



CONTROLLED REFRIGERANT EXTRACTION FOR MAXIMUM SAFETY AND EFFICIENCY

WITH DRILL-HEADS AND PIERCING PLIERS

ANDRITZ

Efficient and innovative refrigerant extraction

ANDRITZ ATN Recovery Systems provide safe, efficient, and environmentally responsible refrigerant extraction for appliances ranging from household refrigerators to industrial high-pressure systems.

- **Household appliances:** Refrigerators and freezers are evacuated using high-performance ATN™ drill-heads, delivering the efficiency of six piercing pliers at significantly lower cost.
- **Industrial appliances:** High-pressure units such as air conditioners, heat pumps, and beverage machines are evacuated with reinforced piercing pliers and industrial drill-heads, supported by an additional 2 m³ storage tank for larger refrigerant volumes.
- **Ammonia appliances:** Small NH₃ refrigerators are evacuated using a dedicated method in which ammonia is absorbed in water.



From left to right:
Piercing plier for refrigerators, high-pressure piercing plier, NH₃ piercing plier, drill-head

Our fully automated solutions ensure environmentally friendly processing of refrigerants – from degassing to material separation – meeting the highest safety and efficiency standards.

REFRIGERATORS AND FREEZERS

For efficient recovery, the appliance must be positioned on its back, allowing oil and refrigerant to be extracted in one single operation. The extraction unit is placed at the lowest point of the cooling system and connected to the compressor.

Once activated, the pressure is reduced to -0.2 bar within two seconds. If this value is not achieved, the control system automatically classifies the process as an error and the unit returns to its starting position.

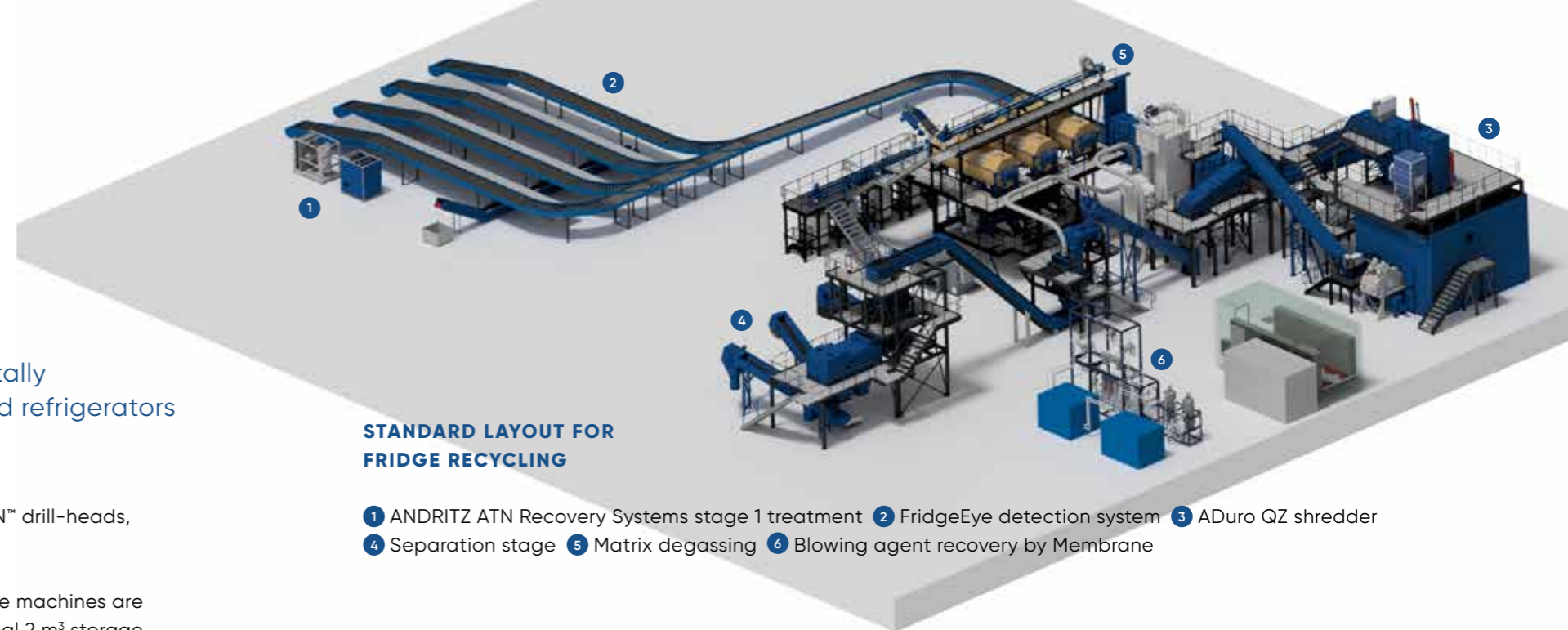
If the required vacuum level is reached, the extraction continues until -0.8 bar is achieved, initiating the degassing process. The drilling mechanism is then released. Within just a few seconds, a precise opening is created in the compressor wall, enabling the oil to be extracted, followed immediately by the recovery of the refrigerant, which is safely transferred to the degassing unit.

The drill-head remains securely connected as long as the internal pressure is above atmospheric

level, ensuring maximum safety during operation. To switch off the unit, the operator simply taps the lever of the drilling machine, which deactivates the drilling mechanism.

The entire process from connecting to disconnecting the drill-heads does not take longer than one minute on average.

The degassing station can be attached under a roller conveyor. Minimum clearance between the floor and the roller conveyor has to be 800 mm.



STANDARD LAYOUT FOR FRIDGE RECYCLING

- 1 ANDRITZ ATN Recovery Systems stage 1 treatment
- 2 FridgeEye detection system
- 3 ADuro QZ shredder
- 4 Separation stage
- 5 Matrix degassing
- 6 Blowing agent recovery by Membrane

VACUUM AND CONDENSING UNITS

The oil is fed together with the refrigerant into an oil collecting tank in the vacuum system. In this tank the oil is separated from the refrigerant by gravity. Afterwards the oil is channeled into the oil tank. There, the residual halogen content is reduced to a value below 0.2 % (even lower values have already been achieved).

Once the maximum oil level in the tank is reached the oil is pumped out. The oil tank is emptied automatically without interrupting the production.

In the meantime, the refrigerant is pumped into the condensation unit via a vacuum pump and a compressor together with some air that has penetrated from leaking refrigerators.

The mixture is raised to 17 bar (domestic fridges and deep freezers only) or 22 bar (non-domestic cooling devices) in the condensation unit. The temperature is reduced to 5°C in the first stage of condensation. From there, the gases enter the separator, where the liquefied gases remain.

The temperature of the non-condensed refrigerant is reduced to minus 35 to 40°C. At this pressure and temperature, all liquefiable gases are liquefied. The liquefied gas is led from the separator to the external collection tank into the external refrigerant tank. The pressure difference between the condensing unit and the refrigerant tank is monitored by the system and kept at the index value (22 bar). The filling level is monitored

two times (by the scale and in the return line of the tank). Shut-off valves between the condensing unit and the tank can be switched off by the system or by an emergency shut-off.

The air purified from the gases is discharged via activated carbon filters. The activated carbon filters are regenerated by the system itself.

The main control cabinet is also located in the vacuum system. Parts such as computers, motor relays, safety relays, transformers etc. are housed in the control cabinet. All electrical connections are located in this cabinet. The values that are important for the operation of the system can be read on the display.

NH₃ (AMMONIA) REFRIGERATORS

The system flushes, degasses, and empties absorption and ammonia-based cooling circuits in a closed, water-scrubbed process. Piercing pliers open the circuit at the highest and lowest points, allowing the water/ammonia mixture to be flushed out into sequential water-filled

containers. Compressed air (16 bar) then clears remaining liquid and ensures complete emptying. For ammonia circuits, integrated water scrubbers in three collection tanks absorb released NH₃ as the mixture passes through. Fresh water rinses the circuit, and a Venturi-based

vacuum completes the evacuation. When a tank reaches saturation, the next one takes over. Optional pH monitoring, NH₃ sensors, and quick-release mechanisms support safe and compliant operation.



OUR ENVIRONMENT IS A TREASURE TO BE PRESERVED

So are the raw materials contained in your waste products. Let us help you utilize them to best advantage. ANDRITZ Recycling is actively demonstrating its commitment to conserving valuable resources by offering a wide range of capabilities in the recycling industry. Our technologies cover solutions for processing rejects from the paper industry, e-scrap, metal and special waste, organic waste, end-of-life vehicles, wood, plastic and textile waste as well as applications for generating energy from various waste products.

ANDRITZ Recycling Service develops recycling solutions that pay off for the customer for the complete life cycle of your mill or equipment. From the supply of spare parts, routine work during a scheduled shutdown, to quick response during a disruption or the implementation of our latest IIoT solutions, we are available to keep operations running smoothly.

AUSTRIA

ANDRITZ AG
p: +43 316 6902 - 0
recycling@andritz.com

THE NETHERLANDS

ANDRITZ ATN Recovery Systems
p: +31 182 623 723
recycling@andritz.com

[ANDRITZ.COM/ATN](https://www.andritz.com/atn)

JOIN US ON SOCIAL MEDIA

