

Reference __

Specification: S-0699-3

Fleet: Silverliner IV

System: Electrical

Latest Revision Date: 01/05/2007

SEPTA TECHNICAL SPECIFICATION

1.0 SPECIFICATION TITLE

EX54 MAIN SMOOTHING REACTOR

2.0 PRE-RELEASE REVIEW

NAME

INITIAL & DATE

██████████

██████

3.0 APPROVAL FOR RELEASE

Signature

████████████████████

4.0 SPECIFICATION RELEASE DATE

09/07/1982

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AGENDA and REVISIONS
SEPTA
TECHNICAL SPECIFICATION

<u>Change No</u>	<u>Release Date</u>	<u>Reason for Issue</u>	<u>Release Approval</u>
1	07/28/1983	Complete rewrite-additional information made available.	
2	04/25/1988	Complete rewrite to add re-insulation and coil detail.	 
3	01/05/2007	Changes made to section 2.5.1. Corrections made to section 2.5.2.	

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2.3.2 *Impedance*

Reactor assembled and measured with 60 Hertz A-C from T1-T2 and T3-T4 (each bank tested separately).

<u>Amperes</u>	<u>Max.</u>	<u>Volts</u>	<u>Min.</u>
4.5	180		147

2.3.3 *High Potential Test*

3000 volts, 60 Hertz to ground for one (1) minute.

2.3.4 *Weight*

Complete Reactor.....2660 lbs.

2.4 **Level I – General Overhaul; Re-insulate**

2.4.1 *All assembled and disassembled reactors shall be inspected and tested for all mechanical and electrical defects.*

2.4.2 *All reactors shall be disassembled, thoroughly blown out with compressed air and then degreased, steam cleaned, and baked dry.*

2.4.3 *The following items shall be serviced, repaired, or replaced as noted:*

2.4.3.1 Covers— repair or replace as required. Silicone all openings to thoroughly seal to prevent entrance of dirt and moisture.

2.4.3.2 Air inlet/outlet assemblies— repair or replace as required.

2.4.3.3 External connectors— replaced as required.

2.4.3.4 Coils, Coil connections, and Terminal straps— repair as required and re-insulated.

2.4.3.5 Yoke and Frame assemblies— repair or replace as required.

2.4.3.6 Insulated Core Assembly— repair as required and re-insulated.

2.4.3.7 Insulators— replace as required.

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- 2.4.3.8 Bridge Assemblies— repair or replace as required.
- 2.4.3.9 Pole Core Assembly— repair as required and re-insulate.
- 2.4.3.10 Replace as required all other component parts and all missing or defective hardware.
- 2.4.4 *Re-insulate as follows:*
 - 2.4.4.1 Test for turn to turn shorts.
 - 2.4.4.2 Remove ground wall insulation and test for shorts. If shorts are detected, replace the turn to turn insulation with two (2) sided 'B' staged Nomex.
 - 2.4.4.3 Space, tape, and dip coil (bare copper with turn to turn insulation undisturbed) in Class H varnish. Bake.
 - 2.4.4.4 Tape lead with two half lap layers of 0.006 x 1" mica tape. Place two 0.015 mica pads under the leads (between lead and coil).
 - 2.4.4.5 Tape coil overall with one half lap layer of 0.006 x 1" mica tape.
 - 2.4.4.6 Tape coil overall with one half layer of 0.007 x 1" glass tape.
 - 2.4.4.7 Test coil for shorts.
 - 2.4.4.8 Meggar all core bolts with 1000 VDC – 500 Megohms minimum. If less than 500 megohms, replace bolt insulation.
 - 2.4.4.9 Replace core insulation if burnt.
 - 2.4.4.10 Assemble coils on core and connect series connection.
 - 2.4.4.11 Tape connections with two layers of mica 0.006 x 1" tape and one half lap layer of 130 (3M) silicon tape. Finish with one half lap layer of 0.007 x 1" glass tape.
 - 2.4.4.12 Insulation resistance test at 1000v from coils to ground and core iron bolts.
 - 2.4.4.13 Assemble complete unit in frame.

2.4.4.14 Perform two VPI's with bake cure cycle after each VPI as follows:

Reactor Vacuum Pressure Impregnation (VPI)

NOTE: It cannot be stressed too strongly that the temperature of the coils and the temperature of the impregnated material are the principle factors that determine the quality of the finished reactor. The factors must be controlled.

A suitable impregnant shall be used in the presence of a dry surcharge to be applied. Masking compound to all surfaces and areas not to be impregnated.

The application of impregnant shall take place promptly after preheat cycle. The coils should be at 43°C – 54°C (110°F–130°F), i.e. warm but not hot, to ensure good penetration and not cause thickening of the impregnant from overheating. Impregnate shall be applied by “VPI” method as follows:

- a. Lower reactor into processing tank.
- b. Attach the recording thermocoupler to the reactor.
- c. Close vacuum pressure vessel. Begin to evacuate a dry vacuum of 5 millimeters of mercury for not less than 90 minutes. After dry vacuum, check coil temperature, it should be at least 38°C–40°C (100°F–120°F). If heat loss is less than 38°C (100°F), preheat to a higher temperature. This temperature range is necessary to have sufficient heat in coils to lower the viscosity of the impregnant so that sufficient wetting and fill is attainable.
- d. While still under vacuum, the resin shall be introduced. Observe rise of resin in impregnation tank through sight glass in tank cover. When resin has risen above .25 inches of coils, stop the resin flow.
- e. Hold wet vacuum for one (1) hour.
- f. Close valve to vacuum source. Open pressure surcharge. When pressure has stabilized between 70 and 80 pounds per square inch, hold for one (1) hour with pressure on resin for “WET” pressure cycle.
- g. Release pressure. Return resin to storage tank. Allow reactor to drain free of resin for ten to twenty minutes. Remove reactor from tank.
- h. Bake time and temperature shall be as recommended by the resin manufacturer.

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2.4.4.15 Perform two varnish dips with bake cure cycle after each.

2.4.4.16 Final test per Paragraph 2.6.

2.5 **Level II** – Complete Major Overhaul; replacement of a Field Coil

2.5.1. *All of 2.4 except sections 2.4.3.4 and 2.4.4 shall be a requirement of 2.5 if not additionally covered by 2.5.*

2.5.2. *Field Coil – if proven defective by inspection and/or test replace all defective coil.*

Replace with CDA 114, 115, 116 fully annealed copper (0.880 x 0.287 inches).

2.6 **Test**

2.6.1 *Resistance –Measure and record the resistance of each bank of the complete reactor.*

<u>@ 25°C (77°F)</u>	<u>Resistance (OHMS)</u>	
	<u>Max.</u>	<u>Min.</u>
TI-T2	0.0180	0.0163
T3-T4	0.0180	0.0163

2.6.2 *Impedance Comparison*

Conduct a 60 Hertz A-C comparison impedance test on each bank of reactor. Set at 10 amperes and read voltage, testing each bank separately (TI-T2 and T3-T4). Record voltage.

2.6.3 *High Current*

Pass 1,000 amperes D-C through the reactor (both banks) for one (1) minute. Connect T2-T3 to insure an additive series connection. Note any mechanical movement or unusual noise. Record final voltage = 24–45 volts.

2.6.4 *High Potential*

2.6.4.1 Apply 3,000 volts, 60 Hertz between banks of coils to ground for one (1) minute minimum. No breakdown shall occur.

2.6.4.2 Apply 3,000 volts, 60 Hertz between banks of coils (TI-T2 to T3-T4) for one (1) minute minimum. No breakdown shall occur.

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3.0 INSTRUCTIONS TO BIDDER

The bidder shall review these specifications and immediately, clearly, and fully communicate to SEPTA all exceptions, significant deviations, conflict of information, and questions; and may submit alternates, in writing, for consideration prior to submitting a bid. The bidder will be responsible for proper interfacing of this equipment with SEPTA. Unless amended in writing, by SEPTA, these specifications shall remain in full force for the duration of the contract. In order to obtain a qualified and qualitative response from bidders it is strongly requested that bidders reply categorically to the specifications. Brochures will not be accepted as a substitute for a completed response to the specifications. (Brochures may be submitted only as supplementary reference bid material.)

4.0 PROPOSAL SUBMISSION

The proposal should demonstrate to the satisfaction of SEPTA that the bidder can and shall meet these specifications and SEPTA requirements. The bidder should state if the equipment shall in all respects be in compliance with these specifications, or the bidder shall comply with 3.0.

4.1 Proposal Technical Content

- 4.1.1 *Organization Data— History, experience, and past experience, staff, capabilities.*
- 4.1.2 *Facilities –Plant, equipment.*
- 4.1.3 *Operations – Office, plant, inspection, quality control, test, make or buy, sub-contract.*
- 4.1.4 *Specifications, Standards, Regulations— List those complied with pertaining to the equipment proposed.*

5.0 PROPOSAL SUBMISSION

Refer to contract document.

6.0 REPAIR PARTS AND SERVICE

Each proposal shall furnish the location of service centers and parts supply depot nearest SEPTA property. Continuous operation of the equipment contemplated by SEPTA is of utmost importance. The bidder shall render service and furnish repairs and parts within twenty-four (24) hours of notification, with a sufficient number of personnel and parts available for each machine delivered. If bidder fails to comply, SEPTA may, without further notice, proceed to resolve the matter and the bidder agrees to reimburse SEPTA for all applicable related costs incurred.

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7.0 REPAIR PARTS AND SERVICE

Refer to contract document.

8.0 REPAIR PARTS AND SERVICE

Equipment to be of the later proven type.

8.1 Standards, Specifications and Practices

Equipment shall meet all latest applicable standards, specifications, and “best” practices for construction, workmanship, materials, use, safety, health, environment protection, and energy conservation.

8.2 Intended Service

Equipment shall be suitable for the intended service, to be rugged, optimum weight, durable, reliable, economical, efficient; for hard usage and sustained operation as normally encountered in SEPTA operations.

8.3 Maintenance

Equipment shall be as maintenance free as practical, but have provision for adequate and easy remaining maintenance at minimum cost and down time. All like components are to be interchangeable and wherever possible, to be standard, commercially readily available.

8.4 Painting

Exterior surfaces only – Equipment shall be cleaned, treated, painted in accordance with the highest applicable industry standards and practices.

8.5 Safety

The bidder furnished equipment shall present no hazard or detrimental effect to SEPTA personnel, equipment, or property; or to bystanders, equipment, or property.

8.6 Documentation

The bidder shall maintain complete and current records, data, inspection, quality control, test reports, and drawings. These shall be available to SEPTA upon request. Data/Inspection sheets shall be approved by SEPTA R.E.D. prior to start of work.

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8.7 Drawings

SEPTA shall have the option to request and receive 1 reproducible and 1 print of any drawings required by SEPTA.

8.8 Parts and Package Identification

8.8.1 *Packaging shall be identified in bold lettering as follows:*

- a. Part Name/Number _____
- b. System Type _____
- c. Quantity _____
- d. Class & Lot Number _____
- e. Specification Number _____
- f. P.O. Number _____
- g. Manufacturer Date _____

8.8.2 *Components/Parts shall be identified in readable lettering (where part size allows useable surface area) as follows in the priority order listed:*

- a. Application, e.g., RH, LH, CW, CCW, UP, DOWN, POS., NEG., ETC.
Size: AWG, Volts, OHMS, DIA., etc.
- b. Class and Lot Number.
- c. Part Name/Number, Specification Number, and Manufacture Date.

8.9 Materials and Processes

All materials used for the overhaul and repair of each item of apparatus shall be of the same class, grade, size, thickness, flexibility, and fit as now being supplied by the manufacturer of the apparatus, shall be suitable equivalents, approved by SEPTA, or shall be materials specifically required by SEPTA.

8.10 Replacement Parts

All replacement parts, such as, but not limited to, armature and field coil insulation kits, bearings and bearing housings, brush holders, commutators, or slip rings, fans and armature shafts, shall be genuine new, supplied from manufactures sealed package, or completely reconditioned, as approved by SEPTA. All replacement parts shall be compatible with those of current design presently used in the production of new/reconditioned apparatus of the same type.

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9.0 INSPECTION

9.1 Equipment Inspection

SEPTA will inspect prior to shipment (and as required monitor Engineering, fabrication, quality control, inspection, and testing) equipment supplied to this specification.

The pre-shipment inspection shall be conducted at the bidders' facility. This inspection will be primarily concerned with, but not necessarily limited to, compliance with these specifications and quality of workmanship. The bidder shall perform inspection and functional testing at his facility in the presence of SEPTA for functional approval prior to delivery. Inspection and testing shall adequately demonstrate the performance and compliance of the equipment as required by this specification. The bidder will render all necessary assistance. SEPTA may elect to waive pre-shipment inspection and inspect at receiving.

Rework necessitated by unsatisfactory results shall be the sole responsibility of the bidder who shall expend every effort to satisfy these specifications and maintain schedule. The bidder shall be responsible for his suppliers and their products meeting these specifications.

SEPTA inspection shall not necessarily constitute acceptance nor shall it in any way replace bidder inspection or otherwise relieve the bidder of his responsibility to furnish an acceptable end item.

9.2 Facilities Inspection

The Authority shall have the right to inspect contractor's facilities prior to award of contract to insure that all equipment necessary to comply with specifications is available and operable.

The Authority shall have the right to inspect repair facilities at any time, and without prior notice, during contractor's normal business hours, for the duration of the contract.

SEPTA reserves the right to inspect any, or all, materials, parts, processes, equipment and workmanship employed in the work.

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9.3 Replaced Material/Parts

All replaced material and/or parts including scrap metal shall be returned to SEPTA with identification of unit (including type and serial number) that it was removed from.

10.0 OPTIONS

Refer to contract document.

11.0 DELIVERY

Refer to contract document.

12.0 SHIPPING

Equipment shall withstand without damage, forces normally encountered in handling and shipping. Valuable and easily pilfered items shall be shipped in such a manner as to resist pilferage.

13.0 TRAINING

Refer to contract document.

14.0 PARTS AND INSTRUCTION BOOKS

Parts and instruction books shall be complete, readily understood, and contain diagrams of all electric, hydraulic, pneumatic systems and utilize standard notations and symbols. The books shall be forwarded to:

**SEPTA, Mgr. Rail Engineering Standards, 14th Floor
1234 Market Street
Philadelphia, PA. 19107-3780**

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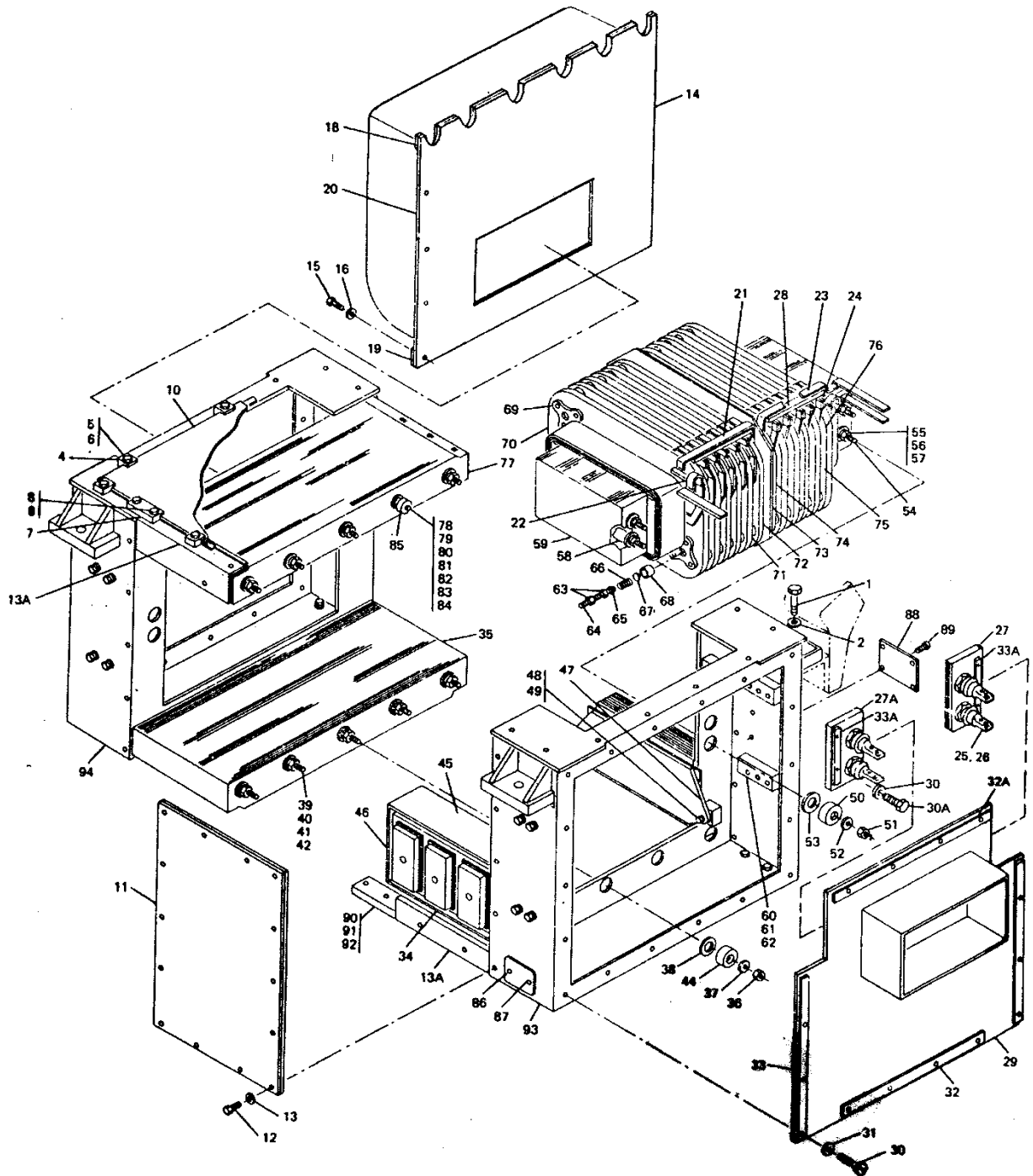


FIGURE 1 MAIN SMOOTHING REACTOR EXS4

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TABLE 1

Ref. No.	Description	Ref. No.	Description
1	BOLT	48	BOLT
2	WASHER, Flat	49	WASHER
3	NUT	50	SPACER
4	CLAMP	51	NUT
5	BOLT	52	WASHER
6	LOCKWASHER	53	WASHER
7	CLAMP	54	STUD
8	BOLT	55	NUT
9	LOCKWASHER	56	WASHER
10	COVER ASSEMBLY	57	WASHER
11	COVER	58	INSULATING SLEEVE
12	BOLT	59	INSULATED CORE ASM
13	WASHER	60	BLOCK
13A	SUPPORT, Angle	61	BOLT
14	AIR DISCHARGE DUCT	62	WASHER
15	BOLT	63	NUT, Hex
16	LOCKWASHER	64	SCREW, Jack
18	STRIP	65	PAD, Jacking
19	STRIP	66	SPRING
20	STRIP	67	WASHER
21	TERMINAL STRAP	68	CUP, Insulating
22	TERMINAL STRAP	69	PLATE, Spring Backing
23	TERMINAL STRAP	70	FIELD COIL
24	TERMINAL STRAP	71	FIELD COIL
25	CONNECTOR	72	FIELD COIL
26	LOCKNUT	73	SPACER, Center
27	TERMINAL CORNER	74	FIELD COIL
27A	TERMINAL CORNER	75	FIELD COIL
28	SPACER	76	FIELD COIL
29	AIR INLET	77	BRIDGE ASSEMBLY
30	BOLT	78	NUT
30A	BOLT	79	WASHER
31	LOCKWASHER	80	WASHER
32	STRIP	81	NUT, Hex.
32A	STRIP	82	WASHER
33	STRIP	83	WASHER
33A	STRIP	84	STUD
34	INSULATION	85	SPACER
35	BRIDGE ASSEMBLY	86	NAME PLATE
36	NUT	87	PIN, Escutcheon
37	WASHER	88	NAME PLATE
38	WASHER	89	PIN, Escutcheon
39	NUT, Hex	90	FOOT
40	WASHER	91	BOLT
41	WASHER	92	WASHER
42	STUD	93	SUPPORT, Reactor
43	STUD	94	SUPPORT, Reactor
44	SPACER		
45	INSULATION		
46	INSULATION		
47	YOKE ASSEMBLY		