

NATIONAL ELECTROSTATICS CORP.

Instruction Manual No. 2ET067210 for
Operation and Service of

**EINZEL LENS
Model EL63-50
(2EA067210)**

7/18/96
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I. DESCRIPTION

The National Electrostatics Corporation Einzel Lens, Model EL63-50 is an all-metal and ceramic electrostatic lens designed for 50 kV maximum voltage and has a 2.50 inch diameter (63.5 mm) aperture.

The lens is shown schematically in Drawing 5-0-6721.

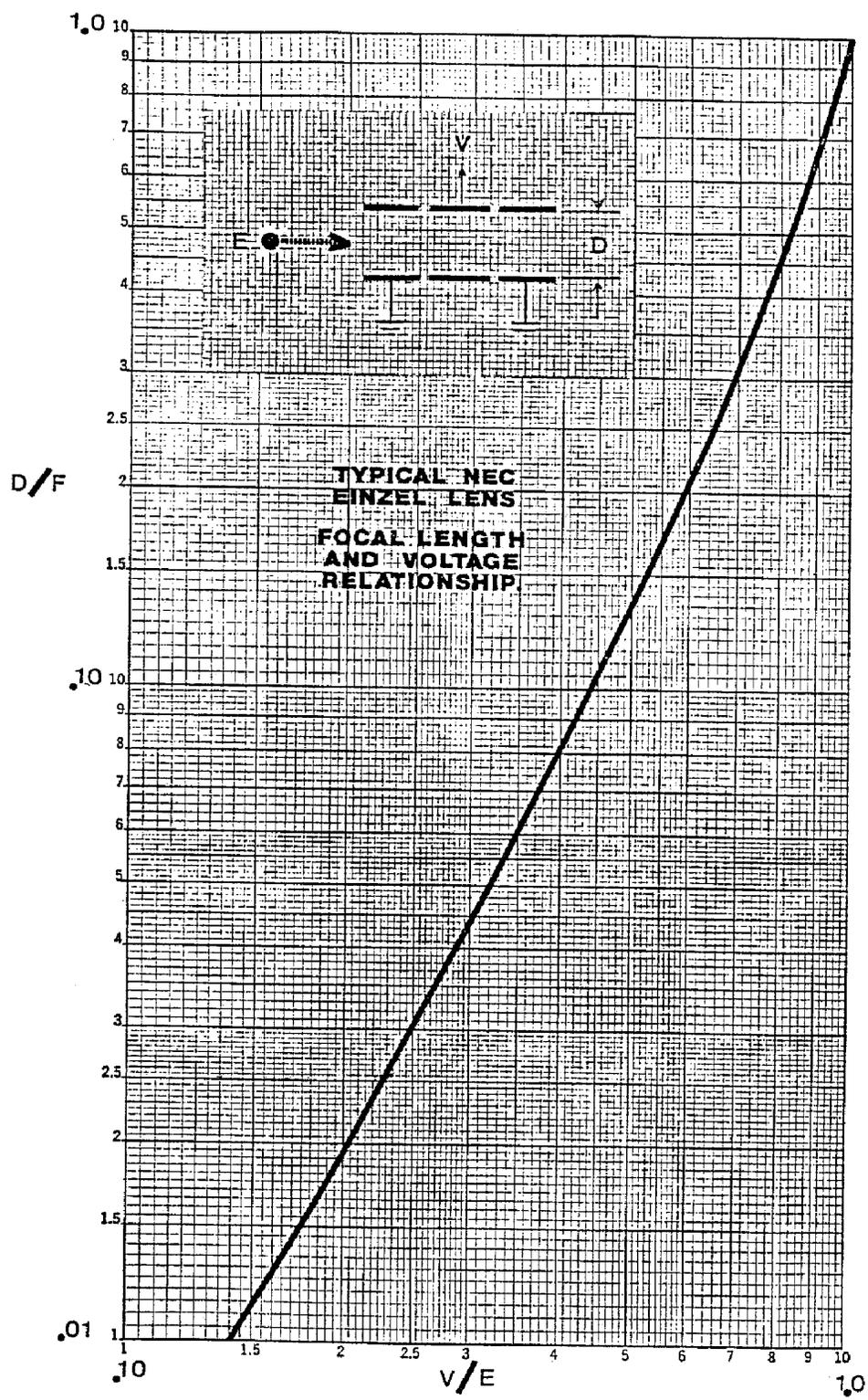
II. **INSTALLATION**

The lens can be installed in any orientation, although an installation with the feedthru pointing downward is preferred as this allows the cable to hang down without any additional support.

The high voltage cable from the power supply should be attached to the insulating bushing by removing the aluminum protective cover and inserting the cable thru the cable clamp. The high voltage cable (typically RG-8/U) should have its shield stripped back beyond the cable clamp when installed. This is optional but should be done if there is an additional ground path between the power supply and the lens housing, and will minimize ground loop pickup. After re-installing the cover, tighten the cable clamp to act as a strain relief.

III. OPERATION

Operation of the Einzel lens is straightforward. Since the focal length of the lens is a function of the potential difference between its middle element and the two outer elements, the outer elements are usually grounded and the middle element is connected to the output of the power supply at potential V . For any charged particle accelerated through a potential drop of V_i before it enters the lens, the graph on the following page gives approximate relationship between Einzel lens strength and the voltage ratio V/V_i for typical NEC Einzel lens geometries. Lens strength is given in the graph as the ratio of lens diameter D to its focal distance F . Usually F is measured from the principal plane, the mid plane of the lens.



IV. **POWER SUPPLIES**

If this Einzel lens has been supplied with power supplies and/or controls refer to the appropriate manual(s). If part of a larger installation, refer to the system documentation.

Typical power supply configurations include a protective resistor which will dissipate the full power output of the power supply if the lens or cable shorts out.

These lenses can be run either positive or negative as the user desires.

V. MAINTENANCE

The lens will never need any normal maintenance. In the event the insulators become contaminated or if disassembly is desired for some other reason, proceed as follows:

- 1) Remove the lens assembly (housing) from the beamline.
- 2) Remove the high voltage feedthru assembly (15).
- 3) Remove captured ball spring assembly (items 10, 11, 12, 13) and setscrew (14).
- 4) Lift out the entire lens assembly by removing screws (1).
- 5) The individual parts may now be disassembled on a bench taking note of the orientation of the center element (6) with respect to element (4) in order to reassemble with the tapped hole of element (6) facing the feedthru port.
- 6) Reassemble on the bench using alignment fixture (24), with screw sets (7), (7), and (23) loose until the fixture is in place.
- 7) Reassemble to the housing in reverse order.

VI. SPECIFICATIONS

Model	EL63-50
Catalog Number	2EA067210
Voltage	50 kV
Flanges	8" O.D. ConFlat, Blind-Tapped
Lens Aperture	2.50" (63.5 mm)
Entrance Aperture	1" (25.4 mm)
Drawing	5-0-6721

VII. **DOCUMENTATION**

Aluminum Gasket Making Instructions

Gasket Securement to NEC Flanges

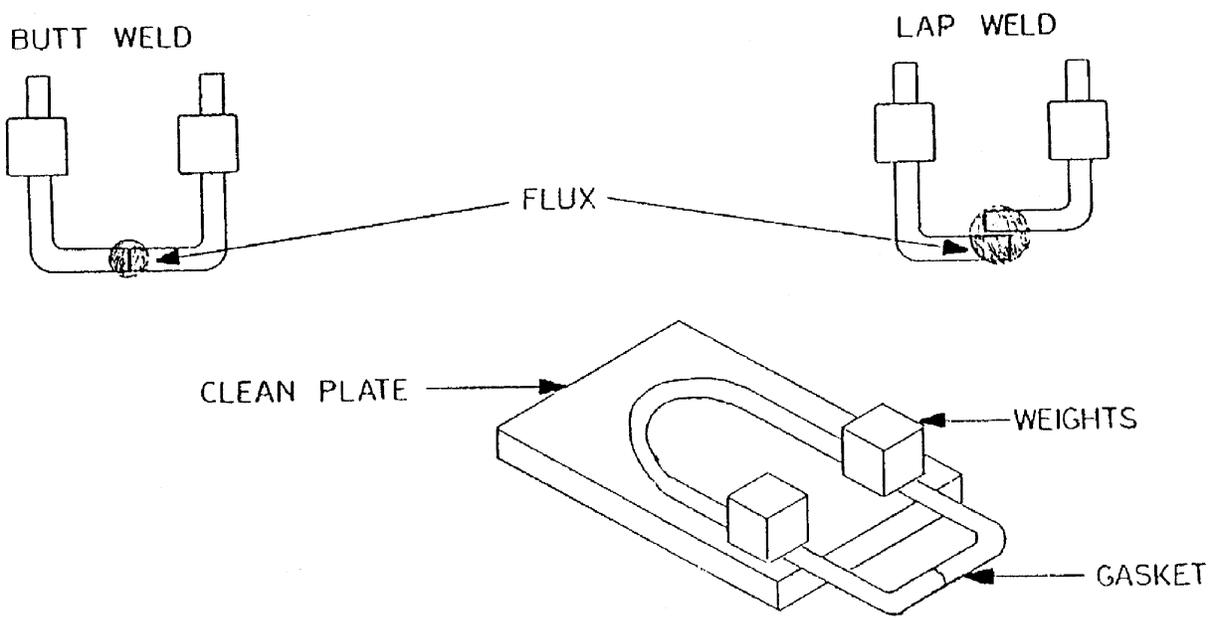
2.50 Dia. 50 kV Einzel Lens Assembly

NEC Drawing No. 2EA067210
Parts List No. 2EA067210

ALUMINUM GASKET MAKING INSTRUCTIONS

1. Prepare flux; use ALL STATE No. 31 ALUMINUM BRAZING FLUX.* If not available locally, contact ARC Products Manufacturing Division, Chemtron Corporation, Hanover, PA 17331. Mix a small amount of powder with water until a loose paste consistency is obtained.
 2. Cut the aluminum wire to circumferential length with a razor blade or scissors. An NEC Gasket Listing is most helpful.
 3. Mount the wire as shown for butt weld Figure A with a slight "spring" such that if the ends were displaced, they would overlap by 1/32" - 1/16", or in case of a lap weld Figure B the overlap is 1/32" - 1/16".
 4. Dab a small amount of flux on the joint.
 5. Adjust a low temperature torch for a small local flame and heat the junction with an undulatory motion. The flux will shrivel up initially, with the aluminum ends soon melting and fusing. Fusion usually is accompanied by a sudden movement of the ends which were sprung under slight compression.
- * Due to shipping regulations, we are no longer able to include even small quantities of this flux without special packaging. For example, a four ounce jar (P/N 3AC028887) is available in 2003 for about \$12.30 plus \$52.00 hazardous shipping expense.

6. Properly fused, the joint can be tested by inserting one's thumbs within the loop and snapping outwards. A poor joint will fail and part immediately.
7. A small aluminum lump at the joint will not affect the sealing ability of the completed gasket.
8. Wash off flux residue with a rubbing action between plastic-gloved fingers under warm water.
9. Soak joint in hot water for 15 minutes to completely remove flux residue.
10. Form gasket by rounding it about a taped flask or other suitable object.
11. Possible difficulties: Too much or too prolonged heating will cause the ends to over-melt and subsequently recede, forming accumulated balls of aluminum.
12. Variations in technique: Some individuals find that an over-lap joint works better than the butt joint. Preference for a localized pencil point flame or for a non-localized flame is also split according to which seems to work best for the individual. A "BIC" lighter flame has been known to work in emergencies.



GASKET SECUREMENT PROCEDURE FOR NEC FLANGES

1. Round gasket to an approximate circle using a tapered flask or other suitable object.
2. Secure gasket to flange with .0007" thick aluminum foil (household foil is adequate) strips looped around the wire gaskets as shown in figure.
3. To hold the aluminum gasket several aluminum strips approximately equally spaced between every other bolt hole is recommended.
4. The .020" aluminum wire gasket readily seals on NEC standard flanges with 20-25 foot-pounds torque using 3/8" diameter stainless bolts and 10-15 foot-pounds using 5/16" diameter bolts. Flanges should be retorqued after the first bakeout. Subsequent bakeouts rarely require retorquing.
5. Remove masking tape prior to bakeout.

INSTALLATION OF NEC STANDARD ALUMINUM GASKET

