

The *REVOLUTIONARY* DryVac Dewatering and Drying System



DryVac Producing
Class A Bio-Solids

SAFE ENERGY EFFICIENT SIMPLE & FLEXIBLE

**Organic and inorganic sludges and
slurries dewatered and dried
in one operation**

www.desllc.biz



**Designed & engineered to
meet your needs by**

DES, inc.

Dehydration & Environmental Systems, Inc.

DryVac – How it Works

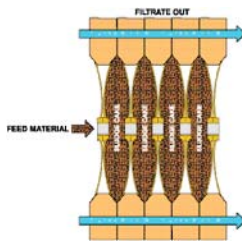
The DryVac technology provides a cost effective integrated process for dewatering and drying, handling organic and inorganic waste streams equally well. In a single operation involving two stages, the liquid waste is first dewatered and then dried. While the DryVac unit appears physically similar to standard plate filter presses, the actual plates are replaced by *DryVac Elastic Envelope Modules (DEEMs)*{patent pending}. These modules expand and contract according to pressure being applied either externally or internally.

Stage One: the dewatering takes place in a very similar way as with conventional plate presses. That is, conditioned sludge is pumped into the sludge chambers, which are lined with filter cloths; solids are retained in the press while liquids are forced out.

Stage Two: is where the DryVac process differs from standard plate filtration presses. In the drying stage, low-pressure steam is used to inflate the DEEMs and, at the same time, a vacuum is applied to the filtrate ports. During this process the cake is squeezed as the DEEMs inflate. The application of heat to the filter cake and the pulling of a vacuum on the filter chamber result in the remaining water being vaporized at low temperature. The walls of the expanding DEEMs remain in contact with the sludge ensuring effective heat transfer. By regulating the duration of the drying stage, the dry solids of the end product can be accurately controlled. Because the cake is much drier than with a conventional press, at the end of the drying cycle the solids drop out easier, leaving the DEEMs relatively clean.

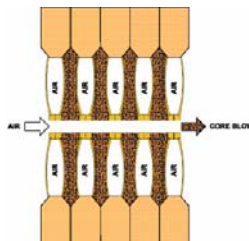
The process is energy efficient and it allows wide flexibility of design when retrofitting existing presses. The DryVac systems are available in capacities ranging from 0.06m³ to 20m³ or more. The system is supplied in modular formats for ease of installation allowing maximum flexibility; fully mobile units are also available.

The DryVac Dewatering and Drying Process



Feed Cycle

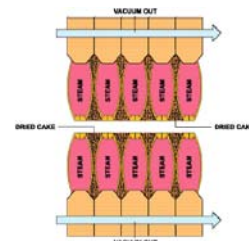
Conditioned sludge is fed into the chambers with the feed pump.



Pressure and Air Blow Cycle

Pressurized air is introduced into the chamber to squeeze the cake.

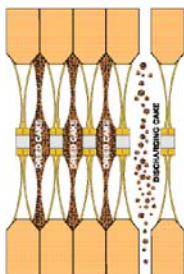
Pressurized air is blown through the cake to remove water.



Drying Cycle

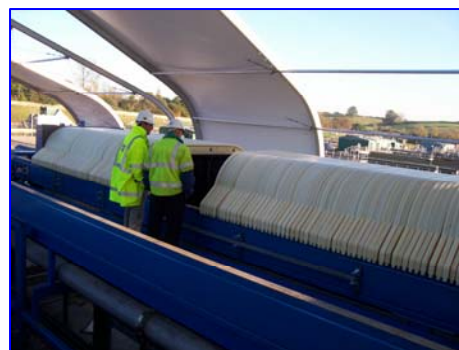
Steam is applied to the steam chamber.

Vacuum is drawn on the 'cake' via the filtrate ports.



Discharge

Steam and vacuum are turned off and DEEMs{patent pending} deflate. Dry product drops out as the press is opened.



1 of 4 Units
Coventry, United Kingdom

Toll Free 1-800-992-9113

The Benefits

SAFE

- Automated units are available
- Negligible odor emissions
- No explosive dust environment
- 1 BAR steam (15 PSI)

SIMPLE & FLEXIBLE

- Surplus activated, primary or diegested materials
- Variable feedstocks
- Dewateres to 20-40%
- Dry materials to 99%
- Low Maintenance
- Automated Operation
- Skid mounted if desired
- Modular Construction
- Retrofits to Exsistng presses

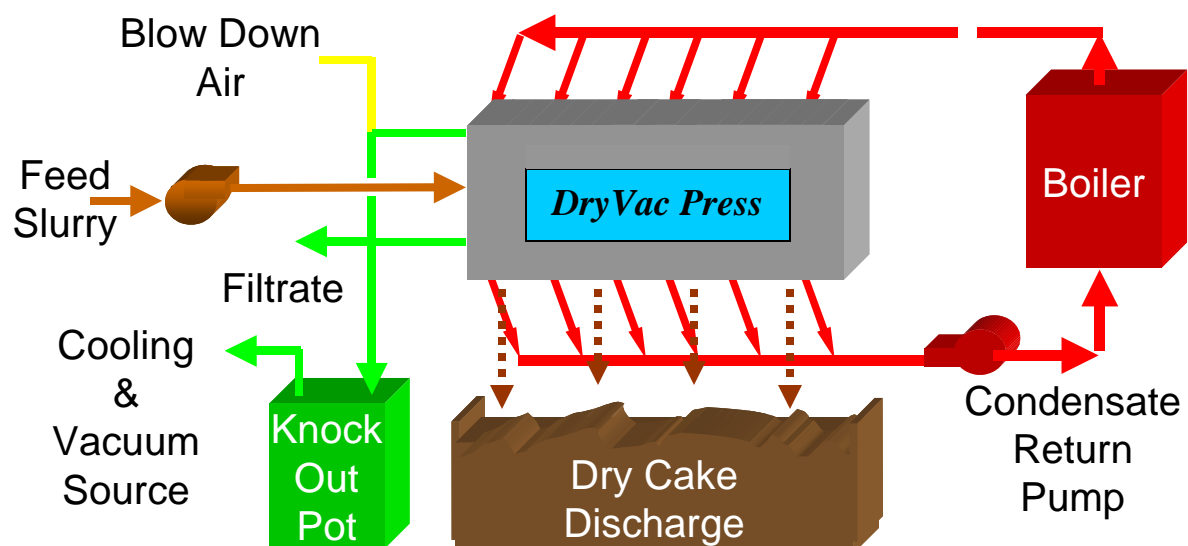
Materials can be tested
at our main facility or
by our mobile DryVac units;
call for information

ENERGY EFFICIENT

- Dewatering and thermal vacuum dehydration
- Combined effect of pressure, heat and vacuum
- Can make use of waste heat
- Excellent heat sink for CHP schemes



Basic Process Layout



DryVac in Wastewater Treatment

There are DryVac installations worldwide with several plants in the USA in applications involving municipal wastewater treatment; other units worldwide are processing industrial bio-solids as well. In most of these applications, plants are typically fed with sludge ranging from 0.5% to 7% solids.

The dewatering process typically requires chemical treatment.

The sludge is dewatered over 45 minutes to one-hour in the beginning of the process; this usually achieves a dryness of between 20-40% solids depending on materials and chemical pre-treatment. Low-pressure steam (120c) is then applied to the DEEM's{patent pending} as a vacuum is applied to the filtrate ports, and the drying phase proceeds.

The remaining moisture is 'boiled off' in a process that can be halted at any time to achieve the desired moisture level. At the conclusion of the drying phase the DryVac equipment is opened up and the dried sludge drops to a conveyor or auger below.

Activated Sludges

The processing of activated sludge and the sludge produced in SBR's/MBR's is a common problem in wastewater treatment, as the material is difficult to dewater and has a negative impact on digestion processes. Often, it is mixed with other sludges prior to processing in an effort to improve its digestion and dewatering characteristics, but this can result in an overall drop in sludge handling efficiencies.

By treating activated sludges in the DryVac process separately from other sludges, it is possible to dry it to a level that makes economic sense. If required, the activated sludge can then be blended back with other sludges for the disposal route of choice. This could include gasification, incineration or land application.

Summary of DryVac Advantages

- DryVac can compete favorably with, and overcome many of the negatives associated with the liming of sewage sludges; the process is virtually odorless.
- From a health and safety viewpoint the process is relatively simple with minimal risk.
- Dried food products can be stabilized and be stored indefinitely.
- The potential to achieve higher dry solids means less cost of transport and disposal.
- Enhanced treatment is achieved.
- Flexibility of disposal options.
- Excellent fit with waste to energy projects.
- Potential for Combined Heat and Power applications with DryVac providing an excellent heat sink.

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