Enervac CORPORATION

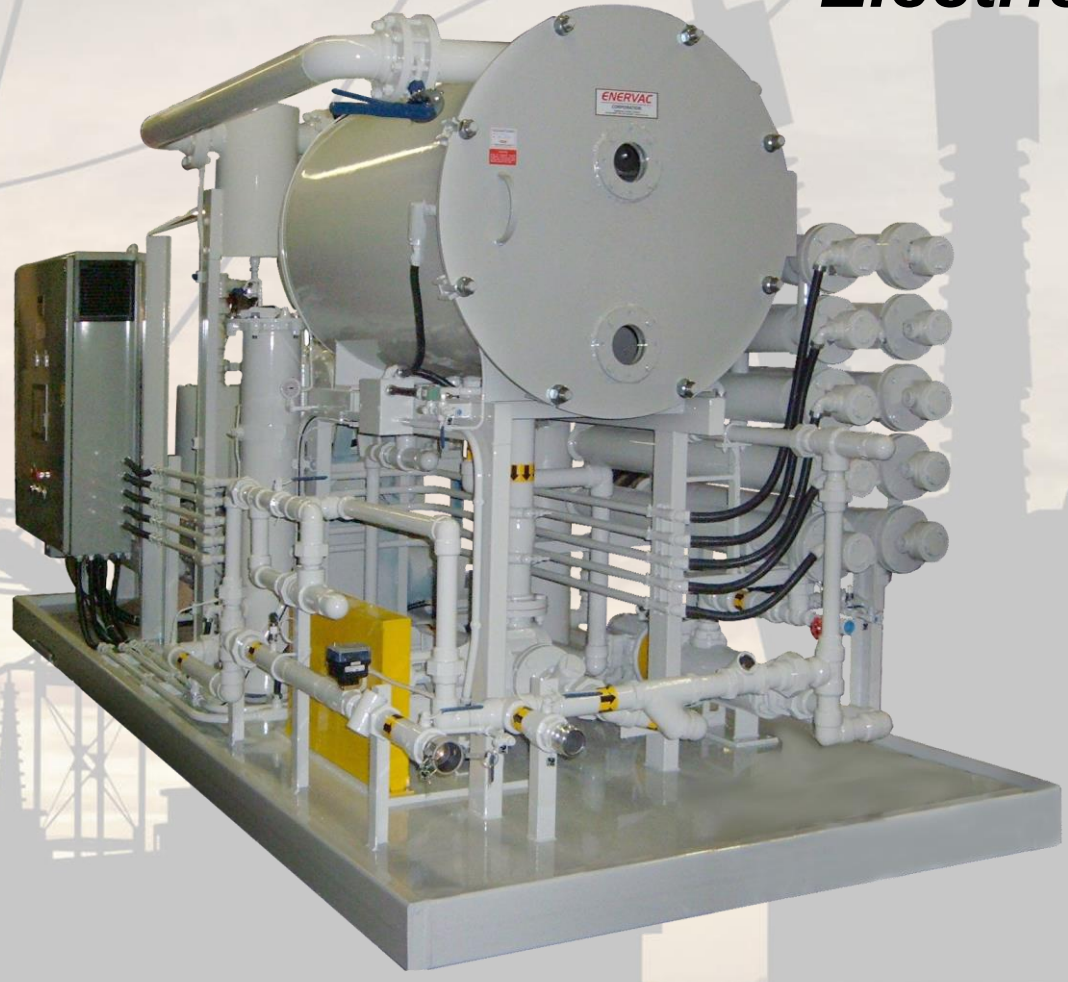
E865A

For

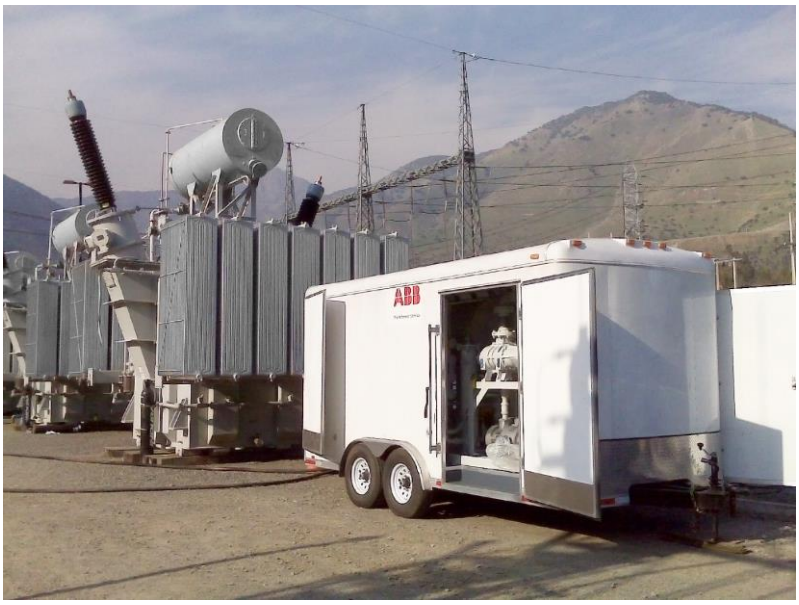
Power Companies

And The

Electrical Industry



Vacuum Oil-Purifiers



Cargo Trailer Mount Option

Present and future transformer ratings require high quality and a great degree of purification of insulating oils at the point of use.

The increasing voltage and rating of the modern transformer and electrical apparatus results in greater electrical stress in insulating material and fluids. To handle these greater stresses, oils with better dielectric quality are required, and lower residual water content in insulation must be maintained.

The proper treatment and upgrading of the insulating fluid will result in the improvement of the properties of the entire insulating media of power transformers.

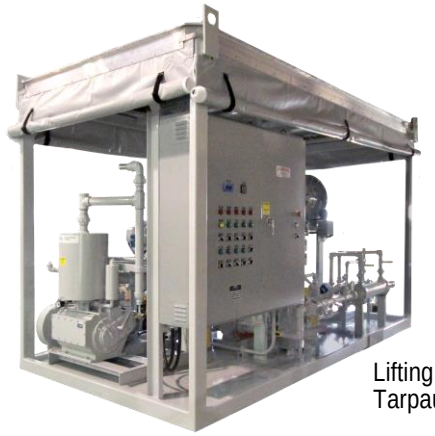
The principal functions of the insulating liquid are to serve as a dielectric material and an effective coolant. To perform these functions, the insulating liquid must have the necessary qualities at the time of initial impregnation and filling at the factory and later maintain the same quality in the field operation.

The Enervac High Vacuum Process upgrades the new or used electrical insulating liquids including transformer oils, polybutenes and silicone fluids.

These systems and equipment were developed as a result of 40 years of experience in vacuum treatment of electric insulating oils.

High Vacuum Process is used for dehydrating and degasification of electrical insulating fluids to increase and maintain their dielectric strength. The processing includes the removal of free and soluble water, free and dissolved air and gases, and particulate matter.

By the application of corrective filters, which remove soluble varnishes, resins and products of oil oxidation, the oil quality can be further improved.



Lifting Frame with Tarpaulin Sides

Single-Pass Performance

The typical performance in a ***single pass*** through an Enervac vacuum system is as follows:

- Dehydration—At minimum oil temperatures of 80° F the water removal is from 100 ppm to less than 10 ppm.
- Degasification—Enervac vacuum oil purifiers reduce soluble air content in a single pass from full saturation of approximately 12% to less than 0.25%. Other gases in solution with oil, including combustibles, are also removed.
- Particulate matter—The accelerator cartridge provides removal of particulate matter to a nominal 5 microns. The addition of a filter downstream of the chamber will remove particulate matter to submicronic size.
- Other contaminants such as products of oil oxidation, thermal degradation, dissolved varnishes, paints and acids can be removed by the addition of Fullers Earth filters to the system.

Applications

The most important applications of high vacuum degasifiers are in the field of extra high voltage transmission and in the manufacture of electrical apparatus for it. In addition, the high vacuum process is used in the degasification of cable oils including polybutenes. Outside of the electrical industry, this process is used for dehydration and degasification of oils for radar and electronic equipment, vacuum pump sealing oils, brake fluids, refrigeration oils—including phosphate esters and silicones.

Enervac offers the Vacuum-Purifier System designed for maxi- mum efficiency in your operations…performance tested by experts, requiring minimum maintenance, and providing long, trouble-free service.

Backed by the full resources of Enervac Corporation's technical specialists, plus "know-how" and thorough research, your Vacuum-Purifier System is unique. Designed for unattended operation and suitable for operation on energized equipment complete monitoring equipment is also available.

Description Of Process

Oil, at ambient or elevated temperature, is introduced into the vacuum chamber, where by vacuum distillation, water, dissolved air and gases, and other low-boiling-range volatile contaminants are removed.

Special chemically inert accelerator cartridges in the vacuum chamber are employed to serve the following functions:

First, their in-depth design structure allows free water to be rapidly separated from oil by coalescence even before it reaches the evaporation stage.

Second, millions of glass fibers 3-10 micrometer diameter provides a large total surface area for exposure of the thin oil film to the vacuum.

Third, sharp points of the glass fibers promote fast release of gases and vapors from oil.

Fourth, the elements act as a fine filter removing solid contaminants. The cartridges are easily replaced and disposable.

This method is more efficient than previously used spray nozzles and baffles, which required several passes to obtain the same degree of degasification.

VACUUM OIL-PURIFICATION SYSTEMS

Model Nomenclature Chart

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Standard Features

- Automatic—Unattended Operation
- Oil Level Controller
- Foam Controller
- TEFC Electric Motors
- Mechanical Sealed Oil Pumps
- Low Watt Density Heaters
- NEMA 12 Central Control Panel
- Inlet and Outlet Flow Indicators
- Ball Valves
- Welded Steel Piping
- Exclusive Processing Chamber
- Performance Tested

Flow Rate	Vacuum Pump Capacity, CFM at 1 Torr		Heater kW 45°F Rise
Size	Code 1	Code 2	Code
3600	1620	1325	198
2400	1100	700	132
1800	1100	410	99
1200	700	410	66
600	305	128	33
400	260	110	22
200	110	46	11
100	46	26	5.5
50	26	26	3

Model nomenclature chart indicates standard and optional features available with each model. Complete flexibility is provided by selection of flow rate, operating pressure, electrical input, NEMA class, miscellaneous options and instrumentation.

Optional	Code	Features
Filters	P	5 Micon Pre-filter
	A	0.5 Micron After-filter
Instru-mentation & Alarms	M	Flow Meter
	H_1	Hygrometer, Outlet Probe
	H_2	Opt H_1 + Inlet Probe
	H_3	Opt H_2 + Vacuum Chamber Probe
	C_1	Vacuum Controller, 1 Probe
	C_2	Opt C_1 with 2 Probes
	C_3	Opt C_1 with 3 Probes

Optional	Code	Features
Misc.	W	Casters
	B	Circuit Breakers
	V	Viton Gasket & Seals
	PI	Inlet Pump Models 50 & 100 gph Only
	X	Special Engineering
Electrical Input	22	220 V, 3 phase, 60 Hz
	38	380 V, 3 phase, 50 Hz
	46	460 V, 3 phase, 60 Hz
	57	575 V, 3 phase, 60 Hz

* Note: Option C_1, Vacuum Controller is standard on models 1200,1800, 2400 & 3600.

Model Size	Oil Flow USGPH	Oil Flow Lit/hr	Height	Length	Width	Vacuum Connect.	Inlet	Outlet	Total Power	Weight
50	50	—	78″	48″	42″	2″	¾″ NPT	½″ NPT	5 kW	1500 lb
	—	189	1981 mm	1219 mm	1067 mm					680 kg
100	100	—	78″	48″	42″	2″	¾″ NPT	½″ NPT	7½	1800 lb
	—	378	1981 mm	1219 mm	1067 mm					816 kg
200	200	—	84″	112″	60″	3″	1″ NPT	¾″ NPT	17	5000 lb
	—	757	2133 mm	2845 mm	1524 mm					2268 kg
400	400	—	84″	112″	60″	3″	1″ NPT	¾″ NPT	30	5700 lb
	—	1514	2133 mm	2845 mm	1524 mm					2585 kg
600	600	—	84″	112″	60″	3″	1½″ NPT	¾″ NPT	42	6500 lb
	—	2271	2133 mm	2845 mm	1524 mm					2949 kg
1200	1200	—	99″	180″	72″	4″	1½″ NPT	1″ NPT	80	8500 lb
	—	4542	2514 mm	4572 mm	1828 mm					3855 kg
1800	1800	—	99″	180″	72″	4″	2″ NPT	1½″ NPT	120	9300 lb
	—	6813	2514 mm	4572 mm	1828 mm					4218 kg
2400	2400	—	99″	180″	72″	4″	2″ NPT	1½″ NPT	155	9900 lb
	—	9084	2514 mm	4572 mm	1828 mm					4490 kg
3600	3600	—	99″	216″	72″	4″	2″ NPT	1½″ NPT	240	11200 lb
	—	13626	2514 mm	5486 mm	1828 mm					5080 kg

Semi-Trailer Mount Option

Special Options

- By-Pass valving; Closed loop cooling and heating for Vacuum Pump; 70° F rise inlet heaters; Rate of flow indicators; Fuller's Earth adaptor; Outlet heater; Vacuum Pump Oil Mist separator; Instrumentation.
- Fuller's Earth Filters as separate units available (stationary or trailer mounted).

Capacities

- Capacities: Standard units range from 50 gph to 3600 gph. Larger capacities or special models on application.

Single-Pass Performance

- *Standard Performance with New Oils with 100 ppm Water Content and fully saturated with air to 12% by volume.*
- Total Water Content: Max. 10 ppm by ASTM Method D-1533
- Total Gas Content: Max. 0.25% by ASTM Method D-2945
- Dielectric Breakdown: Min. 40 kV by ASTM Method D-877
- *Optional Performance with New Oils with 50 ppm Water Content and fully saturated with air to 12% by volume.*
- Total Water Content: Max. 5 ppm by ASTM Method D-1533
- Total Gas Content: Max. 0.15% by ASTM Method D-2945
- Dielectric Breakdown: Min. 60 kV by ASTM Method D-877

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