Slots from 2-10 mm
- ◆ Open area up to 16%
- ◆ 'Quick-loc' couplings
- ◆ Made to DIN8074/5



315/110 mm  
Y junction



110 mm push fit  
coupling



500 mm PN10  
upslope riser



315 mm PN10 spine



110 mm PN10  
lateral drain

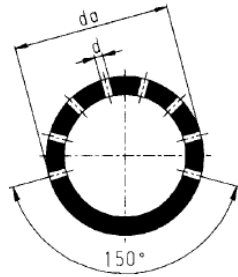
# LANDFILL LEACHATE

## HDPE LEACHATE DRAINAGE PIPE

### Basal Drainage, Up Slope Risers, Junctions, Couplings

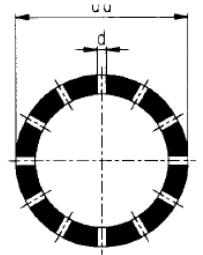
#### 2/3 perforated

Pipe Diam da	No Rows
63 - 110	4
125 - 400	8
450 - 1000	8/16



#### Fully perforated

Pipe Diam da	No Rows
63 - 110	6
125 - 400	12
450 - 1000	12/24

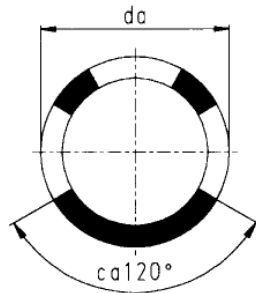


Hole diameters (mm): 6,8,10,12,15

Axial hole spacing (mm): 20,25,30

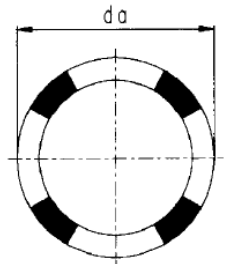
#### 2/3 slotted

Pipe Diam da	No Slots
110 - 355	3
400	6



#### Fully slotted

Pipe Diam da	No Slots
63 - 90	2
110 - 355	4
400	8



Available slot sizes (mm): 2,3,4,5,6,8,10

Axial slot spacing (mm): 20,25,30,40

Property	Standard	Unit	Value PE80	Value PE100
Density	DIN53479	g/cm <sup>3</sup>	0.953	0.96
MFI190/5	DIN53735	g/10min	0.7 - 1.0	0.3 - 0.55
Tensile stress at yield	DIN53455	N/mm <sup>2</sup>	21	24
Elongation at yield	DIN53455	%	10	8
Tensile stress at break	DIN53495	N/mm <sup>2</sup>	30 - 33	37
Elongation at break	DIN53455	%	>600	>600
Modulus of elasticity (short term)	DIN53457	N/mm <sup>2</sup>	800	1000
Modulus of elasticity (long term)	DIN53457	N/mm <sup>2</sup>	150	150

Specifications may be changed without prior notice

# LANDFILL GAS

## Landfill gas extraction wells

### HD-PE Screen & Casing

HD-PE Screen & Casing is used widely within the landfill industry for the extraction and monitoring of landfill gas (biogas). Other applications include groundwater monitoring, contaminated soil remediation, mining and landfill leachate extraction.

HDPE is highly resistant to the wide range of chemicals found within landfill and contaminated land and its physical properties, in particular its flexibility make it an ideal product for landfill engineering. It is fully compatible with all metric-sized HDPE pipes.

#### FEATURES

- ◆ Dimensions to DIN 8074/75
- ◆ Standard 10% open area
- ◆ Resistant to aggressive chemicals
- ◆ High strength, tough and durable
- ◆ Flush threaded joints
- ◆ Standard range of slot sizes from 0.3-6mm
- ◆ Standard perforation 12mm
- ◆ Standard 3 metre lengths
- ◆ Other lengths available (1.0, 2.0, 2.9, 5.8, 6.0 metres)
- ◆ UV stabilised (black)



OUTSIDE DIAMETER mm	DUROSCREEN 17			DUROSCREEN 11		
	INSIDE DIAMETER mm	WALL THICKNESS mm	WEIGHT kg/m	INSIDE DIAMETER mm	WALL THICKNESS mm	WEIGHT kg/m
32	-	-	-	25	3	0,28
40	-	-	-	32	3,7	0,44
50	-	-	-	40,8	4,6	0,7
63	-	-	-	51,4	5,8	1,05
90	-	-	-	73,6	8,2	2,12
110	97,4	6,3	2,08	90	10	3,14
125	110,8	7,1	2,66	102,2	11,4	4,08
140	124	8	3,34	114,4	12,8	5,11
160	141,8	9,1	4,4	130,8	14,6	6,67
180	159,6	10,2	5,48	147,2	16,4	8,42
200	177,2	11,4	6,79	163,6	18,2	10,4
225	199,4	12,8	8,55	184	20,5	13,1
250	221,6	14,2	10,6	204,4	22,8	16,2
280	248,2	15,9	13,2	229	25,5	20,3
315	279,2	17,9	16,7	257,6	28,7	25,7
355	314,8	20,1	21,2	290,4	32,3	32,6
400	354,6	22,7	26,9	327,2	36,4	41,4

# LANDFILL GAS

## Landfill gas extraction wells

### HD-PE Screen & Casing

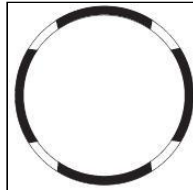
#### Specifications :

##### FULLY SLOTTED (10% OPEN AREA)

Slot sizes: 0.3, 0.5, 0.75, 1, 1.5, 2, 3 & 6mm  
Standard axial slot spacing: 15mm  
(Other axial spacing and slot sizes available on request).

PIPE DIAM (da)  
63-90  
110-140  
160-225  
250-280  
315-355  
400-450

NO. ROWS  
2  
3  
4  
5  
6  
8

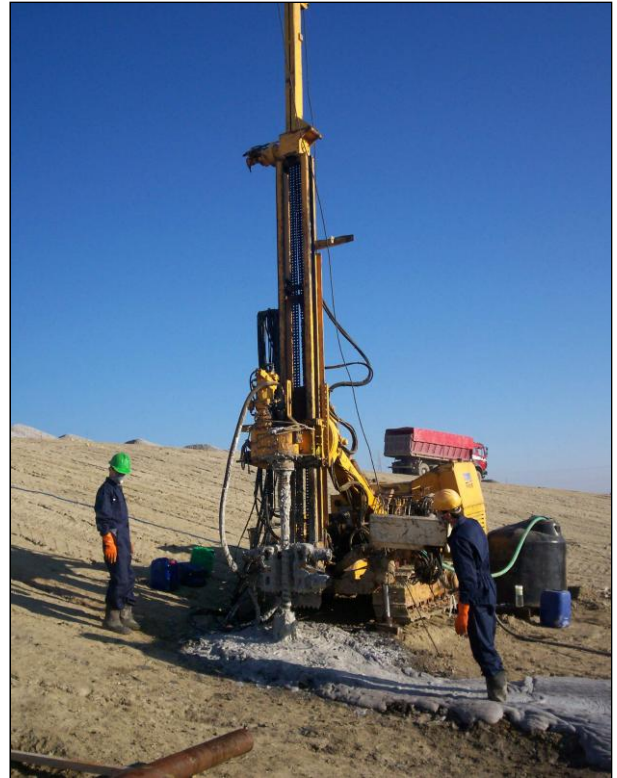
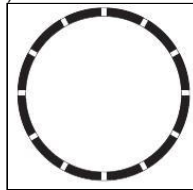


##### FULLY PERFORATED (10% OPEN AREA)

Standard hole diameter: 12mm  
Standard axial hole spacing: 31.25mm  
(Other hole sizes and axial spacings available on request).

PIPE DIAM (da)  
63-90  
110-140  
160-225  
250-280  
315-355  
400-450

NO. ROWS  
2  
3  
4  
5  
6  
8



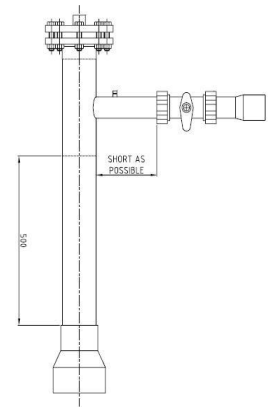
MECHANICAL AND THERMAL PROPERTIES				
PROPERTIES	STANDARD	UNIT	VALUE PE80	VALUE PE100
DENSITY	DIN53479	g/cm <sup>3</sup>	0,953	0,96
MF1190/65	DIN53735	g/10min	0,7-1,0	0,3-0,55
TENSILE STRESS AT YIELD	DIN53455	N/mm <sup>2</sup>	21	24
ELONGATION AT YIELD	DIN53455	%	10	8
TENSILE STRESS AT BREAK	DIN53495	N/mm <sup>2</sup>	30-33	37
ELONGATION AT BREAK	DIN53455	%	>600	>600
MODULUS OF ELASTICITY (SHORT TERM)	DIN53457	N/mm <sup>2</sup>	800	1000
MODULUS OF ELASTICITY (LONG TERM)	DIN53437	N/mm <sup>2</sup>	150	150

# LANDFILL GAS WELLHEADS

Manufactured from landfill gas resistant PE to provide a wide range of LFG wellheads to suit individual applications..

## TYPE 10 WELLHEAD

Comprises both landfill gas and leachate extraction. This type is fitted on top of any gas well pipe that may also incorporate a pneumatic leachate pump. The top of the wellhead is fitted with a removable blanking plate which can be adapted to accommodate any leachate pump. Upon request this may incorporate valve of different types, gas sampling & monitoring points , threaded caps for leachate dip meters, pressure gauges, pressure relief valves, flexible seals to allow settlement, centralizers for the gas well casing, air-filter regulators for the pump, air inlet/outlet , leachate discharge outlet & pump counter.

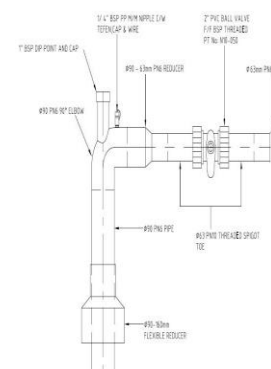


### FEATURES:

- ◆ Installation > 2" wells
- ◆ Simple construction
- ◆ Easy to install
- ◆ To suit any demand

## TYPE 10RPS WELLHAED

This type is commonly used where there is no demand for leachate extraction. Upon request this may incorporate valve of different types, gas sampling & monitoring points , threaded caps for leachate dip meters, pressure gauges, pressure relief valves, flexible seals to allow settlement, centralizers for the gas well casing.



### FEATURES:

- ◆ Less expensive
- ◆ Easy to install
- ◆ Simple construction
- ◆ Accommodates all settlement
- ◆ To suit any size

# LANDFILL GAS WELLHEADS

## TYPE EGC WELLHEAD

A very good solution when we want to collect the biogas produced and at the same time us to continue to deposit waste in the active cell of the landfill is by installing EGC well heads.

These wellheads are placed at any desired level we want, even from the beginning of the cell and allow us to easily lift them while depositing and increasing the level of waste, protecting the vertical pipework partially inside them and by connecting on the top a temporary horizontal pipework we can collect the landfill gas and lead it to the flare unit without venting in atmosphere until to wait for the final restoration of the cell is completed.

Unlike conventional concrete wells with holes which gradually raise these EGC wellheads are filled with gravel to act as a filter outside the inner HDPE screen, are forming a complete landfill gas extraction well at this is lifted up over time thus no additional drilling costs are required when the cell is filled to the top.

They are is at least 4 meter length sections, so that the top 1m remain outside to allow us to monitor the wellhead, and the 3m bottom section to be into the ground not allowing air to enter into the gas collection system.

They are very robust compared to the concrete rings, and not been destroyed by either settlement or by the movement of the waste compactors.

They maintain the verticality of the pipework, the landfill gas enters the wellheads and is been extracted much more efficiently while we can easily plug in a horizontal pipework and lead the landfill gas to the combustion at any time. Optional, they may allow the installation of leachate pumping system simultaneously with the extraction of landfill gas, they may be fitted with flow valves, sampling and monitoring points for leachate level, pressure measurement and landfill gas composition.



### FEATURES:

- ◆ Sampling points for gas pressure & temperature
- ◆ Sampling points for gas quality & flow
- ◆ Robust galvanized steel pipe
- ◆ Removable cover plate
- ◆ Can accommodate pump installation
- ◆ 800mm outside diameter
- ◆ Range of designs to suit application



# LANDFILL GAS

## Field Regulation Stations

It is advantageous to reduce the number of control points within a site. For this horizontal gas collection pipes from a number of wells are grouped together at Field Regulation Stations incorporating a manifold system together with valves and monitoring points. Condensate can also , easily drained at this point using either Syphon or Pumped Knock Out Pots.

Made either from HD-PE or galvanized steel pipe.

OPEN or IN-BOX options available.

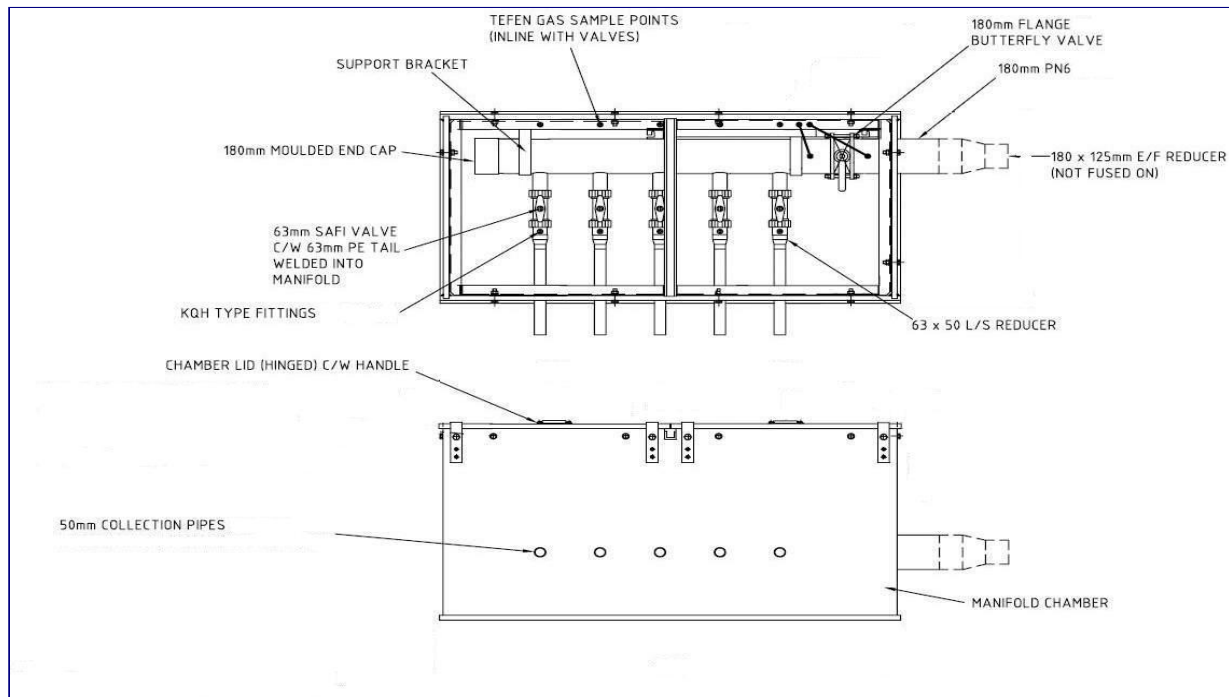
The Basic Manifold Assembly Comprises:

HD-PE manifold body of sufficient length to accommodate specified number of inlet valves  
One end sealed-off and one end fitted with stub flange, chamfered as required, and backing ring.  
Lever operated gas outlet butterfly isolation valve.  
Outlet flange backing ring to suit project's requirements.  
Gas inlets can be single sided or double sided.

The IN BOX option can be fabricated from HD-PE, GRP or steel.

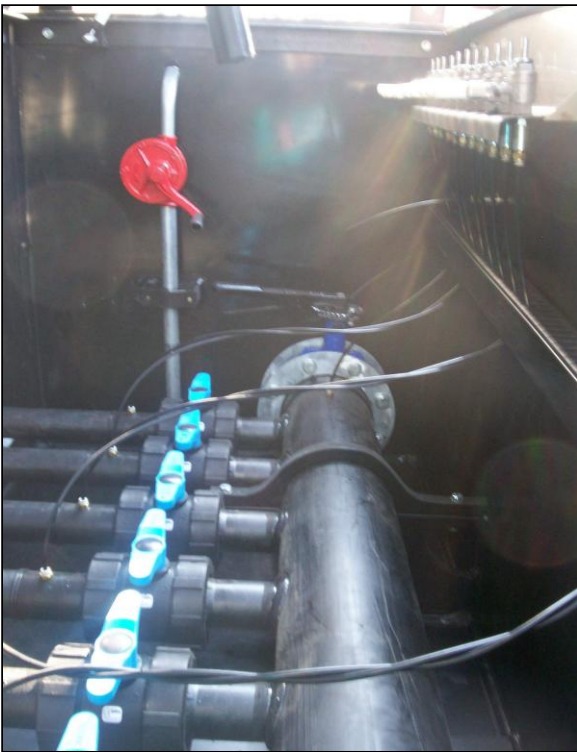
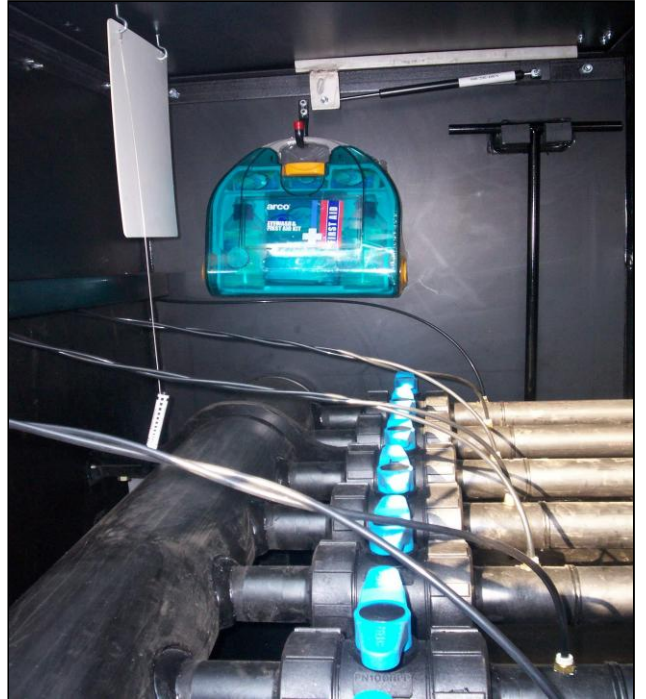
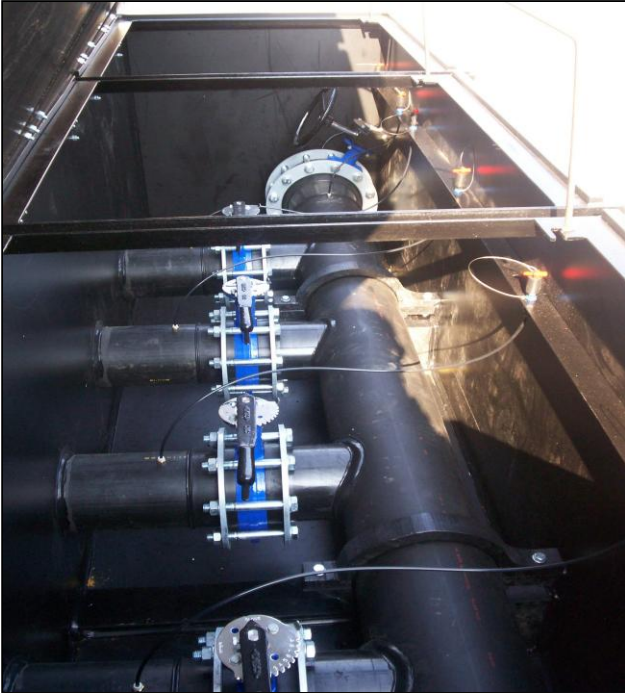
The exact size of the IN BOX is determined by the number and sizes of the inlet pipes and whether these are needed to one or both sides of the main body of the manifold.

The main body manifold diameter is designed to provide equivalent suction to each gas well inlet regardless of individual valve settings.



# LANDFILL GAS

## Field Regulation Stations



# LANDFILL LEACHATE

## TELESCOPIC LEACHATE SHAFTS

HDPE is the industry's recognised material for use within landfill for gas and leachate extraction.

The stress and strain imposed on vertical HDPE pipes in landfills is immense due to the large amount of settlement which occurs within the waste itself.

Vertical pipes are subject to the resultant of axial and radial stresses, but the axial stress is much higher and by far the most damaging.

The damage occurs because the axial strain and consequent stress exceeds the buckling strength of the pipe.

The axial stress is caused by 'skin friction' between the outside wall of the pipe and the surrounding waste as it settles. Loads as high as 100Tf are not uncommon.

If axial movement can be accommodated during settlement then the axial stress is eliminated.

### ACCOMODATION OF STRAIN = NO STRESS

To minimise the stress on a vertical shaft in landfill it must meet the following requirements:-

- ◆ Move axially during settlement
- ◆ Act as a column and not as individual sections
- ◆ Have minimum lateral deflection at joints
- ◆ Able to accommodate settlement over the entire length including the bottom section
- ◆ Be built up in sections as fill occurs
- ◆ Accommodate settlement over 30%

### FEATURES

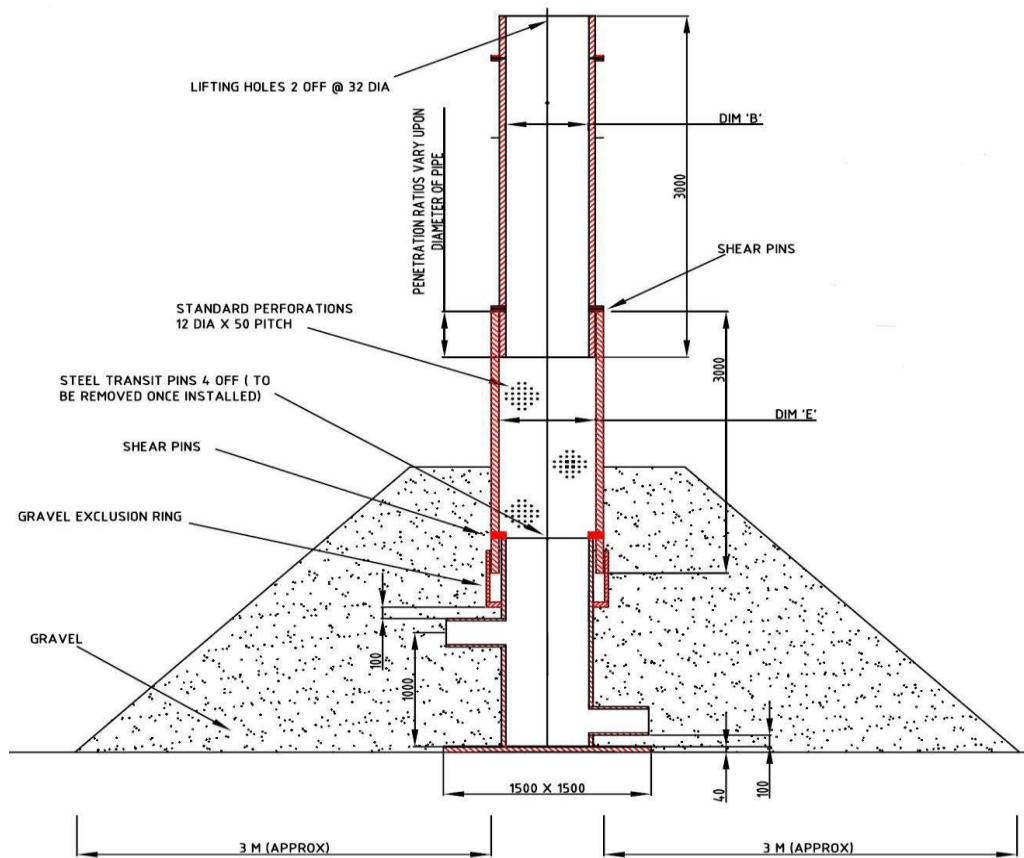
- ◆ High ring stiffness HDPE pipe.
- ◆ Tested shear ring strength.
- ◆ Known shear pin strength.
- ◆ High penetration ratio.
- ◆ Minimal lateral movement at joint.
- ◆ Acts as a single column.
- ◆ Bottom section can move.
- ◆ Standard 3meter sections.
- ◆ Same wall thickness throughout.
- ◆ Easy to install.
- ◆ Granular fill only needed on base.
- ◆ Settlement over 30%.
- ◆ Diameters from 100 to 1600mm.
- ◆ Design calculations provided.



# LANDFILL LEACHATE

## TELESCOPIC LEACHATE SHAFTS

Size (mm)	Sleeve outside diameter (mm)	Inner outside diameter (mm)
125/160	160	125
160/200	200	160
200/250	250	200
250/315	315	250
315/400	400	315



# LANDFILL GAS

## Vent Pipe Biofilter

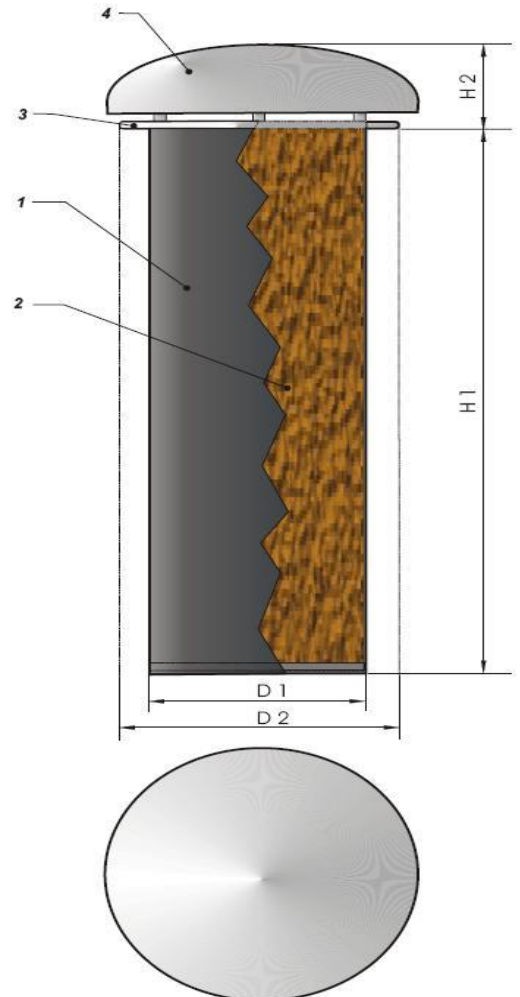
The vent pipe biofilters have been specially designed to reduce odors from various vent pipes, and is ideal for use in vent gas wells in landfill sites.

The specific vent pipes biofilters should be used in wells with A small airflow rate where space does not allow the use of a stand-alone biofilter.

The vent pipe biofilters come in standard range of sizes, fitting various ventilation pipes, and are simply inserted into the vent pipe.

Depending on the environmental conditions the biofilter material may last up to 7 years.  
The replacement of the filter material is an easy and inexpensive process.

The used biofilter material can be readily composed.



### Technical Data and Measurements

Surfaces in contact with the contaminating media:  
**HDPE, stainless steel;** Biofilter Material: **BT50**

Type	Weight [kg]	Waste Air Stream [m <sup>3</sup> /h]	D 1 / D 2 [mm]		H 1 [mm]
BF-100	8	3	95	135	1000
BF-150	10	4	145	195	1000
BF-200	15	5	190	250	1000
BF-250	24	7	240	290	1000
BF-300	35	11	290	350	1000
BF-350	48	14	340	400	1000
BF-400	63	18	390	450	1000
BF-450	80	25	440	500	1000
BF-500	95	35	490	550	1000

\*1) Weight, humidified and ready to use

H2 for all filters: ca. 150 mm

**Special sizes upon request**

February 2005

### Key

- 1) Filter Container (HDPE)
- 2) Filter Material
- 3) Suspension ring with gasket
- 4) Detachable Cover (a=none; b=stainless steel)

a is the standard version

**Different materials and design upon request**



**TECON**

# LANDFILL GAS

## Stand Alone Biofilter

The Stand-Alone biofilter, with its compact design and long service life, can be applied to relieve a variety of different odor problems.

Used in sewage treatment plants, landfill sites and sewage storage systems, but also in the food and chemical industry.

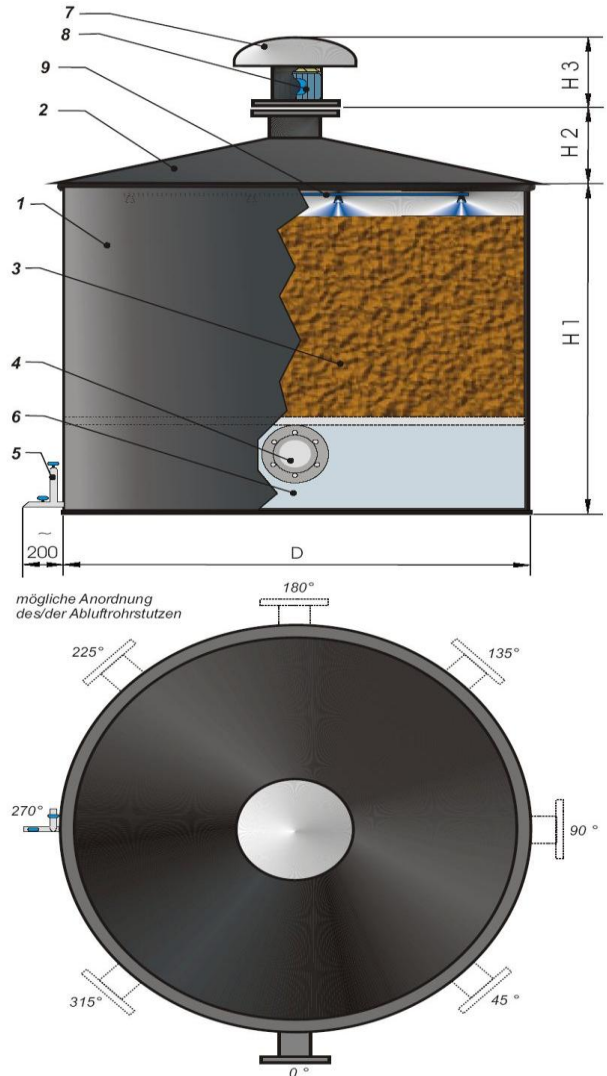
They are designed to treat airstreams from 20 to 400m<sup>3</sup>/hr.

To adapt to higher airstreams of up to 2600 m<sup>3</sup>/hr, our Stand Alone biofilters can be run in a two to four unit arrangement.

These filters can be used as inexpensive passive biofilters, and are readily upgradeable to active biofilters, at any time, by the addition of a cover and a fan.

A controlled surface irrigation system is optional. Depending on the environmental conditions, the biofilter material lasts for 3 to 7 years.

The replacement of the filter material is an easy and inexpensive process. The used biofilter material can be readily composted.



### Technical Data and Measurements

Surfaces in contact with the contaminating media:  
**HDPE, PPs, PVC, stainless steel**  
 Biofilter Material: **bioteg bpcBT50, bpcBT100**

TYPE	Weight ca. [Kg]	Air stream [m <sup>3</sup> /h]	D [mm]	H 1 /ca.H 2 [mm]	H 3
SR	20	110	20	610	180
SR	30	150	30	810	200
SR	50	240	50	810	200
SR	75	330	75	1100	230
SR	100	450	100	1300	240
SR	150	650	150	1300	240
SR	200	990	200	1500	250
SR	300	1450	300	1700	260
SR	400	1800	400	2000	270

H 3 for all types the same approximately 350 mm

Weight of biofilter ready for use  
 Special dimensions on request.

Technical changes possible February 2005

### Key

- 1) Filter Container (a=HDPE; b=stainless steel)
- 2) Detachable Cover (a=HDPE; b=stainless steel)
- 3) Filter Material
- 4) Connecting branch for Input Pipe
- 5) Siphon for drainage and condensate overflow
- 6) Air distributor (and condensate separator)
- 7) Ventilator Cover (a=HDPE; b=stainless steel)
- 8) Ventilator (a=with explosion protection; b=without explosion protection)
- 9) Electronically controlled surface irrigation system

a is the standard version  
 Number 2, 7b, 8 and 9 are optional extras  
**Different materials and design upon request**

### Features:

- **Modular design allows easy adaptation to dynamic airstreams**
- **High efficiency**
- **Compact design**
- **Solid construction**
- **Low investment costs**
- **Easy installation**
- **Trouble free operation**
- **Low maintenance**
- **Long service life**
- **No hazardous by products - used filter material can be readily composted**
- **Great versatility**

# LANDFILL LEACHATE

## ***CONDENSATE Knock-out Pots***

Landfill gas is usually saturated with water when it enters the collection pipe work. The temperature at which it is formed is generally about 30-35°C and this is therefore its “dew point”. As the gas travels from the waste along the collection line it will cool and the water will condense out to form condensate.

Condensate accumulation in the collection main reduces the ease with which the gas can be collected. If this accumulation is not drained, the collection pipes may eventually flood, especially at low points, and cause a “hydraulic lock” within the system.

The symptoms of condensate built up will be deterioration of gas quality and shut down of the flare due to low methane within a short time of commissioning.

The proper installation of the pipe work laid above ground takes a very important role in the whole design. The horizontal gas pipe work is very susceptible to the production of condensate as the black HDPE pipe absorbs a great deal of heat during the day and cools rapidly at night. Because of the above and for frost protection it is recommended that collection mains are buried below ground level.

The most common method of controlling condensate is to install condensate knock-out pots (KOP) to individual low points within the system or at the field regulation stations. Depending on the site the condensate can either be drained back into the site or pumped to a discharged point.

The amount of condensate will vary depending on site conditions but all landfill gas systems will have some degree of condensate within them.

The amount of condensate which occurs in even the smallest system is much more than most people realize. Knock-out pots should therefore always be a part of any landfill gas extraction system.

The main factors to consider when designing condensate drainage are :

- **Location of KOP – Try to drain away from well wherever possible.**
- **Sizing of KOP – To ensure correct pressure drop and adequate reservoir.**
- **Depth of KOP – To ensure that suction vacuum can not lift the condensate back up into the collection pipe.**
- **Depth of drainage material underneath should be at least twice the depth of the knock-out pot.**
- **The most important factor to consider once the condensate has been successfully collected within the KOP is that it must adequately removed.**

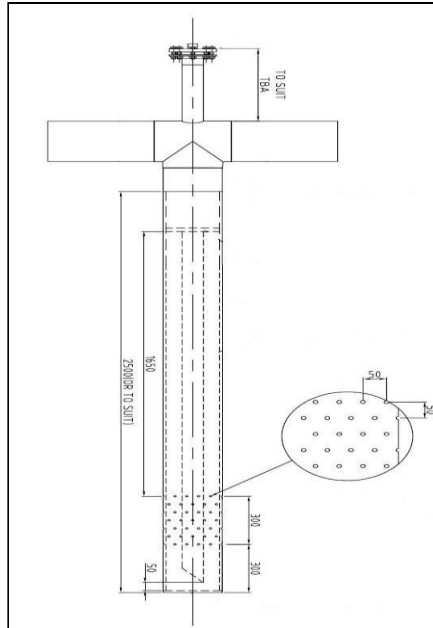
***THE NEED TO CONTROL CONDENSATE IS VITAL FOR A SUCCESSFUL SYSTEM.***

# LANDFILL LEACHATE

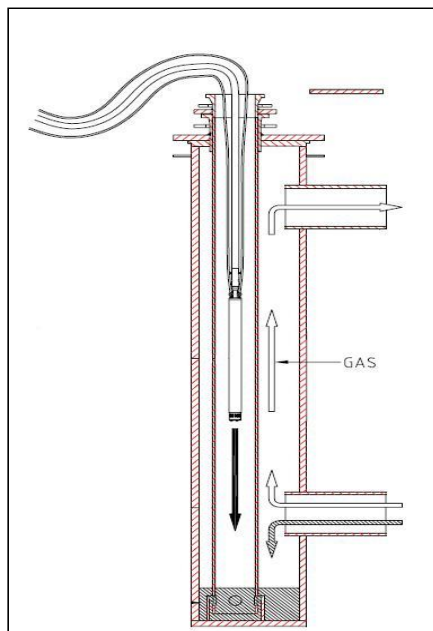
## CONDENSATE Knock-out Pots

There are two main types of condensate knock-out pots:

1. **SYPHON TYPE (SKOP)** : Where the condensate drains by gravity into the waste through a liquid seal at the base of the condensate trap.



2. **PUMPED TYPE (PKOP)**: Where intrinsically pneumatic safe pumps are installed to pump the condensate to a suitable discharge point. These are often used where leachate pumping systems are installed.



# LANDFILL LEACHATE

## PUMPING SYSTEMS

### GeoPumps

The efficiency of a landfill gas extraction system is well dependent on how we manage to control leachate and condensate. High levels of leachate seriously affect the ability to extract landfill gas because landfill gas can not be extracted below liquid level and if condensate cannot drain from the collection system leads to hydraulic locks. Landfill gas extraction system efficiency can be improved by the installation of leachate pumping systems.

The GeoPump™ range of pumps is an automatic, inherently safe pneumatically operated pump which can be used for a wide range of applications including landfill sites but also groundwater remediation applications where explosive environments exist.

It can be arranged to fill from either the top or the bottom to suit different applications.

Specifications			
GeoPump model	Average cycle volume	max flow rate	maximum drawdown
GP2T	0,25 lit	6 lit/min	975 mm
GP2B	0,25 lit	7,6 lit/min	600 mm
GP3T	0,65 lit	22 lit/min	1050 mm
GP3B	0,65 lit	28 lit/min	660 mm
GP4T	1,2 lit	25 lit/min	1060 mm
GP4B	1,2 lit	55 lit/min	660 mm
GP4TXD	0,65 lit	24 lit/min	770 mm
GP4BXD	0,65 lit	28 lit/min	400 mm

### Features

- ◆ Reliability
- ◆ Low maintenance
- ◆ Low operating costs
- ◆ Intrinsically safe
- ◆ Completely automatic
- ◆ Low air requirement
- ◆ Self adjusts to well flow
- ◆ Does not need high quality air
- ◆ Pumps solids in suspension
- ◆ Long lasting
- ◆ Simple and easy to use
- ◆ Can be placed into ID >45mm wells

### PUMPING CAPACITY

As liquid enters the GeoPump™ under gravity and exits under the pressure of compressed air the performance of the GeoPump™ is dependent on several factors which include :

- ◆ Depth of liquid above pump inlet (submergence)
- ◆ Operating air pressure
- ◆ Internal diameter of hoses used
- ◆ Total dynamic head

### Materials

Stainless steel  
Polyethylene  
Viton ®  
Fibre reinforced plastic  
Kynar ®  
Teflon ®

# LANDFILL LEACHATE

## PUMPING SYSTEMS



### how it works....

The GeoPump™ is operated by compressed air and features an internal float which automatically controls the pump itself and regulates the liquid level. It may be installed for shallow or deep wells and operates automatic only when is full with liquid to be pumped thus minimising conserving energy.

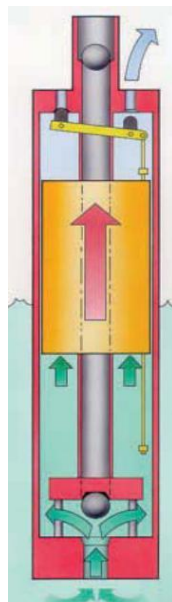
#### Fill Cycle *Pump starts to fill*

The inlet non-return valve opens, allowing fluid to enter the pump.

As the fluid level in the pump rises, the internal float rises to the top of its stroke.

In this upper position, the float actuates a lever assembly to open the air inlet valve, and compressed air enters the pump chamber.

**Note:** No air is used during the fill cycle.



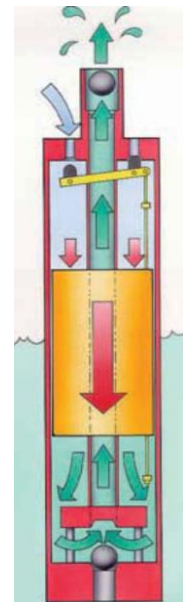
#### Empty cycle *Pump starts to empty*

The air pressure within the pump chamber causes the fluid inlet valve to close.

The fluid is then displaced from the pump chamber up through the discharge pipe.

As the fluid level in the pump is lowered the float actuates the lever to close the air supply and open the air exhaust valve.

A new cycle begins.



# LANDFILL LEACHATE

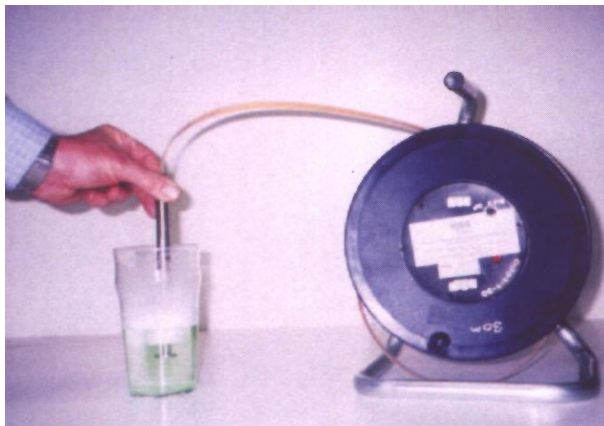
## LEVEL MEASUREMENT

### *Anti-Foam Dip Meter*

The **Anti-Foam Dipmeter** has been designed to measure the leachate level within gas/leachate wells or sumps.

The special shroud is unaffected by the presence of leachate foam found within wells, particularly where leachate is being pumped and/or positive gas extraction occurs.

Once the float comes in contact with liquid (**NOT FOAM**) an audible buzz is heard together with a visible red light.



#### FEATURES :

- ◆ Measures liquid not foam
- ◆ Simple to use
- ◆ Easy to clean
- ◆ Robust construction
- ◆ Compact design

#### SPECIFICATION :

Shroud diameter:	34 mm
Shroud length:	60 mm
Shroud material:	Brass
Probe material:	Austenitic stainless steel
Tape type:	Steel mm markings
Tape width:	9,5m
Tape coating:	Cross linked polyethylene
Tape lengths:	30, 50, 100, 150, 200, 250, 300 meters *
Real type:	Polypropylene
Real diameter:	230mm
Audible indicator:	70 db(A) buzzer
Visual indicator:	Red LED
Power:	9 volt PP3 battery



Specifications may be changed without prior notice

\* Special lengths available on request

# LANDFILL LEACHATE

## LEVEL MEASUREMENT

### *Water Level Dip Meter*

**Water Level Meters** (Dipmeters) are used to determine the water level within a borehole, piezometer pipe or sump.

It consists of a stainless steel shrouded probe, specially designed to minimise displacement errors, providing unparalleled accuracy particularly within small bore piezometer installations.

As the probe is lowered into the water, a single audible buzz is heard and a red light shows.

Mounted on a rugged lightweight drum with integral brake and probe holder for easy operation and storage with internal sensitivity control.

#### **FEATURES :**

- ◆ Slim-line 14mm probe
- ◆ High accuracy
- ◆ Simple to use
- ◆ Easy to clean
- ◆ Robust construction
- ◆ Compact design

#### **SPECIFICATION :**

Probe diameter:	14mm
Probe length:	150mm
Probe material:	Austenitic stainless steel
Tape type:	Steel mm markings
Tape width:	9,5m
Tape coating:	Polyethylene
Tape lengths:	30, 50, 100, 150, 200, 250, 300 meters *
Real type:	Polypropylene
Real diameter:	230mm
Audible indicator:	88db(A) buzzer
Visual indicator:	Red LED
Power:	9 volt PP3 battery

\* Special lengths available on request



Specifications may be changed without prior notice

# LANDFILL LEACHATE EVAPORATION

## Evaporation is the Future for Leachate Volume Reduction

Evaporation is a type of vaporization that occurs on a liquid as it changes into the gas phase.

The sun (solar energy) drives evaporation of water from oceans, lakes, moisture in the soil, and other sources of water.

There are three main factors that impact the evaporation process:

- Air Density,
- Temperature and
- Humidity



The evaporator system is a mechanical atomizer, dividing a set volume of liquid into millions or billions of droplets.

As droplet size decrease the greater the available surface area for evaporation becomes. With a greater number of small droplets and a greater total surface area, a higher volume of evaporation is possible.

The increased surface area means more and faster evaporation is possible.



# LANDFILL LEACHATE

## EVAPORATION

Droplet sizes are measured in microns.

A micron is 1/1000 millimeter (a human hair is about 100 microns in diameter). As a basic rule droplets smaller than 150 microns tend to be the most prone to drift. These small droplets fall more slowly than large droplets because they don't have the mass necessary to easily overcome resistance of the air.

Influence of droplet size on potential distance of drift			
Droplet Diameter (microns)	Type of Droplets	Time required to fall 3meters	Lateral distance droplets travel in falling 3meters in a 1,3 m/s wind
400	Light Rain	1.9 sec	2,6 m
240	Very Fine Rain	6 sec	8,5
100	Misty Rain	11 sec	13,4 m
50	Light Misty Rain	40 sec	53,3 m

The chemical constituency of the liquid being evaporated also impacts the Mass of a droplet. Thus, suspended solids and dissolved solids can increase or decrease the molecular weight of a droplet. Anhydrous Ammonia for example is lighter than O<sub>2</sub>, having a molecular weight of 17.03 so if the liquids have high ammonia levels, the droplet mass will likely be lighter.

Thus, evaporation, which is effectively an energy transfer, will have less time to occur with heavier droplets than with lighter droplets.

### Evaporation Chart - Cubic Meters per Day:

Evaporation Efficiency 90%			
Nr of Heads	ATHENS	THESSALONIKI	ALEXANDROUPOLI
	REGION 1 m3/day	REGION 2 m3/day	REGION 3 m3/day
1	10	7	9
2	20	13	18
3	30	20	27
4	40	26	36
8	80	53	71
10	100	66	89

Evaporation Efficiency 80%			
Nr of Heads	ATHENS	THESSALONIKI	ALEXANDROUPOLI
	REGION 1 m3/day	REGION 2 m3/day	REGION 3 m3/day
1	9	6	8
2	19	12	17
3	28	19	25
4	38	25	33
8	76	50	67
10	95	62	83

Evaporation Efficiency 70%			
Nr of Heads	ATHENS	THESSALONIKI	ALEXANDROUPOLI
	REGION 1 m3/day	REGION 2 m3/day	REGION 3 m3/day
1	9	6	8
2	18	11	16
3	27	17	24
4	36	23	32
8	73	45	64
10	91	57	79

Evaporation Efficiency 50%			
Nr of Heads	ATHENS	THESSALONIKI	ALEXANDROUPOLI
	REGION 1 m3/day	REGION 2 m3/day	REGION 3 m3/day
1	7	5	6
2	14	9	13
3	22	14	19
4	29	19	26
8	58	38	51
10	72	47	64

# LANDFILL LEACHATE EVAPORATION



The evaporator is a land-based stand alone delivery system designed to be placed in a location that is ideal for evaporation. Systems have been installed on slide slopes of landfills, edges of wastewater holding ponds and a variety of other places where the water can be easily managed and evaporated.

One of the biggest advantages is that it is flexible enough to be moved to a different location fairly easily.

## Main Features:

The standard evaporation kit is designed to operate at a standard speed 3800 to 4100 RPMs (Can be adjusted but has only one setting at a time) producing a uniformed droplet size of 50 to 150 micros depending on speed you set up at a static flow rate 18 Liters per minute for the 3HP.

Each system includes a Stainless steel post with mounted stainless steel winch used to raise and lower a 4,5m to 9m adjustable arm with an additional safety chain.

An All-Weather Control Panel™ (380V 3phase), an 3HP Evaporator Head, manual flow valves, 1/4 HP centrifugal pump (larger for multiple head configurations), all plumbing from the pump to the Evaporator Head (up to 30m), 30m of wire for run from panel to Evaporator Head, and 15m of wire from panel to pump.

Multiple Head systems may include 1 panel to operate all the heads.

## Optional:

Extra wire beyond the 30m and 15m included

Flow Meter

Plumbing to Pump

Storage/Staging Tank

Wind monitoring (turns off when the wind exceeds certain speed)

Custom Stand with Shaded cover to Mount Panel

# LANDFILL LEACHATE EVAPORATION

## Similar Installations:



# Landfill Gas Monitoring

## GFM 4xx Base Model

### *Multifunction environmental monitor.*

The GFM4xx is the base model for the optimized control and maintenance of landfill gas extraction systems and flares.

The GFM4xx is a lightweight, hand-held instrument that has been designed and manufactured for use in the most challenging field conditions.

When using the instrument the back-lit screen offers operational use to take place even in poor light conditions.

The large battery life allows detailed gas analysis to take place for extended periods of time.

The instrument allows the measurement of the 3 key gases in landfill management and is designed to help landfill engineers minimise down time and maximise efficiency.



### Standard Features

- Gases measured: CH<sub>4</sub> (0-100%), CO<sub>2</sub> (0-100%), O<sub>2</sub> (0-25%)
- Variety of pressure expansions available
- Atmospheric Pressure (AP)
- ATEX certified (II2G EEx ib IIB T1)
- Manual data storage and programmable unattended.
- Data logging functions - over 3000 readings storage capacity.
- Internal pump.
- 12 month re-calibration interval.
- 8hr Rechargeable battery life.
- Supplied with leather case, charger, spares, USB memory stick with manuals and calibration certificate.

### Optional Features Available

- Optional Additional Gases :H<sub>2</sub>S, NH<sub>3</sub>, CO , H<sub>2</sub>
- Static , Differential Pressures
- Lower Explosive Limit (LEL)
- Peak Methane (CH<sub>4</sub>), Carbone Dioxide (CO<sub>2</sub>)
- Hard protective transport case
- Temperature Probe -10 to 60C Input
- Vane Anemometer 0,5 to 40m/s Input
- Field exchangeable battery pack



NOTE: The above Standard & Optional Features may differ, according to client requirements.

# Landfill Gas Monitoring

## Portable Gas Analyzer

The base model for the optimized control and maintenance of landfill gas extraction systems and flares.

Lightweight, hand-held instrument that has been designed and manufactured for use in the most challenging field conditions.

The large battery life Li-ION 20Ah allows detailed gas analysis of 10 hours of continuous operation.

The instrument allows the of Methane (CH<sub>4</sub>), Carbon Dioxide (CO<sub>2</sub>), Oxygen (O<sub>2</sub>) and Hydrogen Sulfide (H<sub>2</sub>S) in many applications like landfills, co-generation plants, etc and is designed to help landfill engineers minimise down time and maximise efficiency.

### Standard Features

The analyzer uses a long life electrochemical cell for O<sub>2</sub> (3-5years), a specific electrochemical cell for H<sub>2</sub>S, and two separate IR sensors for CH<sub>4</sub> and CO<sub>2</sub>, assuring precise and reliable measures.

#### ***Infrared for CH<sub>4</sub> and CO<sub>2</sub>***

Range: 0-100% for CO<sub>2</sub> & CH<sub>4</sub>  
Linearity: within +/- 10%  
Zero repeatability: +/- 0,05%  
Span repeatability: +/- 0,1% at 5%, +/- 2% at 100%  
Response time T90: <30s

#### ***Electrochemcial cell for O<sub>2</sub>***

Range: 0-25% for O<sub>2</sub>  
Accuracy: +/- 1% f.s.  
Response time T90: <15s  
Average life: 3-5 years

#### ***Electrochemical cell fo H<sub>2</sub>S***

Range: 0-2000ppm for H<sub>2</sub>S  
Linearity: 0 to -40 ppm error at f.s., linear at zero and 400ppm H<sub>2</sub>S  
Response time T90: <25s



### Technical Features

**Warning light:** Battery status (on the rear side)  
**Power supply:** Rechargeable Li-Ion 20Ah battery (ca. 10 hours of continuous use)  
**Operating temperature:** 5-40°C  
**Sampling pump:** internal (200ml/min)  
**Warmup time:** less than 60 sec  
**Dimensions and weight:** 230(h) x 210 x 80 mm; 1,2 Kg

### Standard Accessories

- hygroscopic 0,2μ disk filter
- PVC sampling tubing
- battery charger
- plastic bag with shoulder belt, with transparent front cover which allows the reading of the display without opening the bag.



# GAS ANALYSIS and CONTROL

## FIXED SYSTEM

### “Click” System

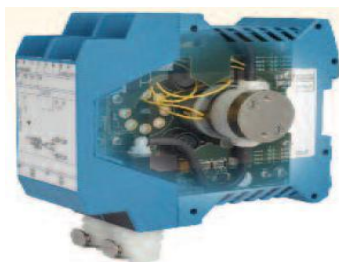
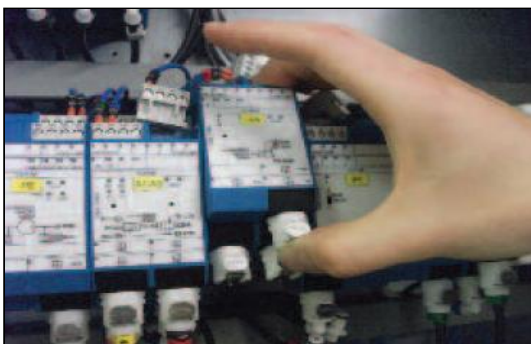
Click! modular fixed systems are a simple but highly effective solution for on-line biogas analysis. Designed for easy self-maintenance and expansion, Click! systems give users greater flexibility over traditional on-line gas monitoring systems.

A typical Click! system installation contains all the necessary component parts such as gas analyzers, pumps, filters and switching valves that have a working or calibration life, and would possibly need to be changed during traditional service visits. Designed for reliability and long service life downtime and minimized service visits.

Basic operational maintenance can be conveniently carried out by a qualified electrician.

#### FEATURES:

- ◆ CH<sub>4</sub> (Methane), CO<sub>2</sub> (Carbon Dioxide), O<sub>2</sub> (Oxygen), CO (Carbon Monoxide), H<sub>2</sub>S (Hydrogen Sulphide), NH<sub>3</sub> (Ammonia), plus many more and are available in several ranges
- ◆ Continuous and timed sampling available
- ◆ Pressure and Flow measurement
- ◆ Temperature measurements
- ◆ Flow measurements using optional flow device
- ◆ Modular design for self maintenance
- ◆ Interface to orifice plates and pilot tubes
- ◆ 4-20 mA and digital input/output
- ◆ Remote Telemetry using GSM/GPRS, MODBUS, PROFIBUS etc.



#### Applications :

- Flare gas and flow monitoring for PPC regulations
- Landfill gas extraction gas and flow monitoring

#### Data logging

All data from the Click! System can be remotely downloaded using mobile phone technology and published to a secure area of [www.gasdata.net](http://www.gasdata.net), allowing customers to generate reports and view all data online.

This remote communication also allows users to enter gas alarm trigger levels and generate email and text alerts. The facilities also allow access advanced diagnostic tools and carry out software updates as required.

Specifications may be changed without prior notice.

# GAS ANALYSIS and CONTROL

## Landfill Gas Sampling Kit

Serious site investigations should also require periodic verification of onsite readings together with quantitative analysis of minor gas components and investigation of the origin of some of the bulk gasses, most commonly methane.

This analysis is laboratory based and involves a variety of techniques from Gas Chromatography to Mass Spectrometry.

Gas Sampling Equipment is generally accepted as the most reliable and cost effective method of taking a gas sample for laboratory analysis. This is due to the ease with which a sample can be taken at the site and the convenience of transporting it to the laboratory for analysis. A sampling kit weighing only 5 kg and requiring no electrical supply is widely used for most applications. The compressed sample can be introduced from the cylinder into the analyser via a dosing valve or septum allowing a comprehensive analysis to be carried out from a single sample.

The cylinders used are extremely durable and are available in aluminium alloy and stainless steel. At the recommended pressure of 14 Bar the most popular 55ml cylinder will contain nearly 0.75l of sample gas at atmospheric pressure.

### Gas Sampling Kit contains:

- ◆ One Gas Sampling Pump,
- ◆ six 55ml Stainless Steel Sample Cylinders,
- ◆ Filling Indicator,
- ◆ Purging Attachment,
- ◆ Connecting Tube,
- ◆ Spare Valves with Insertion Tool.
- ◆ All items in the Kit are available separately.

### Taking a Sample:

The sample is collected by "Pumping" the Pump until the required pressure of sample is obtained within the Sample Cylinder.

This can be monitored by using the Filling Indicator or by counting the number of Double Strokes, (Push/Pull), of the Pump that have been made. As a guide the table below shows the number of Double Strokes required to obtain a sample of 14 bar (200 psi) in the different size Sample Cylinders available.



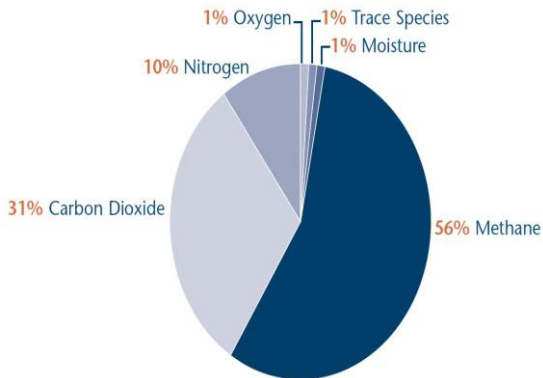
Cyl Capacity (ml)	15ml	30ml	55ml	70ml	110ml
No Push Pull Strokes	9	16	24	33	43

Specifications may be changed without prior notice.

# LANDFILL GAS

## FLARE UNITS

Landfill gases shall be collected from all landfills receiving biodegradable waste and the landfill gases produced during the decomposition of waste is a potent contributor to the global green house affect and also pose significant health and safety risks. Thus must be treated and due to it's often rich in methane content represent a potential energy source which can be used to produce energy.



The main division in the types of flare on the market is between open and enclosed flares. The original landfill gas flares were of the open design. However, European legislation, in reducing green house affect calls for high combustion temperatures and specific residence times, has developed the market for enclosed flares. In addition, the two basic categories can be further divided according to the way in which air is mixed with the landfill gas.

### OPEN FLARES

The original landfill gas flares were of the open design. Open flares are also known as elevated flares. Open flares burn landfill gas as open flames, though a windshield is normally fitted. Combustion is rudimentary and with no control over the range of temperature or degree of combustion which occurs. Due E.U. legislation pushing for higher & higher environmental standards these has become less popular these days but still are been used to same cases owing to their simplicity and lower cost.

### ENCLOSED FLARES

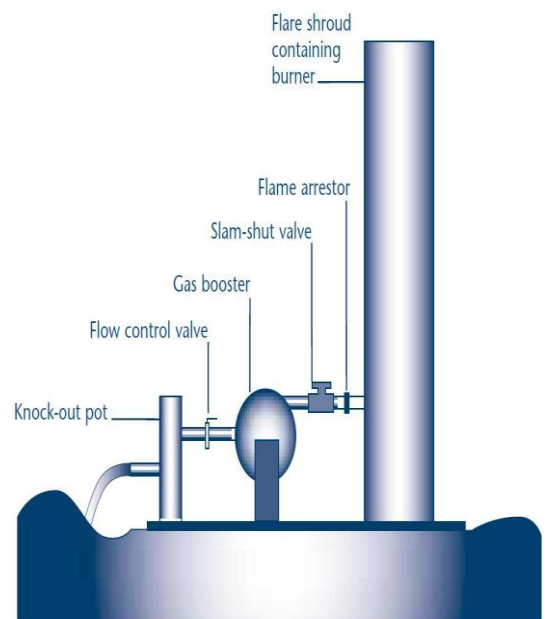
Enclosed flares are also known as ground flares. Enclosed flares burn landfill gas in a vertical, cylindrical stack enclosure. Combustion is controlled ensuring stable temperature and controlled emissions. The enclosure is often insulated to reduce heat losses and allow operation at higher temperatures.

### BASIC FLARE ARRANGEMENT

The technology of a landfill gas flare is conceptually very simple: landfill gas is brought into contact with a supply of air and ignited. A variety of configurations of conduits and chambers can be used for the purpose. Whatever the exact design of the flare, however, it will comprise a number of basic elements, in addition to piping, valves and the body of the flare.

The basic elements common to open and enclosed flares are:

- **gas cleaning/conditioning** before the flare to remove moisture and airborne debris, from within the landfill gas;
- **a blower or booster** developing the head of pressure needed to feed landfill gas to the flare;
- one or more **flame arrestors** in the feed line to prevent flash-back of the flame down the pipe;
- some method of **control** over the flow rate to the burner, and possibly over the supply of combustion air;
- **a burner** designed such that it maintains turbulent mixing of air and fuel and that the velocity of the gas is high enough to reduce the risk of flash-back of the flame down the feed pipe without blowing off the flame;
- **a flame detector** to check that ignition has been successful and combustion is taking place – this facility is normally provided with enclosed flares but it is more difficult for open flares since the location of the flame can be highly unstable.
- **an ignition system** to light the gas mixture on start-up;





# LANDFILL GAS

## OPEN FLARE UNITS

The **GFE range** is a compact range of elevated landfill gas flares for small to medium sized landfill sites. The high temperature stainless steel flare tip together with the condensate knockout pot, gas fan and control panel are all mounted on a compact robust galvanised chassis all pre-assembled for immediate use.

Ideally suited for temporary pumping trials or permanent installation the **GFE range** provides an economical, safe and efficient gas control flare.

Model Specification		GFE-100	GFE-300	GFE-500	GFE-800	GFE-1000	GFE-1500	GFE-2500
Landfill gas flow rate	Nm <sup>3</sup> h <sup>-1</sup>	20-100	60-300	120-600	160-800	200-1000	300-1500	500-2500
Max power consumption	kWe	1,5	5,5	11	18,5	15	18,5	22
Booster max pressure	mbar	100	150	150	175	164	185	165
Combustion range CH <sub>4</sub>	% vol	20-60 %	20-60 %	20-60 %	20-60 %	20-60 %	20-60 %	20-60 %
Flame temperature*	°C	>850 °C	>850 °C	>850 °C	>850 °C	>850 °C	>850 °C	>850 °C
Noise level	dB(A)	<80	<80	85	88	88	91	91

Other options are available upon request.

We reserve the right to alter specification without prior notice

### General Specifications :

- PLC control, Enclosure to IP55
- Galvanized condensate knockout pot
- Centrifugal blower, in mild or stainless steel
- Motor ATEX compliant
- Direct drive or Belt drive
- Star-Delta or soft start starting
- "Motor trip" automatic cut out function onto the control panel
- Pneumatic or electric operated burner supply safety shut-off valve
- Deflagration ATEX flame arrester
- High suction switch
- Manual gas/air mixer combustion control
- High energy spark ignition
- Flame monitoring & UV sensor

### Chassis & Pipe work :

- High temp stainless steel burner & burner shroud
- Gas sampling and instrument ports
- Welded to EN287-8
- All pipe work is hot dip galvanised to BS EN ISO 1461 or/and painted

### Options :

- SS condensate knockout pot & PP or SS demister element
- Pumped drainage system, Trace heating and insulation
- Stainless steel Pipe work
- Gas fan inlet ATEX flame arrester
- Flow indicator manometer, local digital display
- Thermal mass flow meter, local digital display
- Dual point thermocouple, temperature monitoring and display
- Inlet gas analysis system Automatic temp controlling thermocouple
- PLC based data logging & Telemetry
- Extended shroud to hide visible flame
- Ceramic fibre insulation
- Trailer and Roll on off mounted models
- Other options available to suit customer requirement
- Other capacities to 3000 Nm<sup>3</sup> h<sup>-1</sup>



\*The temperature is dependent on the gas quality and section of flame monitored.

Should the gas quality be <25% then the temperature may be less than 850°C & temperatures up to 1000°C is possible.

# LANDFILL GAS

## OPEN FLARE UNITS

### *Installations & Features*



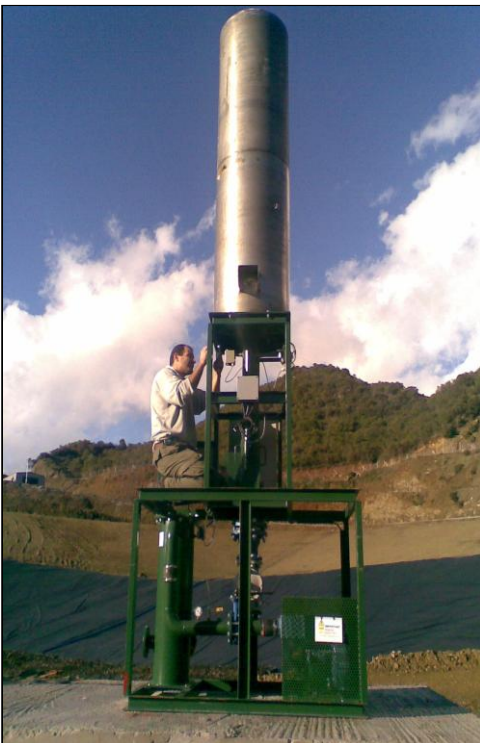
**GFE-100**



**Flame Arrester  
electric operated safety shut-off valve**



**GFE-150**



**GFE-400**



**Control Panel c/w Flow & Temp digital display**

# LANDFILL GAS

## HIGH TEMPERATURE FLARE UNITS

The **HTF range** fully comply with the latest and stringent emission standards within EU, including TA Luft and UK's Environment Agency whilst minimize energy requirement. A PLC continues monitor the optimum combustion temperature automatically regulating forced air draught in the fuel/air mixture in the combustion chamber. Cyclonic burner provides residence time >0.3 sec. This results combustion temperatures between >1.000°C up to 1.250 °C thus results to low emissions. The **HTF range** comes in various flow rates starting from as low as 50 m3hr1 through up to 6000 m3hr1.

Also the **HTF range** may in different configurations be used as part of a Utilization project, Containerized, Single or Twin stage blowers, Duty-Standy or Duty-Duty.

### Downstream of the booster:

Inlet flange with manual lever operation isolation valve  
Vacuum pressure & temp gauge  
Gas sample port, , flow indicator manometer or digital read-out.  
Galvanized Condensate knockout pot  
Polypropylene demister element,  
Pressure gauges across the demister  
High condensate level switch  
HDPE condensate drain lance and liquid seal vessel

### Gas Booster:

Centrifugal blower, in mild or stainless steel, ATEX compliant,  
Direct or belt drive, Star-Delta starting.  
"Motor trip" automatic cut out function onto the control panel.

### Upstream of the booster:

Fan outlet pipe c/w vacuum pressure & temp gauge  
Gas sample port, Anemometer inlet  
Manual lever operation burner control valve  
Pneumatic operated safety shut-off valve  
Deflagration ATEX flame arrester  
Provided with pressure gauges and temperature sensor  
Pilot burner gas train

### Flare Stack:

High temperature stainless steel burner  
Galvanized steel combustion chamber  
125mm thick 1265°C 128kg m-3 ceramic fibre insulation  
Spark ignition into pilot burner  
Flame monitoring (°C PID adjust & display), UV sensor,  
Modulating damper, electrically actuated  
Automatic temp controlling thermocouple

### Options:

Multiple inlet manifold, Stainless steel Pipe work,  
Stainless steel Condensate knockout pot,  
Stainless steel demister element,  
Pumped drainage system, Trace heating and insulation,  
Orifice plate flow meter, Thermal mass flow meter,  
Digital transmitter display on control panel,  
Gas fan inlet ATEX flame arrester, Belt drive,  
Pressure digital transmitter in mbar on control panel,  
Other options available to suit customer requirement



### Material of construction:

- Combustion chamber: AISI 304
- Piping: AISI 304
- Burner: AISI 304
- Support: AISI 304

Twin stage blower, Acoustic enclosure,  
Low pressure switch, Gas analyser inlet,  
Inlet gas analysis system,  
Data logging & Telemetry  
Electric operated safety shut-off valve

# LANDFILL GAS

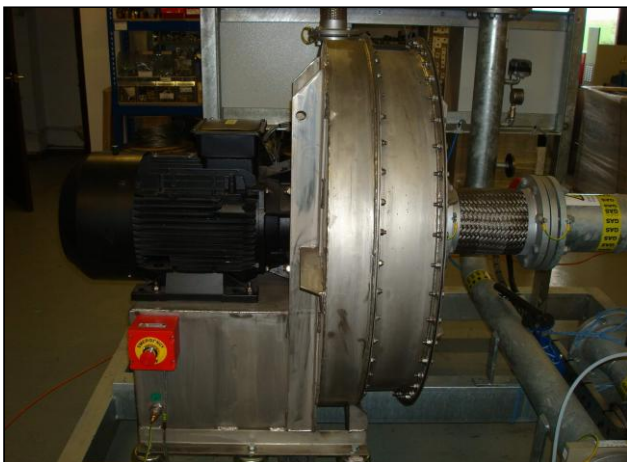
## HIGH TEMPERATURE FLARE UNITS

### *General Specification*

Model Specification		HTF-100	HTF-300	HTF-500	HTF1000	HTF-1500	HTF-2000	HTF-2500	HTF-3000
Landfill gas flow rate	Nm <sup>3</sup> h <sup>-1</sup>	20-100	60-300	120-600	200-1000	300-1500	400-2000	500-2500	600-3000
Minimum Burner Capacity	kW	100	300	600	1000	1500	2000	2500	3000
Maximum Burner Capacity	kW	500	1500	3000	5000	7500	10000	12500	15000
Combustion range CH <sub>4</sub>	% vol	20-60 %	20-60 %	20-60 %	25-55 %	25-55 %	25-55 %	25-55 %	25-55 %
Flame temperature	°C	1000 - 1200							
Minimum Residence Time	sec	>0,3	>0,3	>0,3	>0,3	>0,3	>0,3	>0,3	>0,3
Blower Type		CL	CL	CL	CM	CM	CM	CM	CM
Blower Material		Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
Motor	kWe	0.75 - 3	2.2 - 5.5	5.5 - 7	7.5 - 15	15 - 30	15 - 30	15 - 30	15 - 30
Power Supply		400V+N+T 50 Hz							
ATEX		Ex II 2 G - Ex-nA II T3							
Blower Duty pressure	mbar	150	150	150	150	150	150	150	150
Turn Down Ratio	ratio	1:5	1:5	1:5	1:5	1:5	1:5	1:5	1:5
Ignition on Pilot		High Energy Spark							
Noise level	dB(A)	Low Noise Levels							

Other options are available upon request.

We reserve the right to alter specification without prior notice



**Direct-drive twin stage blower**



**Duty – Standby Belt Drive blowers**

# LANDFILL GAS

## ENCLOSED FLARE UNITS

### Features



**Skid mounted chassis**



**Wide range of control systems**



**Ceramic fibre blanket rated up to 1420°C**



**Control panels are pre-wired & tested to speed installation and commissioning & Acoustic housing to minimise noise**



**Telemetry panel**



**Fireblaster landfill gas Pilot**



**Flow measurement**



**Landfill Gas Analyser panel**



**Fully comply to ATEX regulations**

# LANDFILL GAS

## ENCLOSED FLARE UNITS

### *Installations*



# GAS UTILIZATION

## Benefits & Opportunities

### Benefits

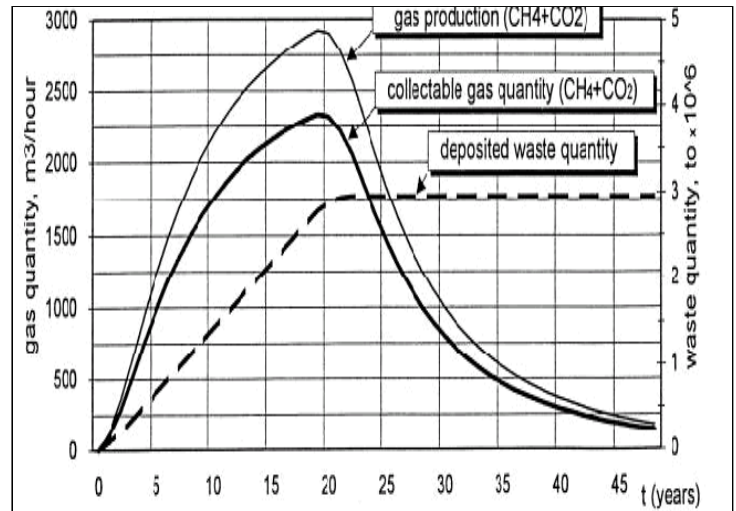
Landfill Gas is comprised of 60% methane and 40% carbon dioxide. The climate relevant effect of Methane CH<sub>4</sub> is 21 times higher than that of Carbon dioxide CO<sub>2</sub>

Landfill gas presents an alternative to conventional fuels.

One ton of municipal waste produces a realistic figure about 100 to 200 m<sup>3</sup> N of landfill gas with a methane content of about 40 to 50% in a time period of 15 to 25 years.

Each tonne of waste placed in the landfill may produce between 175 and 350 kWh of electrical power.

If the methane is collected and, instead of being burnt in a flare, is fed to an electricity generating set then useful power can be produced from the biodegradable waste in the landfill.



An average municipal waste landfill with an utilized storage capacity of 1,000,000 tons can be expected to produce at peak 700 m<sup>3</sup>/hr of landfill gas and this gas amount allows operating a 1 MW gas engine for power generation.

1 MW of electricity generation from landfill gas over a period of ten years prevents the release of 35,000 tones of carbon dioxide emissions from fossil fuel power stations over the same period that corresponds roughly to the demand of 2,600 EU households.

### Opportunities

Our Company and our most experienced and highly qualified Landfill Gas Project team partners :



- Can provide a consultancy service covering all aspects of landfill gas environmental control and utilization.
- Besides that we may offer our services in design, supply, build and operate a landfill gas generation project on your landfill site.
- Further that we may undertake to design, build, operate and finance a landfill gas extraction and utilization scheme at your site at no cost to the landfill operator and then pay a royalty on energy sales.

In any case we can provide the landfill operator with benefits such as :

- An exemplar renewable energy project;
- Elimination of the capital and operating costs of installing and operating landfill gas collection and disposal facilities at the site; and
- A substantial ongoing royalty payment stream.

