



CIRRUS® VEC

Vapor Emission Control

LeadIng.

 **BOC**
A Member of The Linde Group

Pure Air – A clear choice

CIRRUS® VEC - What?

- Flexible and uncomplicated emission reduction of Volatile Organic Compounds (VOCs) from process gases...

...through cryogenic condensation



Vapor Emission Control – Why?

- Environmental reasons
 - regulations
 - concern
 - voluntary programs

Safety reasons

flammability

Economic reasons

increase production

solvent prices

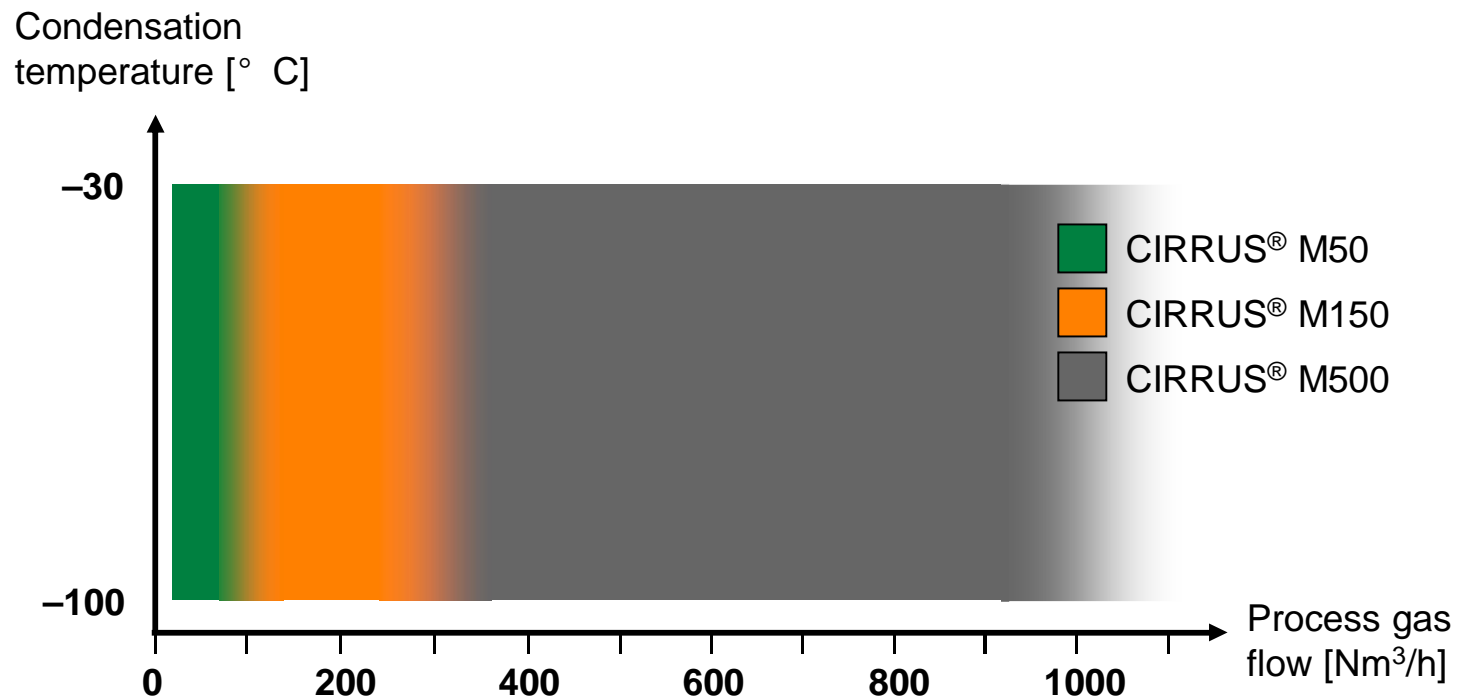
Marketing reasons

image



CIRRUS[®] VEC – When?

- Process gas flow up to 1000 Nm³/h
- VOC concentration higher than 40 g/Nm³
- Freezing point of VOC below -30°C



CIRRUS® VEC – Where?

- Industrial production
- Pharmaceutical
- Chemical
- Specialty chemical
- Petrochemical



- Off-gases from
- Reactors
- Tank breathing
- Vacuum pumps
- Valves
- Dryers

CIRRUS[®] VEC – Where? *cont.*

- Tank farms
- Filling
- Inerting
- Breathing
- Loading operations
- Truck
- Railcar
- Ship



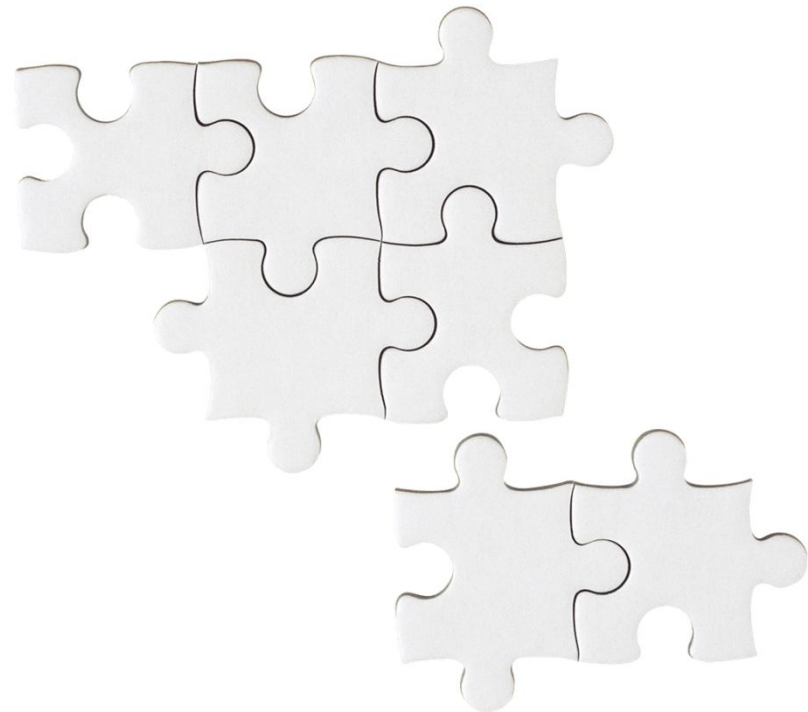
Different VOCs



Modular CIRRUS® VEC systems



- Different sizes
- Cover a variety of needs
- Batch or continuous operation
- Standardized
- Complete systems



CIRRUS® VEC program



CIRRUS® M50



CIRRUS® M150



CIRRUS® M500

CIRRUS® ZE300



CIRRUS® TM100



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Ensure yourself the system is your optimal VEC solution!

- Test the system in *your* process on site
- Full-scale operational trials
- Modules delivered directly from equipment pool
- Quick and uncomplicated installation
- Installation and test assistance
- Satisfied – purchase your test unit – it's simple and easy



Features of the CIRRUS[®] VEC system



- Safe and environmentally sound
- Fast
- Flexible
- Reliable and uncomplicated
- Cost-efficient

Safe and environmentally sound

Minimize impact on surrounding environment!

- Solvents can be reused
- Cooling medium
 - produced from pure air
 - can be released to atmosphere or reused
- CFC-free
- No wastewater
- No secondary pollution
- No sources of ignition
- Built to operate in potentially explosive areas



Fast

Get your system up and running rapidly!

- Fast delivery time
- Fast installation
- Fast preparation
- Fast startup and shutdown
- Fast process



One system for varying process conditions!

- Easily handle variations and changes
 - process gas flow
 - VOC concentration
 - inlet temperature
 - condensation temperature
 - different VOCs
- Modular product program
 - different standardized sizes
 - expansion possibilities
 - optional accessories for different functions
- Operation
 - automatic or manual
 - programs and calendar
 - local or remote control



Reliable and uncomplicated

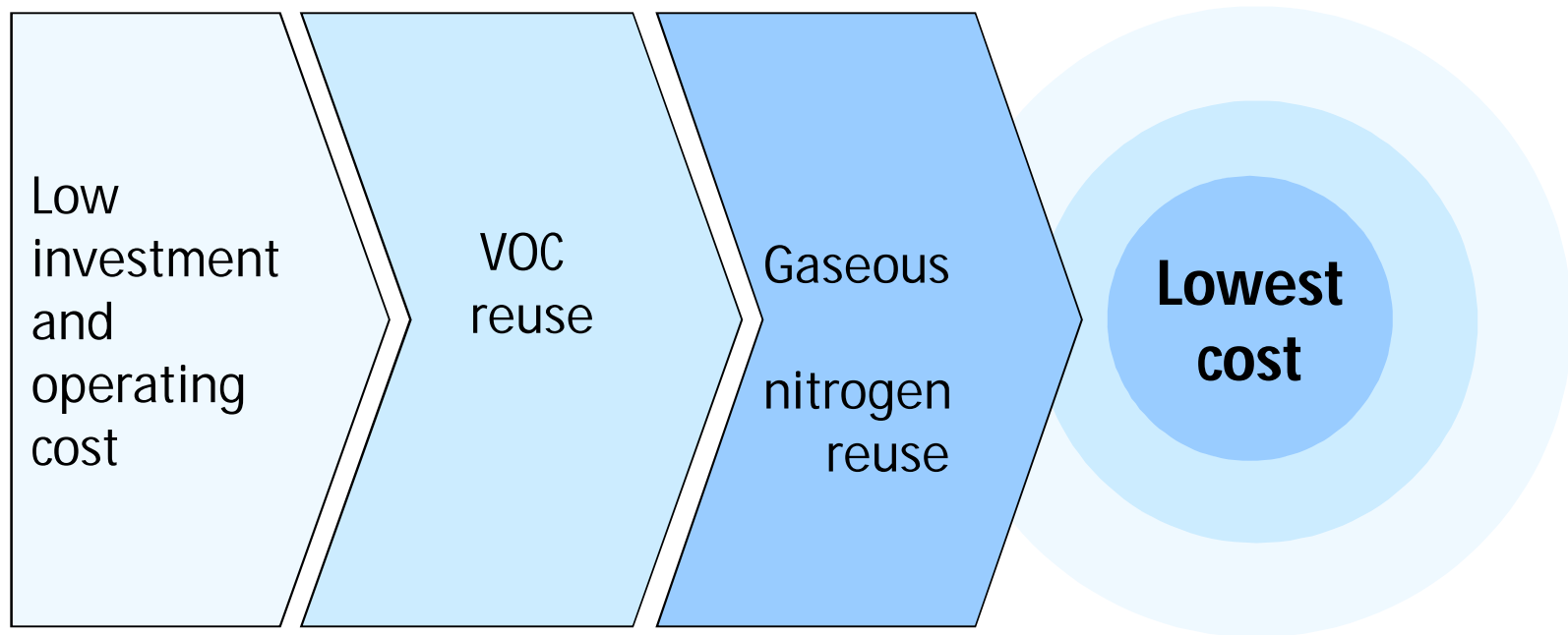
Avoid unnecessary production stops!

- Each unit is thoroughly tested before delivery
- No rotating parts
 - long operating life
 - minimized maintenance needs lowers the operating costs
- Easy to install
 - low weight, small footprint and mobile
 - quick integration - a few days
 - indoors or out
 - no facility rebuilding
- Easy to operate
 - no special operating personnel needed
 - fully automatic
 - most often zero preparation
 - simple and brief startup and shutdown



Cost-efficient

- Low investment cost
- Low operating costs
 - no need of special operator or maintenance personnel
 - low maintenance or repair level



Speed-up the first time startup - save your time and money!

- Skilled and experienced personnel
- Installation inspections
- Safety checks
- Start-up
- Initiating tuning procedures
- Basic training and education



System support for optimal running conditions

Reduce your system's life cycle cost!

- Tank service
- After-sales service
- Gas and process optimization



Akzo Nobel, Sweden

Needs and decision factors

- Increase production
- Replace existing mechanical condensation system
- Achieve a more effective purification without CFC
- Permission from authorities



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VOCs: ethyl chloride, ethylene oxide, diethyl ether and ethanol

Flow: <10 to 60 Nm³/h

Condensation temperature: -55 ° C

CIRRUS M50 – Installation & results

- Installation quick and easy - only small changes in piping
- Less space than old cooling system
- Reuse of VOC and nitrogen
- Significant reduction in emissions
- High availability
- Large reduction of maintenance costs
- Purification degree is 95-99%
- Numbering up from one to two modules as production increased

Conoco Jet, Sweden

Needs and decision factors

- Emission reduction to comply with Swedish emission regulations
- Efficient process gas treatment
- Activation of the system by truck driver

VOCs: various hydrocarbons in gasoline

Flow: 200 to 240 Nm³/h

Condensation temperature: -105 ° C

CIRRUS M150 - Installation & results

- Process gases from filling of 10 to 15 trucks daily
- The truck driver calls ahead to automatically activate the system - no unnecessary nitrogen consumption during stand-by
- Purification degree of 99 %
- Condensed gasoline is recycled - pumped back to storage tanks
- Numbering up from one to two modules when depot traffic increased



We value helping you to add value to your production!



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