

INSULATING OIL CONDITIONING & REGENERATION SYSTEM

**CUSTOMIZABLE
STATIONARY &
MOBILE OPTIONS**



- ***Mineral Insulating Oils***
- ***Synthetic Ester Fluids***
- ***Natural Ester Fluids***
- ***Silicone Fluids***



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Oil Conditioning

Optional Oil Regeneration

Transformer Dry-Out

Systems Engineering & Sales Co. Inc.
Phone:(260) 422-1671

SESCO
Fax:(260) 424-0607

3805 East Pontiac Street, Fort Wayne, IN 46803
E-Mail: sesco@sesco-inc.com

// INTRODUCTION

The SESCO SES320 series of insulating oil conditioning and regeneration systems have been manufactured for more than 30 years and can be found in the power generation, transmission, distribution and transformer manufacturing industries world-wide.

The SES320 family of oil purifiers are used to condition new and recondition in service insulating fluids for use in high voltage electrical equipment. The SES320R incorporates an optional adsorbent treatment stage to add oil regeneration capability.

All SES320 models are designed to “single pass” oil processing performance standards to accommodate transformer maintenance and commissioning requirements.

The SES321-600 and SES321-900 are compact, versatile, easy to tow, trailer mounted pre-configured systems with relatively few options.

The SES320-900 through SES320-3000, are fully configurable, and available in stationary skid as well as numerous mobile versions.



// CAPABILITIES

• Prepare new and Group 2 in service dielectric fluids for transformer service	✓
• Reclaim badly degraded Group 3 in service mineral dielectric fluids for transformer service	✓ Requires optional adsorbent treatment stage.
• Remove moisture from transformer insulation via multi-pass oil circulation	✓
• Remove sludge from a transformer via multi-pass hot oil circulation	✓ Requires optional adsorbent treatment stage.
• Circulating oil within an energized transformer *	✓
• Drain transformer for maintenance	✓ Optional dry breathing air systems are available for dry air back fill.
• Heat transformer core for vacuum dry-out via multi-pass hot oil spray while under vacuum	✓ Requires optional inlet oil booster pump. Optional spray connection manifold recommended.
• Evacuate transformer for vacuum dry-out	✓
• Measure rate of water extraction during vacuum dry-out	✓ Requires optional vacuum line cold trap.
• Fill transformer while holding under vacuum **	✓

*Safe energized transformer processing is procedure dependent and requires an experienced transformer service technician.

** A redundant vacuum pump configuration is required to achieve for holding pressures < 0.5 torr while filling.

TREATMENT STAGES

01	02	03	04	05	06
Oil Heating The fluid is gently heated to reduce the viscosity in preparation for the vacuum dehydration and optional adsorbent treatment stages.	Polar Contaminant Adsorption (optional) The heated fluid then passes through an optional (bypass included) adsorbent media process that removes acids, color bodies and other polar contaminants.	Filtration (3µ β200) The next treatment phase uses long life, low pressure drop, pleated synthetic filter media to remove 99.9% of all particulate > than 3 microns.	Vacuum Dehydration & Degasification Vacuum and high efficiency thin film low temperature evaporation is used to remove dissolved water and dissolved gases.	Filtration (0.5µ β75) A polishing filter completes the process. Pleated synthetic filter media is used to remove 98.7% of all particulate > than 0.5 microns.	Ready for Use The conditioned oil is now ready for use. Discharge flow rate and pressure are adjustable to accommodate the application requirements.

// PROCESSING PERFORMANCE & SPECIFICATIONS



Design Flow Rate	50 GPM 11340 LPH
Max Flow Rate	52 GPM 11790 LPH
Vacuum Capacity @ 1 Torr	1150 - 1750 CFM
Processing Vacuum Range	2.0 - 0.2 Torr
Electric Heating Capacity	176 - 256 kW
Electric Heat Watt Density	11.5 W/in ²
Fuel Oil Burner Heating	230kW & 350kW
Processing Temperature	Adjustable 40-87 C°
Filtration Stages	2
Filtration Efficiency	$\beta_x \geq 1000 @ 3 \mu$ $\beta_x \geq 200 @ 0.5 \mu$
Inlet Pressure	7 - 25 psia
Outlet Pressure	75 lbf/in ²
Seal Material	Fluorocarbon
Standard Control System	HMI w/ Automatic System Protection
Electrical Classification	NEMA, IEC
Power Supply	575V / 3 ϕ / 60Hz 480V / 3 ϕ / 60Hz 240V / 3 ϕ / 60Hz 380V / 3 ϕ / 50Hz
Power Consumption	60 - 310 kW

MINERAL OIL

Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 65 kV
Moisture Content Single pass (ASTM-D1533-88)	100 ppm reduced to < 10 ppm 50 ppm reduced to < 5 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	100 ppm reduced to < 2 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.9% > 1 μ 97.8% > 1/2 μ
Processing Temperature (Adjustable)	Min 120 F° 49 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.3 Torr

SYNTHETIC ESTER FLUIDS

Processing Rate	Derate processing rate by 25% (Multiple Passes Recommended)
Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 60 kV
Moisture Content Single pass (ASTM-D1533-88)	200 ppm reduced to < 100 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	200 ppm reduced to < 60 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.8% > 1 μ
Processing Temperature (Adjustable)	Min 170 F° 76 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.2 Torr

NATURAL ESTER FLUIDS

Processing Rate	Derate processing rate by 25% (Multiple Passes Recommended)
Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 60 kV
Moisture Content Single pass (ASTM-D1533-88)	100 ppm reduced to < 40 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	200 ppm reduced to < 30 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.8% > 1 μ
Processing Temperature (Adjustable)	Min 170 F° 76 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.2 Torr

// MOBILE APPLICATION

Typical Mobile Layout

OIL CONNECTIONS

FLOW METER

CONTROL PANEL

OPTIONAL INTEGRATED OIL STORAGE

282"

OPTIONAL HOSE REEL ASSEMBLY

OPTIONAL REDUNDANT VACUUM SYSTEM

Inlet Connection	2.0" NPT
Outlet Connection	1.5" NPT
External Vacuum Connection	4" CAM
Min Length	216"
Max Length	282"
Width	86"-90"
Height	93"- 99"
Minimum Weight	9150

* Dimensions and weight will vary with options

99"

DEGAS CHAMBER

VACUUM SYSTEM

OPTIONAL VACUUM & OIL HOSE STORAGE

90"

// STATIONARY APPLICATION

CONTROL PANEL

VACUUM SYSTEM

OIL CONNECTIONS

Inlet Connection	2.0 NPT
Outlet Connection	1.5 NPT
External Vacuum Connection	4" CAM
Length	160" - 188"
Width	82"
Height	93"
Minimum Weight	8900

* Dimensions and weight will vary with options

192"

95"

88"

// STANDARD FEATURES

- Completely Customizable
- Numerous Mobile Options
- Variable Speed Flow Rate
- Automatic Temperature & Chamber Level Control
- Two Stage Vacuum System
- Vane, Piston, & Dry Screw Backing Pump Options
- Low Maintenance Vacuum Booster Pump
- Multi-Stage Degasification System
- Automatic Foam Control System
- Positive Displacement Low Speed Inlet & Discharge Oil Pumps
- Low Watt Density Oil Heating System
- 7 Inch ASME Code Filter Housings (outer diameter)
- Discharge Flow & Totaling Rate Meters
- System Full Scale Vacuum Gauge
- Color Touchscreen Control System with Data Logging
- Optional Switch and Pilot Light Control System



CUSTOMIZABLE MOBILE APPLICATIONS

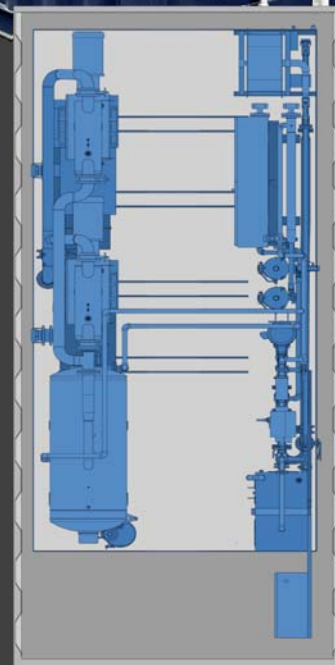


- SESCO offers a wide variety of mounting options to address specific operational requirements and/or restrictions.
- All mobile packages can be upgraded with oil processor accessories to extend or enhance the package transformer service capabilities.
- Each mobile application can be upgraded with options designed for increased practicality and comfort in order to further accommodate your needs.



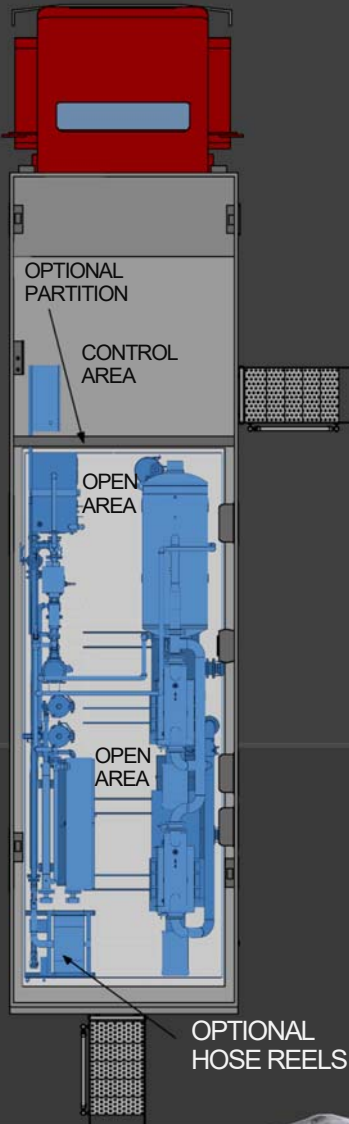
ISO CONTAINER

SES953 - ISO Container Mounting Matrix		1	2	3	4	5	6	7	8	9	10	11	12
SES953 -													
1	Container Type	None	1										
		20' ISO Standard	2										
		40' ISO Standard High Cube	3										
		Custom Length High Cube (ft) #											
2	Chassis	None	X										
		Standard Spring Suspension	S										
		Air Ride Suspension	A										
3	Condition	New		N									
		Used Once		U									
		Used - Restored		R									
4	Side Man Door	None			X								
		Single			S								
5	Oil Connections	None				X							
		Single Rear				R							
		Dual Rear				2							
6	Vacuum Connections	None					X						
		Single Rear					R						
		Single Side					1						
		Dual Driverside & Curbside					D						
7	Ventilation	None						X					
		Factory Installed						V					
		Kit for Customer Installation						K					
8	Lighting Package	None							X				
		Interior							I				
		Interior & Exterior							E				
		Interior Kit for Customer Installation							K				
		Interior & Exterior Kit for Customer Installation							C				
9	120V Package	None								X			
		Interior								I			
		Interior & Exterior								E			
		100A Load Center Only								L			
10	HVAC	None									X		
		Forced Air Heater									H		
11	Vacuum Hose Storage	None										X	
		Vertical Wall Mounted Storage Tube Assembly										V	
		Ceiling Mounted Storage Tube Assembly										C	
12	Oil Hose Storage	None											X
		Interior Wall Hangers											W
		Vertical Wall Mounted Storage Tube Assembly											V
Example	SES953 -	1	T	16	S	2	R	V	E	E	H	T	X



SES953

Box Truck



SES952 - BOX TRUCK MOUNTING MATRIX		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	Chassis Mfg	International	I																									
		Freightliner	F																									
2	Max Length	Minimum Amount Required		28																								
		Custom Length (16' Min - 28' Max)	#																									
3	Max Height	Standard 13.5 FT		13																								
		Custom 12.5 FT		12																								
4	Installed Equipment Type	SES320 Conditioning System			C																							
5	Generator(s) (See Generator PN Matrix)	None				X																						
		Primary - Full Load Diesel Tier IV F - Tow behind				G																						
		Secondary Only				A																						
		Primary & Secondary				B																						
6	Isolated Control & Lab Area	None				X																						
		84" Max w/ side door w/ clear observation sliding partition				T																						
		84" Max w/ side door w/ solid wall partition w/hinged man door				S																						
7	Attic Storage Area	None					N																					
		36" deep attic storage area					A																					
8	Oil Connections	Dual Rear							1																			
		Dual Exterior Belly Mounted both sides							2																			
9	Vacuum Connections	None							0																			
		Single interior rear							1																			
		Dual interior upper side wall							2																			
		Dual exterior belly mounted both sides							3																			
10	Side Man Door Construction	304 SS exterior door & frame w/ observation window & SS lockset								S																		
		FRP door w/ exterior cam lock & interior latch & observation window								F																		
11	Control Area Side Entry	None							0																			
		Aluminum stairs with single removable railing							1																			
		Aluminum stairs with dual removable railings							2																			
12	Additional Entry Stairs	None									X																	
		Aluminum stairs per control area railing arrangement on rear									R																	
13	Belly Stair Storage	None																										
		Provide lockable aluminum belly mounted dual stairs storage assembly									S																	
14	Side Windows	None																										
		Control room roadside observation window														X												
		Equipment area egress window (rear door access)													W													
15	Ventilation	Factory standard																				F						
		Power intake louvers														P												
16	Interior Lighting Package	None																										
		Area LED ceiling mounted lighting with individual load center control																					X					
		Area LED ceiling mounted lighting with wall switch control																					F					
17	Exterior Lighting Package	None																										
		Curbside & Driver side Flush Mount LED Flood Lights with dual load center control (2 lights)																					X					
		Curbside & Driver side Flush Mount LED Flood Lights with dual load center control (4 lights)																					2					
																							4					
18	Interior 120V/1 Package	None																										
		STD PKG - 15A GFCI Outlets Equipment area (4), Control area(5)																					X					
		STD PKG plus two additional dedicated 15A GFCI appliance outlets																					F					
																							A					
19	Exterior 120V/1 Package	None																										
		Curbside & Driver side GFCI Receptacles (2)																										
20	Area Heating	None																										
		Control area 5KW ceiling forced air heater w/ wall thermostat																										
		Control & Equipment area 5KW ceiling forced air heaters w/ wall thermostats																										
21	Area Cooling	None																										
		Wall mounted 18K BTU A/C																										
22	Loose Hose Storage	None																										
		Skid integrated vacuum & oil straight length hose storage. (100 Ft 4" vacuum hose, 160 FT 2" oil hose)																										
23	Power Cable Provisions	None																										
		(4) conductor 15FT pigtail / 50FT cable set with high amperage quick connectors w/ access door																										
		(4) conductor exterior high amperage twist lock connection box & 50FT cable set w/ mating twist connectors																										
24	Belly Storage	None																										
		Propose belly storage to fit the available space																										
25	Control Area Furniture	None																										
		Propose control area furniture to fit the available space																										
26	Waste Oil Storage Tank	None																										
		Provide a 40 GAL aluminum belly mounted waste oil tank with exterior level gauge & 3" fill connection																										
27	Testing Power Supplies	None																										
		230V/3PH - 30A - with receptacle and 50FT cable																										
		220V/1PH - 30A - with receptacle and 50FT cable																										
		Both																										
Example		SES952- N 48 13 C X T N 3 3 S 1 A S W F F 4 F E 2 W S 2 F F T X																										



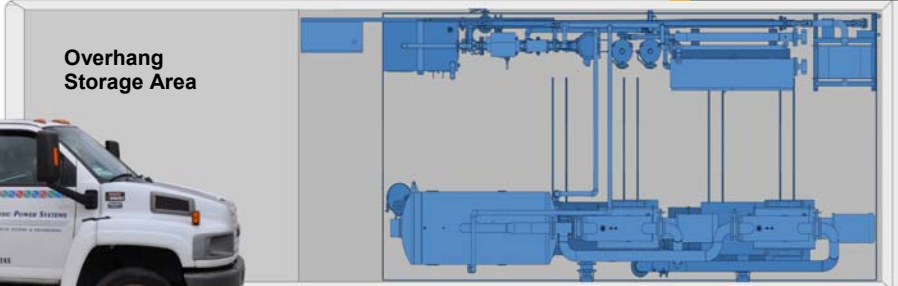
SES952



// DECK OVER CARGO TRAILER

SESS951 - DECK OVER CARGO TRAILER MOUNTING MATRIX			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
SESS951-																									
1	Hitch Type	Rear Ball Hitch	1																						
		Rear Pintal Ring Hitch	2																						
		Gooseneck Ball Hitch	3																						
		Gooseneck Fifth Wheel Hitch	4																						
2	Axles	Tandem		T																					
3	Trailer Body Length	16 FT			16																				
		20 FT			20																				
		22 FT			22																				
		24 FT			24																				
		26 FT			26																				
		28 FT			28																				
4	Wall Lining	None				X																			
		1/2" White Plywood or FRP				L																			
5	Mounted Spare Tire	None					X																		
		Tongue Mounted Spare Tire				T																			
6	Oil Connections	None						X																	
		Single Rear							1																
		Dual Rear								2															
		Dual Exterior Belly Mounted								3															
7	Vacuum Connections	None								X															
		Single Rear									R														
		Single Side Wall										1													
		Dual Driverside & Curbside Side Wall											D												
8	Side Man Door	None									X														
		Trailer Grade FRP w/ Cam Lock											P												
9	Side Access Doors	SS Commercial Grade with SS Lockset										S													
		None											X												
10	Control Area Length	Gooseneck Area Access Doors										G													
		Minimum Amount Required												M											
11	Control Area Partition	Custom Length (36" Min - 76" Max)													#										
		None														X									
12	DO Trailer Entry Stairs	Solid Framed Wall with Man Door													S										
		Clear Hinged Sliding Partition													T										
		None															X								
		Rear																R							
13	Entry Stair Railings	Side																							
		Rear & Side																							
		None																							
14	Ventilation	Single																							
		Dual																							
15	Interior Lighting Package	None																							
		Factory Specified																							
16	Exterior Lighting Package	Equipment & Control Area																							
		Equipment, Control, & Gooseneck Area																							
17	Interior 120V/1 Package	None																							
		Equipment & Control Area																							
18	Exterior 120V/1 Package	Equipment, Control, & Gooseneck Area																							
		None																							
19	HVAC	Curbside & Driverside Receptacles (2)																							
		None																							
20	Vacuum Hose Storage	Forced Air Heater																							
		Nose Wall Mount Air Conditioner																							
		Heater & Air Conditioner																							
21	Oil Hose Storage	None																							
		Vertical Wall Mounted Storage Tube Assembly																							
22	AL Belly Storage Box (18" W x 14" H x 48" L)	Trailer Frame Integrated Storage Tube Assembly																							
		None																							
		Interior Wall Hangers																							
		Curbside																							
		Roadside																							
		Both																							

Example SESS951- 1 T 16 S L T R S X 84 T B B V A 2 A 2 B T X B



(34" deck height, no wheel wells, 96" - 102" width)

SES951

ACCESSORIES

SES320 Mobile Accessories Matrix		SES320A							
Inlet Oil Booster Pump	None	X							
	Centrifugal 135 Lbs (Recommended)	C							
	Positive Displacement - 475 Lbs	P							
Transformer Vacuum Manifold	None	X							
	Vacuum	V							
	Vacuum & Hot Oil Spray	S							
	Both	B							
Vacuum Line Cold Trap	None	X							
	Portable 9.2L Liquid Nitrogen Trap	P							
	Integrated 9.2L Liquid Nitrogen Trap	N							
	Integrated Cascade Refrigerated Trap	C							
Dry Air System 28CFM Continuous Duty	None	X							
	-70°F, Not Breathing Certified	1							
	-90°F, Not Breathing Certified	2							
	-70°F, Breathing Certified	3							
	-90°F, Breathing Certified	4							
Dry Air Dew Point Monitor	None	X							
	Local	L							
	HMI Alarm	H							
Dry Air CO Monitor	None	X							
	Local	L							
	HMI Alarm	H							
Dry Air Hose (85FT SS Braid w/ cover)	None	X							
	Dry Air Hose Only	H							
	Dry Air Hose & Spring Return Reel	R							
Example		SES320A	C	X	P	3	L	X	R

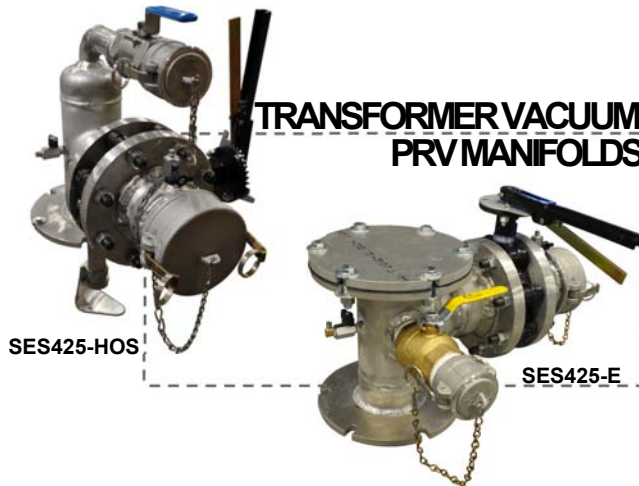
INLET OIL
BOOSTER PUMPS



LIQUID NITROGEN
COLD TRAP



TRANSFORMER VACUUM
PRV MANIFOLDS



DRY AIR SYSTEM

STANDARD SPARE PARTS KIT

- First Stage Filter Elements (4)
Pleated Synthetic Media (5 μ β200 Efficiency)
- Second Stage Filter Elements (4)
Pleated Synthetic Media (1/2 μ β75 Efficiency)
- Vacuum Chamber Dispersal Elements (1 set)
- Vacuum Pump Oil (20 L)
- Gasket Kit

(Fuses are not required)

CUSTOM SES320-3000 PACKAGE

To request a quotation for your customized SES320 - 3000 package, fill in the three categories below with the numbers that correspond to your desired options. Use the tables shown on previous pages as guides for generating each number.

Processor Configuration (Page 5)

SES320 - 3000

1	2	3	4	5	6	7	8	9	10	11	-	12	13	14	-	15	16	17	18	19	20	21	-	22	23	24	-	25	26	27	28	-	29	30
---	---	---	---	---	---	---	---	---	----	----	---	----	----	----	---	----	----	----	----	----	----	----	---	----	----	----	---	----	----	----	----	---	----	----

Mobility Options (Pages 6 - 9)

SES 95

SES953 |

SES951 |

SES952 |

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----



Accessories (Page 10)

SES320A

1	2	3	4	5	6	7
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