



CADABCO ENGINEERING
GASOLINE VAPOUR RECOVERY SOLUTION



**GAS STATION and
SMALL TERMINAL
VAPOUR
RECOVERY
UNIT**

About Us



The Team of Cadabco Ltd is motivated and experienced one. We have over 15 years of experience in the field of the Hydrocarbon Vapour Recovery Systems for different fields and applications, but mostly in the Petrol Terminals and in gas stations.

Our effort is to provide a scalable and feasible solution bringing economic benefit for the petrochemical industry, thus preserving the ecology and making the working environment greener and cleaner.

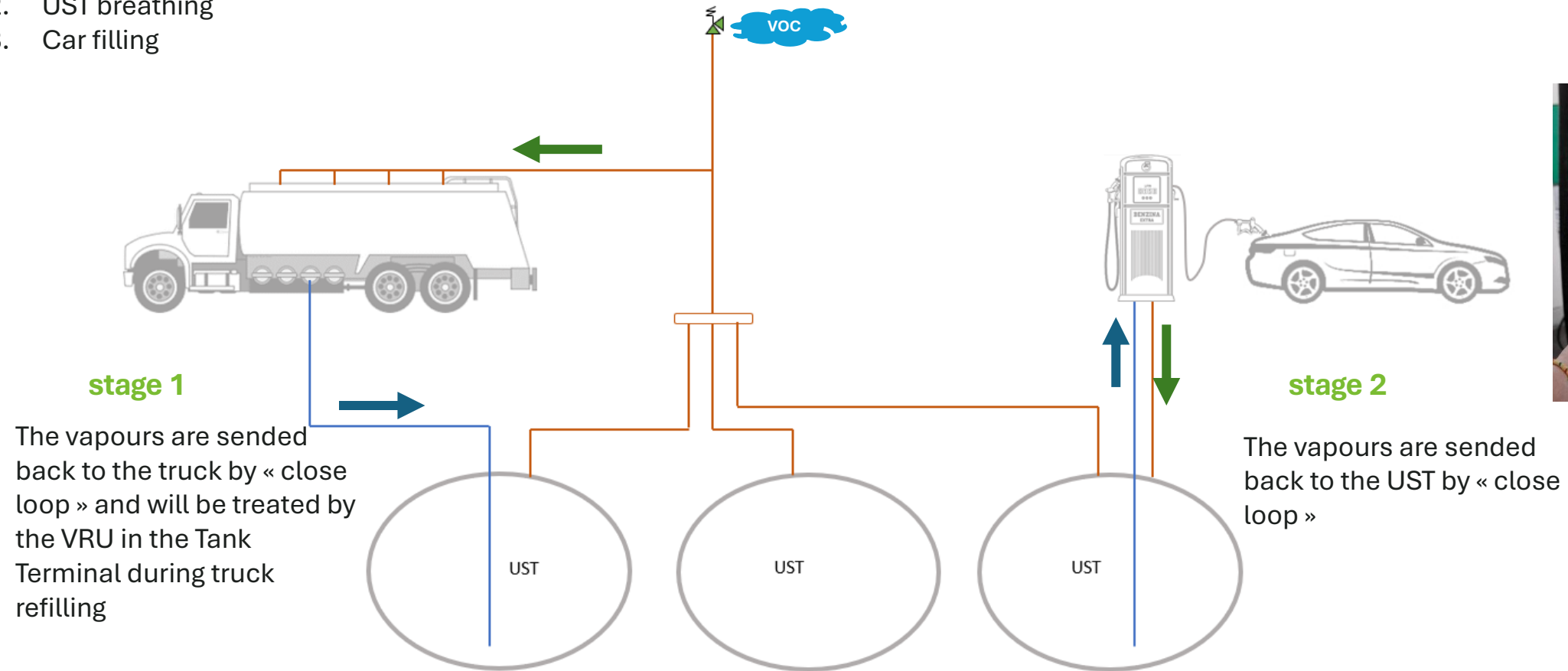
We believe that with the common efforts we can achieve our goals of zero emissions in the atmosphere from the gasoline distribution process.



Gas Station emissions

As a first step we have to understand where are the sources of emissions in a gas station

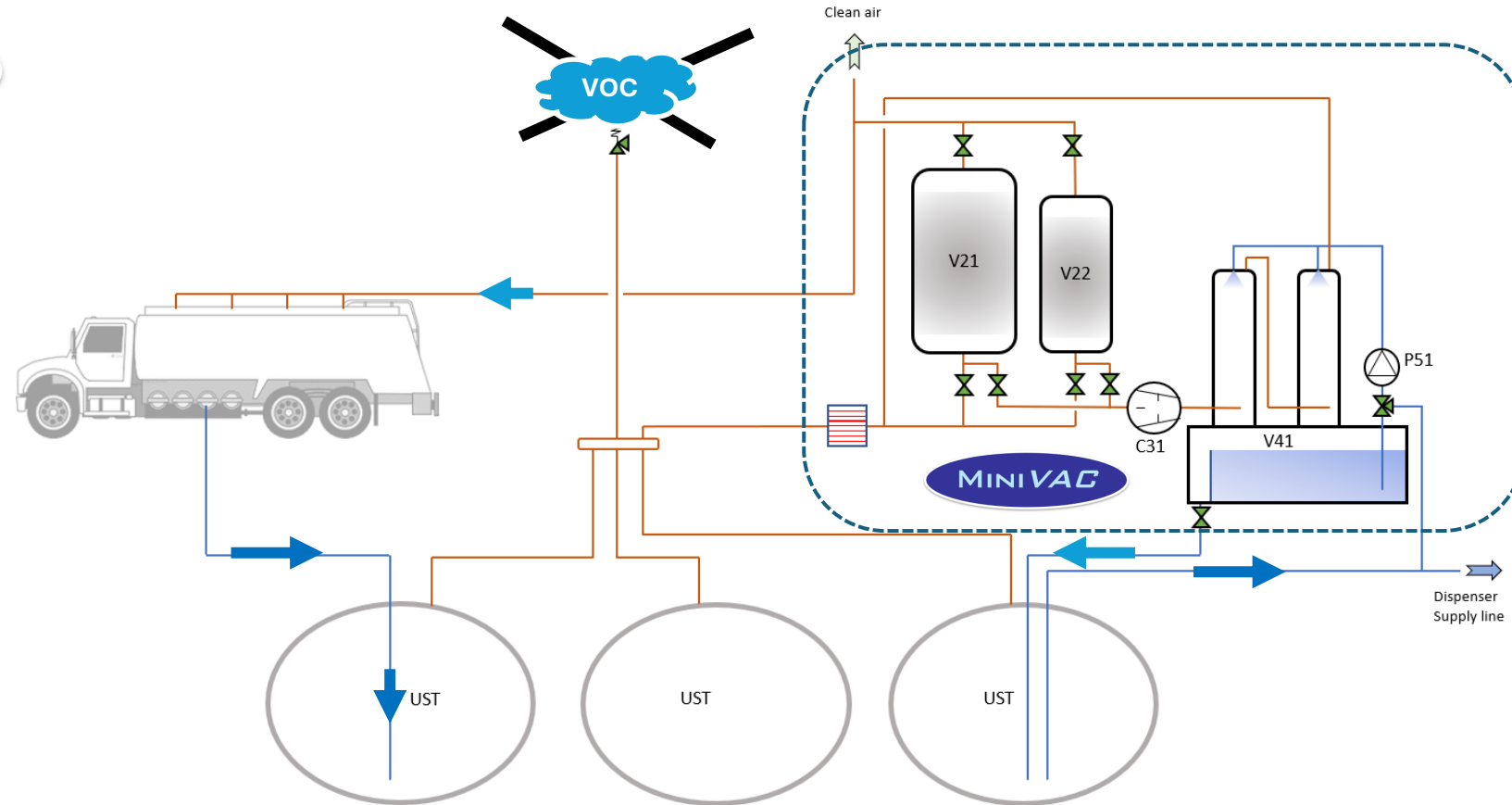
1. UST (underground storage tank) filling
2. UST breathing
3. Car filling



By installing stage 1 & stage 2 the major VOC emissions are recovered, but there are still some emissions due to tank breathing and stage 2 efficiency

PROCESS

MICROVAC INSTALLATION



The MINIVAC will treat all the vapour occurring during the liquid transfer in the gas station and the UST breathing

The efficiency of the unit is greater than 99%

The MINIVAC give also the possibility to increase the efficiency of the Stage 2 by increasing the return vapour flowrate from the dispenser. The exciting vapours are directly treated by the MINIVAC

PROCESS



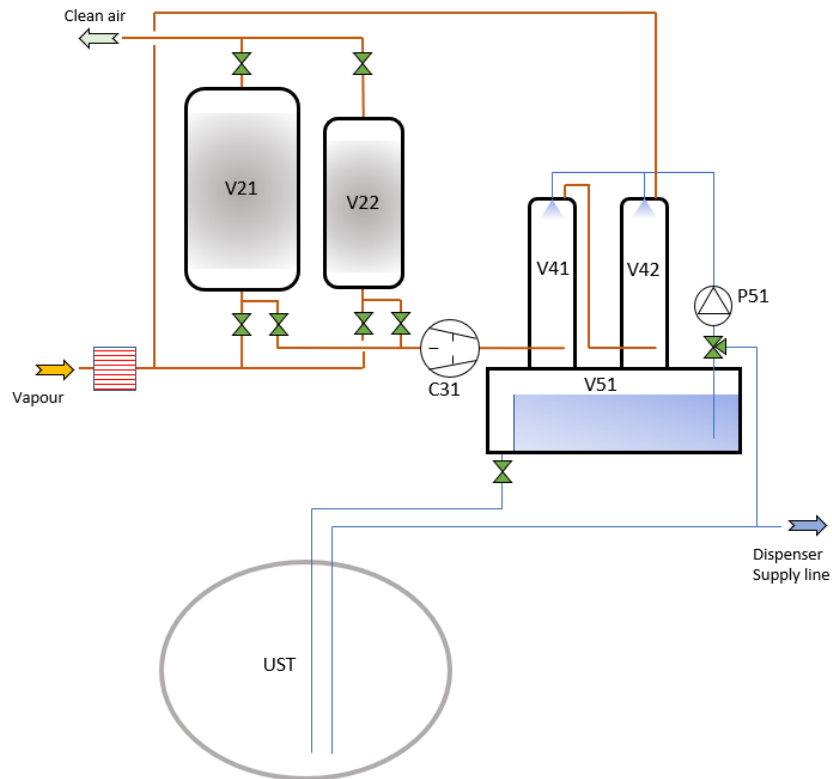
The Vapour Recovery Process proposed is based on adsorption on activated carbon and regeneration of the saturated carbon by the dry vacuum technology.

During emptying of the truck the vapours present in the underground tank will be pushed out through the carbon bed, where the hydrocarbon components will be adsorbed, whilst the clean air is vented to atmosphere.

Any excessive vapour from car re-filling (stage2) and UST breathing will also be treated by the system.

Once the truck is emptied, the carbon bed needs to be regenerated. This will take around 1 to 2 hours

The unit is working with 2 activated carbon beds in order to avoid any pressure increase in the UST



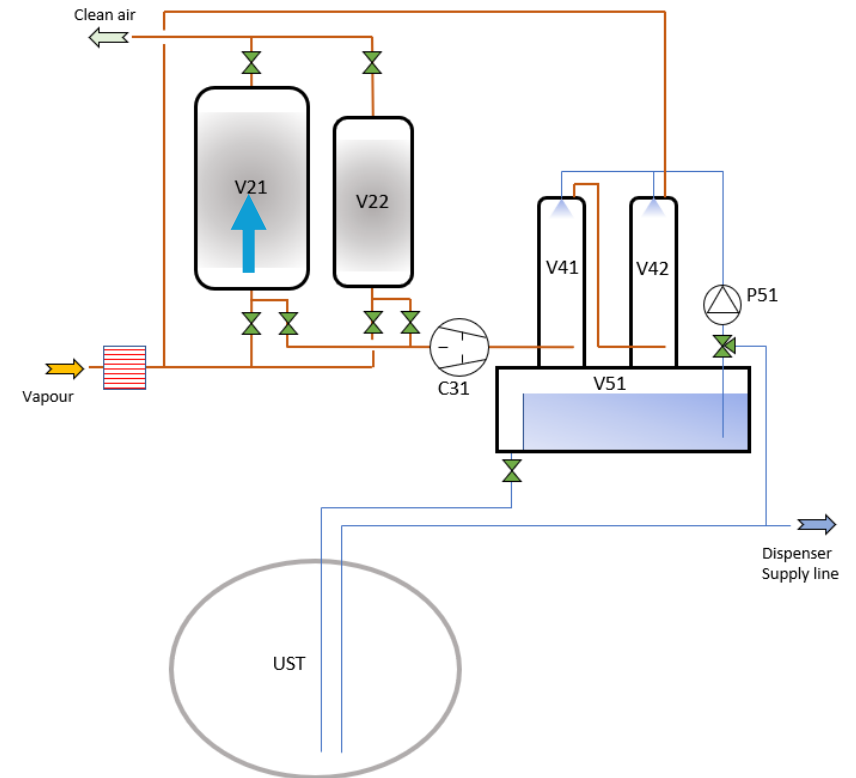
PROCESS



STEP BY STEP ADSORPTION V21

In stand by mode V21 vessel will take all the vapours occurring during the operating of the gas station or the terminal

The saturation status will be given at the end of the unloading of a gasoline truck for gas station or the end of the truck loading for a terminal



PROCESS



STEP BY STEP REGENERATION

After saturation of the vessel we are starting a regeneration process
 Refreshing of the gasoline in the buffer tank V51 by starting P51 for
 T1

Closing of V21 opening V22

Start Vacuum pump C31 for preheating

Open vacuum valve of V21

After T2 open purge valve of V21

After T3 close vacuum valve of V21

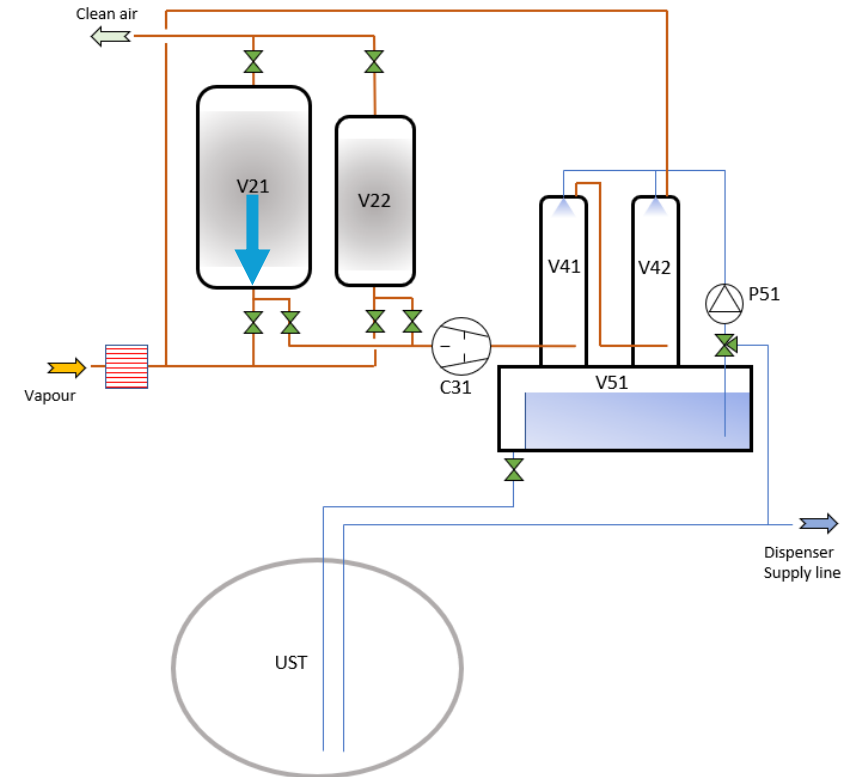
Open V21 close V22

Open vacuum valve of V22

After T4 purge V22

After T5 stop Vacuum pump C31

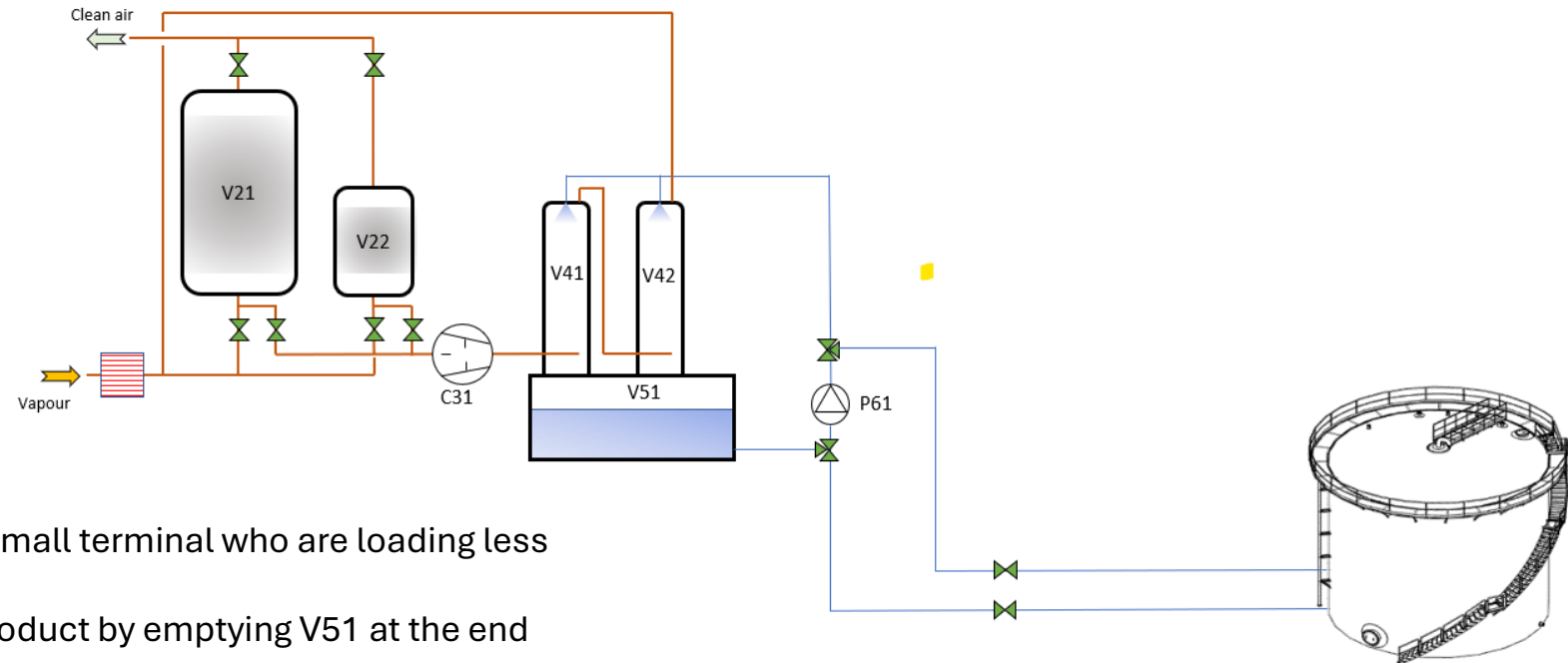
Open gasoline drain valve



Timer		Description
T1	20 min	Refreshing time
T2	45 min	Regeneration time V21
T3	10 min	Purge time V21
T4	30 min	Regeneration V22
T5	8 min	Purge V22
Total cycle	120 min	Regeneration time between 2 trucks

PROCESS

For small terminal



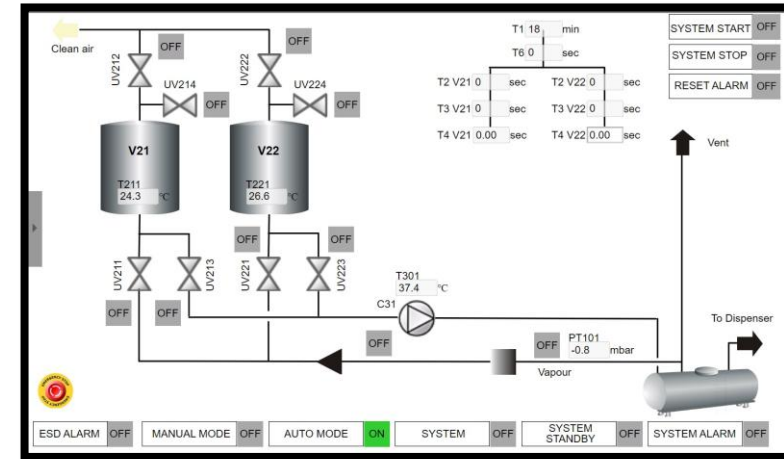
The Minivac can be adapted for small terminal who are loading less than 1 truck every 3hours
P61 will be used to refresh the product by emptying V51 at the end of the regeneration

CONTROL



The MINIVAC is controlled by a SIEMENS PLC

The PLC has a built-In Web server wich enables to operate the system using a connected device (PC, Smart Phone, tablet)



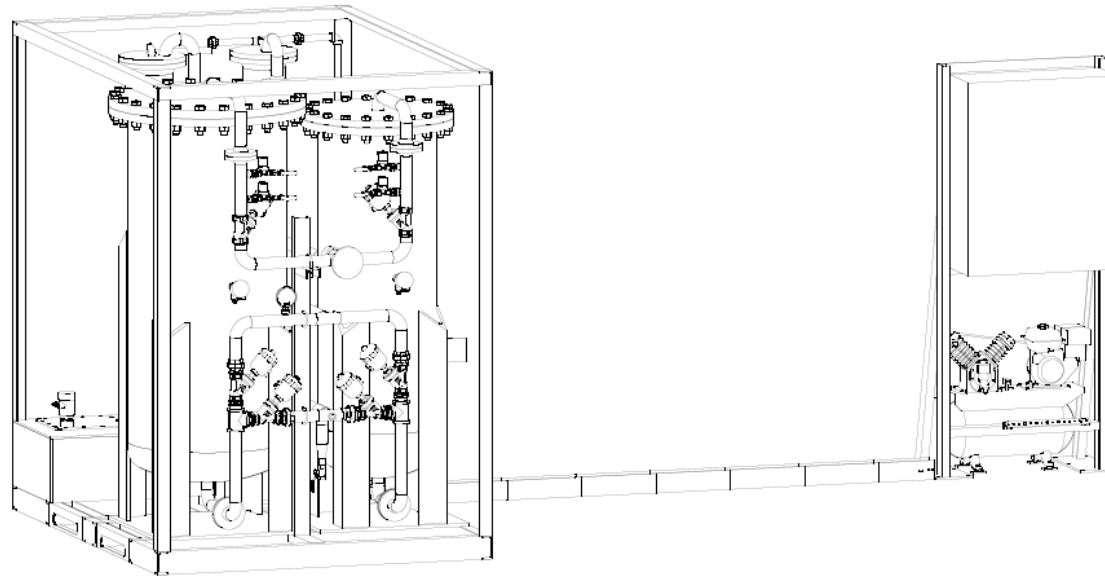
T211 ALARM LEVEL	80.0 °C	T4-V22	60.00 sec	PT101 SWITCH ON	3.0 mbar
T221 ALARM LEVEL	80.0 °C	T5-V22	30.00 sec	PT101 SWITCH OFF	0.5 mbar
C31 FB TIME	10.00 sec	T211-GAIN	1.25	PT101-GAIN	0.63
T1	20 min	T211-OFFSET	-250	PT101-OFFSET	-378
T2-V21	600 sec	T221-GAIN	1.25	WEEKLY RGENERATION COUNT	3
T3-V21	300 sec	T221-OFFSET	-250	ANNUAL RGENERATION COUNT	3
T4-V21	60.00 sec	TT301 ALARM LEVEL	130.0 °C	MANUAL REGENERATION	OFF
T5-V21	30.00 sec	TT301-GAIN	1.88		
T2-V22	600 sec	TT301-OFFSET	-378		
T3-V22	300 sec	Filter Time V21	10.00 sec		
T6	60 sec	Filter Time V22	10.00 sec		



DESIGN



The MINIVAC is provided with a control system installed outside the Hazardous area
The MINIVAC can be provided with a integrated control system (inside the skid)
The MINIVAC need some Interconnection cables and instrument air to operate
The MINIVAC can be supplied with our without product recovery metering system





MINIVAC Parameter

● ● ● APPLICATION

A miniaturized Vapour Recovery Unit to recover hydrocarbon vapours generated by product transfer and evaporation at retail gas stations or small terminals.

● ● ● PROCESS DESCRIPTION

Based on the Cadabco pressure swing Vapour Recovery Unit process, the **MINIVAC** recovers hydrocarbons by adsorption on activated carbon, regeneration by vacuum and re-absorption in the liquid product.

● ● ● EFFICIENCY

The **MINIVAC** will recover up to **99% of the vapours** emitted at the retail gas station storage vents.

The **return on product** will be **more than 0.2%** of the liquid turnover, resulting in a payback period of less than 1 year (depending on gasoline price and turnover).

The amount of recovered product will be monitored by the process calculator and connected to a central supervision system to register the process parameters as well as the **MINIVAC** efficiency.

● ● ● MAIN TECHNICAL PARAMETERS

Vapour quantity:	up to 100 m ³ / day
Power supply:	400 V, 3 Kw
Emission level:	max. 10 g HC/m ³
ATEX certified installation:	Zone 1 IIB T4



ORVR (Onboard Refueling Vapor Recovery)

The MINIVAC is compatible for all Gas Station with or without stage 2 and for vehicle equipped with ORVR

Complications between ORVR & Stage II

Vehicle ORVR vapor recovery systems have design characteristics that are not compatible with Stage II vacuum assisted systems. When these two systems work in conjunction, the overall efficiency declines significantly, as compared to each system functioning on its own.

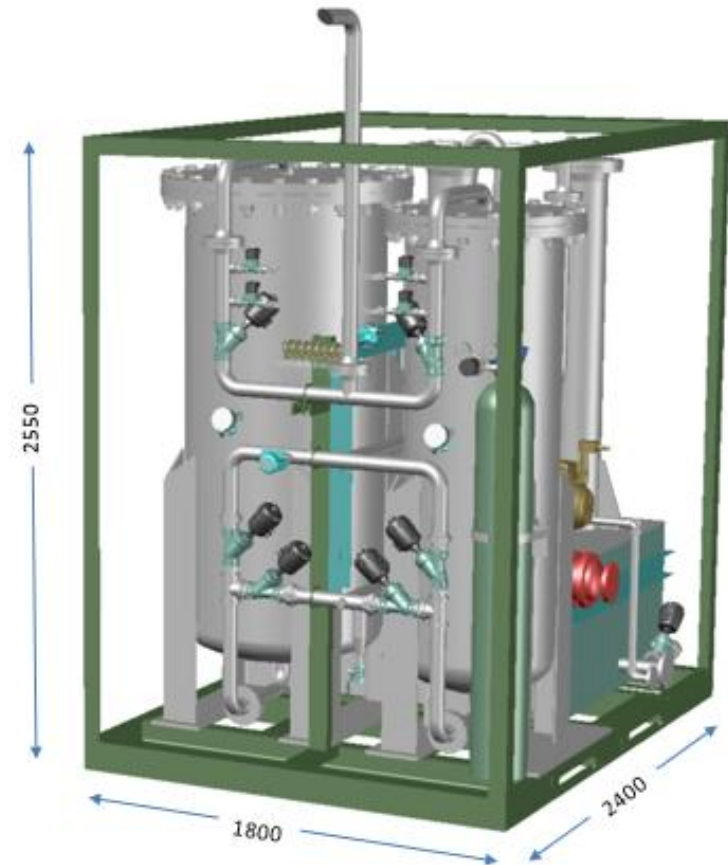
Problem

An ORVR carbon-filled canister (installed on modern vehicles) is designed to capture fuel vapors displaced while refueling, and then to inject them into the intake manifold later on, so that they are burned along with the regular fuel, during normal engine operation.

However, a Stage II vapor recovery system, installed on refueling gas station pumps, uses a vacuum to prevent fuel vapors from being released into the atmosphere. The design of the fill pipe seal in ORVR systems, prevents fuel vapors from entering the fuel tank fill pipe. That frustrates the purpose of the Stage II nozzle, which was designed to vacuum away any fuel vapors that come up that fill pipe, during the refuelling process. If the car's own vapor recovery system is working properly, then the Stage II nozzle will only be vacuuming normal fresh air and depositing that into the gas station's underground fuel storage tanks. That ends up causing evaporation of fuel vapors into the atmosphere, because too much pressure builds up in those fuel storage tanks. When that pressure becomes too great, it is released into the atmosphere via a pressure relief pipe.



General Arrangement





General Arrangement





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