



SiCURE

The alternative to heat and solvent cleaning of rubber

SiOx machines AB provides the modern alternative to treatment of rubber items in ovens or in extraction processes. We call it SiCure. Conventional processes consume a lot of electricity or use toxic / explosive solvents. Our method – SiCure – extracts silicone or extender oils using liquid carbon dioxide (LCO₂).

Why liquid CO₂ (LCO₂)?

LCO₂ is perfectly suited for extraction of oils and unwanted residues from rubber articles. LCO₂ reaches even the smallest pores due to its low surface tension in a short time and at a low temperature.

LCO₂ is similar to acetone as solvent, at the same time it is non-toxic, non-flammable, odorless, non-corrosive and safe to work with. LCO₂ used in this process is recovered from gaseous streams from chemical industries and is therefore a sustainable resource. No extra contribution to global warming, in other words. LCO₂ is sold in different grades depending on the application.

How does SiCure work?

With SiOx SiCure machines, there is no need for time and energy consuming heat treatment or use of expensive and explosive solvents. Residue in the rubber is extracted by a renewable solvent, LCO₂, in 1 to 2 hours. The goods come out completely dry without any solvent residue. Packaging can be done just minutes after the process. The extracted residue is collected in a controlled way in liquid form after the process. 99% of the CO₂ used in SiCure process is reused. The patented distillation process of CO₂ is very energy conservative compared to other solvents and the temperature of the object processed never exceeds 25 degrees C. At ambient atmosphere, CO₂ is only present as a gas, which means that the objects treated come out dry at room temperature.

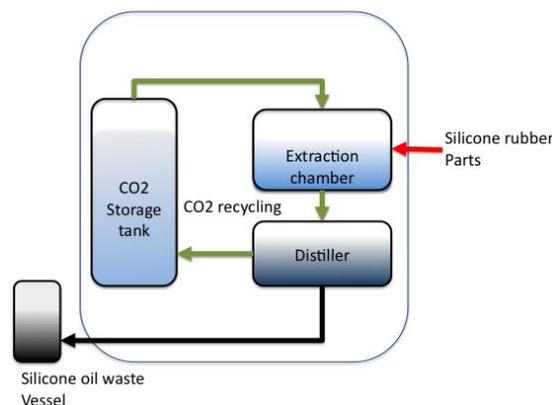
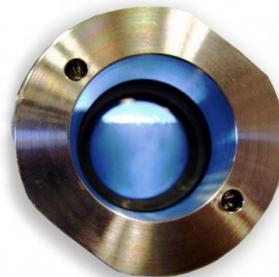
All process data and batch numbers can be stored, analyzed and verified with SiOx software module. Compliance with CFR part 11 is an option. SiOx provides different software packages depending on the application.

What can be processed?

Silicone rubber items in any geometry can be processed. Since the process works at room temperature, re-polymerization of slits and small holes will not occur. Silicone treated with SiCure machines pass all necessary biocompatibility tests and is well suited for medical devices and implants. Contact us to get more information about what SiCure can do for your products.

About SiOx machines AB

We are partner of Electrolux Sweden (ELS) who produce the SiCure machines exclusively for us. Electrolux "platform design" and our long experience working with CO₂ and polymers, enables us to reduce construction and manufacturing cost – whilst keeping all the benefits of the advanced CO₂ technology. Call us or visit our website www.sioxmachines.com to learn more about what our process and technology can do for your business.



SiCURE KEY BENEFITS

Short process times

Reduction of residues to 50 ppm of silicone oils

No drying step necessary

No re-polymerization effect

No cut-healing due to re-polymerization

Mechanical properties of material are maintained

No formation of SiO₂ dust

Low energy consumption

CO₂ recycled to 99%

No solvent and residue emissions to atmosphere and working environment

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SiOx SiCURE MACHINES

The operator places the silicone / rubber items in the machine and selects a cleaning program to start the process. Process parameters and actual status of the program are displayed on the screen. After the program has ended the door opens and the silicone items are removed from the machine, dry and at room temperature. Extracted silicone oil or residue is automatically drained from the machine distiller vessel and collected in concentrated form. 99% of the CO₂ is recovered and stored in the internal storage tank. As an option, SiOx offers a software package where process data can be stored and automatically be analyzed for deviations. Our software comply with CFR part 11. Other options such as barcode scanners for batch identification and storage of process data and reports of released batches in a database are available.

MACHINE SPECIFICATIONS

	P35	P70
Maximum system pressure Bar)	63	63
Extraction chamber volume (liters)	250	400
Maximum load (kg)	50	200
Rotating drum material	Stainless steel	
Pressure vessel material	Galvanized steel	
CO₂ recovery system (Compressor, cooling unit, distill vessel)	x	x
Internal CO₂ storage tank	x	x
Extract Collection vessel	x	x
Clean room class 100 000	x	x
5.7" touch screen HMI interface	x	x
Control from external PC	x	x
Built in modem	x	x
For remote service and software upgrades		
Machine dimensions		
Width (mm)	1750	1750
Length (mm)	1750	2150
Height (mm)	2330	2330
Options		
Stainless steel vessels	x	x
CO ₂ sensor and alarm system	x	x
Custom software (monitoring, validation)	x	x
Software comply with CFR part 11	x	x
Other application specific modifications	x	x



CASE STUDY: SiCURE OF PDMS HOSE

Hose wall-thickness:	1,5 mm
Batch time:	80 min
Energy consumption:	4 kWh
Amount of Silicone oil extracted: (cyclic siloxanes D4-D20 are extracted)	3.1 wt%
Amount if silicone oils left in hose	< 0.1%
Batch size using SiOx P-70:	100 kg

