



- Geothermal Heat Pumps
- Packaged & HVAC Chillers
- Vapor Recovery Systems

DE-LN Gasoline Vapor Recovery Systems

The DE-LN Series uses conventional mechanical refrigeration for cooling the first and second stages and Liquid Nitrogen for cooling the third and final stage of the recovery system. The cooling temperature of the LN₂ stage is dependent on the permissible level of vent emissions and can be varied between -100°F to -300°F to achieve 35 mg/liter, 10 mg/liter, and less than 1 mg/liter.

A standard range of DE-LN2 units is available that meet the requirements of small, medium and large sized petroleum truck and marine loading terminals. Units can be provided that meet customer site specific requirements and comply with 40 CFR Parts 9 & 63 NESHAPS, 14 December 1994.

Model Number	Compressor Sets	Approx. Daily Capacity gallons Before Defrost	Refrigeration Stage @ 35mg/liter (0.29#/1000gal) Emissions Pumping Rate Per		Liquid Nitrogen Stage @ 10mg/liter (0.10#/1000gal) emissions	Electrical Characteristics @ 460V/3Ph/60Hz				
			Minute	Hour		Total Nameplate Connected HP	Average Electrical Consumption @ 15° Ambient			
							Ampere Draw		Kw Draw	
							Current Draw at Design Conditions	Full Nameplate Draw of All Motors	Full KW .85SF Draw at Nameplate Rating	KW Draw at Design Conditions
Units Requiring One Hour Per Day Shut-Down For Defrost (Dual coils for continuous operation are available as an option.)										
DE800	1	400,000	800	35,000	Design minute and hour loading rates are the same as the Refrigeration Stage with 100% overload Capability when Refrigeration Stage is operating	86	65.7	118.2	80.1	44.5
DE1200	1	600,000	1,200	52,000		105	82.7	144.2	97.7	56
DE1600	1	800,000	1,600	70,000		129	100.4	174.4	118.2	68
DE2400	1	1,200,000	2,400	105,000		177	142.9	239.4	162.2	96.8
DE3200	1	1,600,000	3,200	140,000		207	162.7	277.4	188	110.2
DE4800	1	2,400,000	4,800	210,000		284	250	407.6	276.1	169.3
Units With Dual Coils (50% Capacity 2 hr./day Required for Defrost)						For Continuous Operation				
DE6400	2	3,200,000	6,400	280,000		387	325.5	521.6	353.3	220.5
DE7800	2	3,900,000	7,800	340,000		519	443.9	718.6	486.7	300.6
DE9600	2	4,800,000	9,600	420,000		600	472.5	764.8	518.0	320.0



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OVERALL DIMENSIONS									
Model DE	DE800	DE1200	DE1600	DE2400	DE3200	DE4800	DE6400*	DE7800*	DE9600*
Width	8'	8'	8"	8'	9'	9	13	13	13
Length	42'	42'	45'	45'	50'	60'	38'	40'	43'
Height Maximum, Shipping	11'	11'	11'	11"	11'	11'	11'	11'	11'
Vapor Inlet Connection	6"	8"	10"	12"	14"	16"	18"	20"	22"
Weight (lbs.)	27,400	29,700	34,750	39,800	42,500	50,500	45,000	47,500	50,000

* Per skid -two required for models: DE6400, DE7800 and DE9600

Utilities

- 230/460 Volt, 3 Phase, 50/60 Cycle Power Supply - specify which one
- Liquid Nitrogen storage tank must be leased from Praxair or similar company, or can purchased
- Defrost fluid, d-Limonene, to be provided by the customer

WEIGHT OF REFRIGERANTS/FLUIDS (LBS)				
Model Number	d-Limonene	Precooler R-22	High Stage AZ-50	Low Stage R-23
DE800	4,640	46	89	91
DE1200	4,725	49	104	98
DE1600	4,840	58	129	109
DE2400	4,950	75	140	125
DE3200	5,200	85	155	145
DE4800	6,250	92	175	250
DE6400	6,525	96	190	285
DE7800	6,850	101	202	335
DE9600	7,040	104	210	360



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Safety

The refrigeration process offers the ultimate in efficient vapor recovery, safety, and fire protection. The recovery condenser is essentially a flame arrestor, refrigerated to between -100°F to -300°F. This safe design or construction is in marked contrast to absorption/adsorption systems where millions of BTUS of energy are stored in the carbon. In the carbon, hot spots and peroxides can form which can be self-igniting or can involve spontaneous combustion. If safety and efficiency are the concern of the buyer, the refrigeration process is the obvious choice.

Condensing Coil

The condensing coils are manufactured from 304 stainless steel tubing with aluminum fins. Each coil is installed in its own aluminum enclosure. The space between the inner and outer skin of the enclosure is insulated with urethane foam. All drain tubes leading from the enclosures are manufactured from aluminum and heat traced. Connecting pipe work is flanged to facilitate easy removal of coils.

Decanter/Meter

A hydrocarbon/water decanter is provided which will gravity separate water from the hydrocarbon. The decanter is heat traced with the defrost fluid. A positive displacement pump is included to pump the recovered condensate back to storage; a meter is also provided to record the volume of condensate recovered. Direct reading indicator provides the user and operator with a cumulative record of the recovered condensate vapor in gallons. No additional equipment or gages are required. Hydrocarbon vapor recovery is excellent and is well in excess of 99% depending upon the setting of the controls and recovered gasoline is two (2) gallons per 1,000 gallons loaded with a 40% vapor inlet concentration.

Low Operating Cost

The electrical requirements for average daily operation is 1,000 Kw per 1,000 gallons of gasoline loaded and .33 Kw per 1,000 gallons of distillate loaded. The volume of liquid nitrogen used will depend on the required maximum level of hydrocarbon emissions. For the current EPA standard of 35 mg/Liter loaded, LN₂ is not required and is only used at a rate of 24ft³/1,000 gallons of overload usage above the ratings for the Refrigeration Stage. For 10mg/liter, LN₂ usage is 48 ft³/1,000 gallons transferred. Nitrogen usage remains the same for either distillate or gasoline.



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Reliability

Edwards experience of manufacturing vapor recovery systems since 1974 shows that the life-span of a system is 20 years, or more, without the need to replace any major components. The liquid nitrogen stage of the system is extremely simple in operation and requires no electrical energy to condense the hydrocarbon vapors. If the mechanical refrigeration should fail the LN₂ stage is capable of providing full vapor recovery-a 100% system back-up. Defrost frequency will increase and unless dual LN coils are included, shutdown for defrost will be required.

Overload

The new Edwards DE Series of vapor recovery units is specifically designed for quick truck loading. The DE units are easily capable of handling up to two times the equipment rating. Break-through can never occur with a refrigeration machine. In a machine based on refrigeration, the suction pressure of the compressors automatically rises with the load. Raising the suction pressure can easily double or triple the refrigeration capacity of the unit with the LN coil; additional Nitrogen can be used to compensate for overloads on the refrigeration stage and the LN stage.

Automatic

Operation of the complete unit is fully controlled from the single panel within the enclosure. All functions are automatic and PLC controlled. The Edwards Vapor Recovery units are furnished with automatic controls which provide operation without full-time attendance.

Low Maintenance

There is no requirement for scheduled shutdown of the system for maintenance. The refrigeration systems are hermetically sealed and barring a malfunction are not opened for maintenance. Individual pumps and motors do require occasional maintenance but this can be done during the normal operation of the system or during the one hour defrost period.

Defrost Period

The system requires a one hour defrost period every 24 hours during which no vapors may be processed. This can be done automatically during a period of no loading. If there is not a period during the 24 hours where the system is not in use, dual coils can be provided as an option on Models 800 - 4800, which will allow continuous operation of the system. Models 6400-9600 include dual coils.



Edwards Engineering

60 Years of Excellence In Heat Transfer Products

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Certification

All units have air purged compressor/control housings suitable for installation in hazardous areas. All electrical equipment and wiring external to the air purged housing is for Class I Group D, Division I codes. Purging is in accordance with NFPA 496 and the units meet U.S. NEC codes.

Factory Package

Factory packaged units are available with various custom modifications to meet on-site specifications. The standard enclosure is designed to be mounted on a concrete pad and does not include a flooring. If the unit is to be mounted on elevated supports, a flooring can be provided. All operating components are mounted on a steel I-beam base ready to place on-site. The refrigeration machinery, except for the vapor condensing coils and defrost storage reservoir, is located within a weather-proof, fire resistant enclosure. Pick-up lugs are provided for the unit for ease in rigging.

Weather-Proof

All working components and electrical controls are either of weather-proof construction or are housed in a weather-proof enclosure constructed of fire-proof building panels with an exterior of painted aluminum panels. This enclosure provides full room for attending personnel to enter for routine maintenance and service.