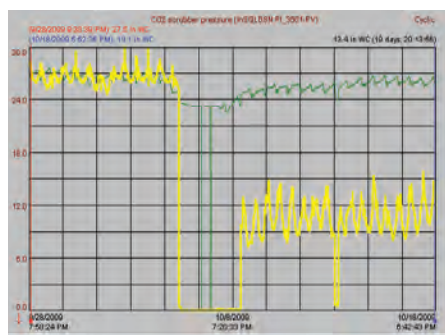




# CO<sub>2</sub> Scrubber Structured Packing Retrofit

*Replacing scrubber internals reduces bottleneck at scrubber and lessens fermenter PSV lift*

Designed to provide an affordable solution to lower the pressure drop across the CO<sub>2</sub> scrubber, this upgrade can help facilities adhere to Clean Air Act compliance requirements by reducing instances of PSV lifting.



*Trendline from actual plant retrofit shows pressure drop before and after installation.*



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## Reduce fermenter vent lifting while adding peace of mind

As ethanol plants increase production rates, especially those with capacities of 30 to 50 MGY, the resulting increase in carbon dioxide production sometimes causes fermenter Pressure Safety Valves (PSVs) to lift. Depending on the frequency of this lifting, this could result in a violation of air quality permits. By replacing OEM random packing with highly efficient structured packing, ICM estimates the pressure drop across the scrubber, as well as potential permit deviations, to be reduced greatly.

### An explanation of pressure drop

All fermenters in ICM-designed plants include pressure vents with a set point of 27.7" WC. Depending on carbon dioxide flow rate, there will always be some pressure drop through the piping. This drop makes the fermenter pressure greater than the pressure in the scrubber bottoms. If the scrubber bottoms pressure exceeds 18" WC, there is a high possibility that fermenter vents will lift. It is important to note that calibration of pressure transmitters can shift over time, and it is possible that pressure transmitters located on the bottom of the scrubbers are not always calibrated accurately. To confirm pressure transmitter readings, a local pressure indicator or manometer can be used to measure pressure at the bottom of the scrubber and at the top of fermenters.

### Avoid EPA fines without adding operating costs

The Structured Packing Retrofit allows your plant to increase production rates without the risk of compromising permitted emission limits due to fermenter venting.\* The retrofit also offers the cost-avoidance benefit of potential air permit emissions violations due to PSV lifting. A facility that knowingly emits unpermitted VOCs into the atmosphere has the potential to be fined up to tens of thousands of dollars per day that the plant is in non-compliance.

Other solutions to minimize PSV lifting include: slowing plant production rate, installation of a larger scrubber, and installation of a fan. The Structured Packing Retrofit is a low-cost solution relative to those options.

## Prevent Pressure Safety Vent Lift at High Production Rates

### Options at a glance

	Install new, larger scrubber	Install fan	Retrofit existing scrubber with structured packing
Utilizes existing equipment	No	Yes	Yes
Effect on operating costs	No change	Increase	No change
Effect on water requirements	No change	No change	No change
Expense	\$\$\$\$\$	\$\$\$	\$

\* An air permit modification or amendment is typically required for any production increase.



**Evidence of PSV lifting** (and environmental violation) can be seen as a liquid pooling near and/or sludge buildup on your PSVs.

This build-up can also be caused by gasket seals that have been compromised by repeated exposure to CIP solution. ICM can help eliminate damage to your gasket seals by installing a PSV riser to lift your PSVs out of the CIP overspray area.



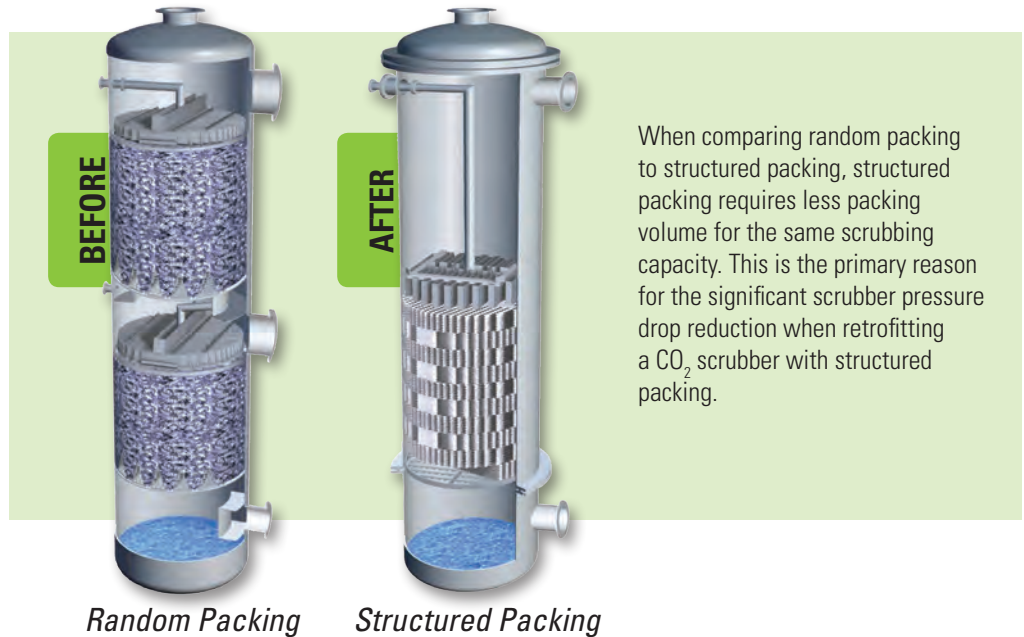
### Find out more

Learn more about this and other plant upgrade options by calling our Customer Service department today.

**877.456.8588**



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When comparing random packing to structured packing, structured packing requires less packing volume for the same scrubbing capacity. This is the primary reason for the significant scrubber pressure drop reduction when retrofitting a CO<sub>2</sub> scrubber with structured packing.

### Optional Services

ICM structures our solutions around your needs, allowing you to choose the level of ICM involvement that is right for you, from equipment supplier to turnkey installation provider.

**Accelerated Installation**—ICM will provide a second crew, working two (2) 10-hour shifts for a 2-day period.

**Expedited Delivery**—ICM will provide materials in eight (8) weeks. Standard base delivery option is 11 weeks.

**Crane and Operator**—For added convenience, ICM can manage the scheduling and shipping to meet project schedules. ICM has multiple crane options and would be happy either to supply our own crane or work with your crane and operator.

**Vacuum Truck**—ICM can manage the procurement and scheduling of a vacuum truck for the removal of the random packing.

**Environmental Services**—During equipment installation, your CO<sub>2</sub> Scrubber will be taken offline, allowing fermenters to vent to the atmosphere. Depending on your state agency policy, this requires an approval or variance from the state. Our environmental team can provide the services necessary to acquire these permissions as well as manage necessary pre- and post-installation paperwork.



**TIP:** If fermenter PSVs are lifting and you are not operating above your plant's nameplate, you may have a **bio-film buildup** or other obstruction in your CO<sub>2</sub> scrubber.

**Faulty seals or weak springs** can also cause CO<sub>2</sub> to vent from the PSVs at pressures under the specified set point.