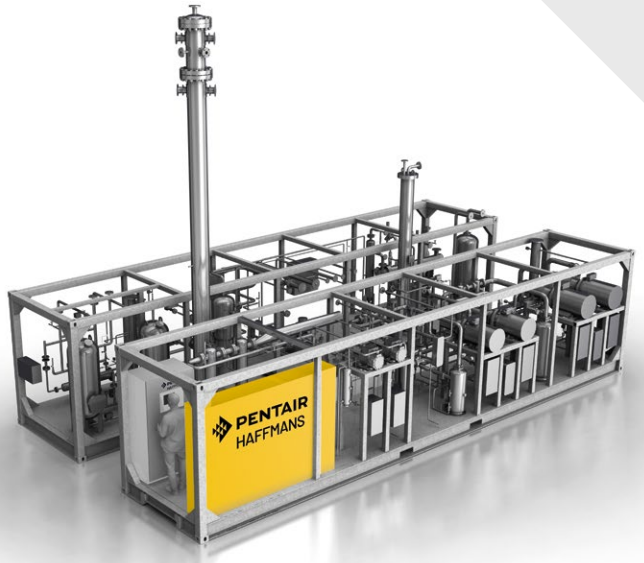
PENTAIR

HAFFMANS
ECO$_2$BREW



BE CO_2 SELF-SUFFICIENT

ECO_2Brew is unique in its design to recover CO_2 from fermentation processes at larger 24/7 operating breweries (> 2,000,000 hl/yr). Its 100 % water-free operation can save up to 1 m^3 of water per tonne liquid CO_2 in tank.

The purity of the liquid CO_2 end product exceeds general quality standards for food/beverage/ingredient purposes including the latest edition of the ISBT standard.

Safety first! Since our system utilizes the brewer's glycol to liquefy the CO_2 the operation is free of Freon or Ammonia!

Our plug-and-play ECO_2Brew comes pre-packaged with all parts mounted pre-wired and pre-piped on two 40 ft skids and allows for fast and easy installation. A containerized solution for outside mounting is optional. At the heart of the ECO_2Brew sits a proprietary technology: CO_2Scrub. It has proven its worth purifying gas from bioethanol sources and is now successfully applied in the brewing industry. All this without any water consumption.

Are you wondering about the recovery rates? Especially at a lower feed gas purity recovery rates are significantly higher than what you'd obtain with traditional competitive technology, offering the possibility to recover excess CO_2 for onsite soft drink production and/or export purposes.

Recovering your own CO_2 lowers your site's CO_2 footprint and reduces your VOC emissions to the atmosphere. Both contribute to a more sustainable operation.

Our dedication to your CO_2 self-sufficiency continues after the commissioning. Through comprehensive lifecycle management, our technical support and service team ensures that your ECO_2Brew operates optimally.

BENEFITS

- **CO_2 self-sufficiency and beyond**
- **High quality liquid CO_2 ≥ 99.998 % v/v, O_2 ≤ 5ppm v/v**
- **High recovery efficiency even at low CO_2 inlet purity ≥ 90 % v/v**
- **Robust design for reliable 24/7 operation, uptime ≥ 95 %**
- **Low footprint (2x 40 ft skids)**
- **Pre-packaged plug-and-play solution**
- **Refrigerant free**
- **Up to 40 % energy savings with Glycol heated vaporizer**
- **Tolerant to gas from fermentation processes with high level of adjuncts (abnormal impurities)**

OPTIONS

- Foam separator
- Gas booster
- Gas balloon, gas washer, and dry running 3-stage compressor (alternative to screw compressors)
- Liquid CO_2 storage tank
- Ambient or Glycol heated vaporizer
- Cylinder filling unit
- Road tanker pump
- Quality control equipment
- Installation and commissioning services
- Original spare parts
- After-sales services

ECO$_2$BREW

PROCESS DESCRIPTION

Raw foam-free fermentation gas is fed to the ECO$_2$Brew system where CO_2 screw compressor units increase the gas pressure to 48barg (696psig) in 3 stages removing condensate in the process. H_2S is filtered after the 2nd stage. The remainder of the impurities is absorbed by liquid CO_2 in the specially designed CO_2Scrub, and purged into the atmosphere. The water in the gas is removed in the on-line drier downstream. Regeneration of the off-line drier is automatic utilizing heating elements and dry CO_2 purge gas. CO_2 liquefaction takes place in the glycol cooled condenser, and O_2 removed in the stripper. The flash gas is led back to the 2nd stage of the CO_2 compressor, whilst the purified liquid CO_2 end product is fed at 15 barg (218 psig) to the onsite storage tank.

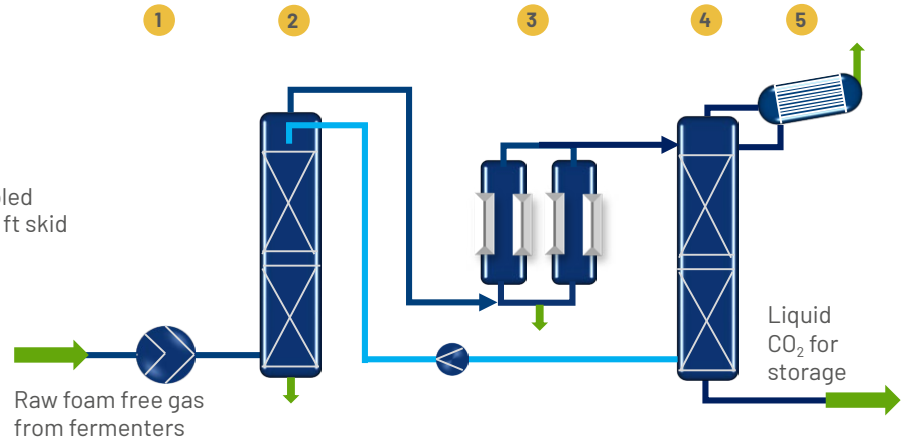
WHY HAFFMANS?

We could bore you with the mere facts of being a market leader in CO_2 recovery with an installed base of 1000+ plants in the brewing and beverage industry. But the answer is very simple: pure dedication! We are your Total CO_2 Management Partner. CO_2 is running through our business veins. Our R&D department is constantly researching new technologies to improve CO_2 quality, recovery rates, and efficiency. After all, seeing a superscript 2 in CO_2 gives us a heart attack. We don't want you to be dependent of CO_2 suppliers if you can easily recover your own CO_2 and be more independent and sustainable. And foremost: we are there for you when your system is up and running: global service hubs and dedicated technical support – we troubleshoot whenever you need us to keep your plant up and running! *That's why Haffmans!*

SCOPE OF SUPPLY

1. 3-stage CO_2 compressor units
2. CO_2Scrub (patent pending)
3. Drier
4. Stripper-reboiler
5. Glycol cooled CO_2 condenser

> All parts incl. MCC panel and dry cooled water circuit prepackaged on 2 x 40 ft skid



ECO$_2$Brew	BREWERY CAPACITY	CO_2 CAPACITY LIQUID IN TANK	REFRIGERANT FOR CO_2 LIQUEFACTION	FOOTPRINT	WATER CONSUMPTION	GLYCOL CONSUMPTION	POWER CONSUMPTION
Metric	> 2.0 Mhl/yr	1000 / 2000 / 3000 kg/h	None. Glycol cooled CO_2 condenser	2 x 40 ft pre-packaged skids	*Zero*	< 160 kWh/tonne CO_2	< 160 kWh/tonne CO_2
Imperial	> 1.7 Mbbl/yr	2200 / 4400 / 6600 lbs/h				< 21 TORh/UStON CO_2	< 97 hph/UStON CO_2

Estimated values are for budgetary purposes only, based on:
Inlet CO_2 >99.7%v/v, 15 °C (59 °F) @ 150-250 mm (6-10") WC, foam free gas @ max capacity | Site ambient< 30 °C (86 °F), altitude < 100 m (328 ft), water < 20 °C (68 °F), glycol < -5 °C (23 °F)

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