

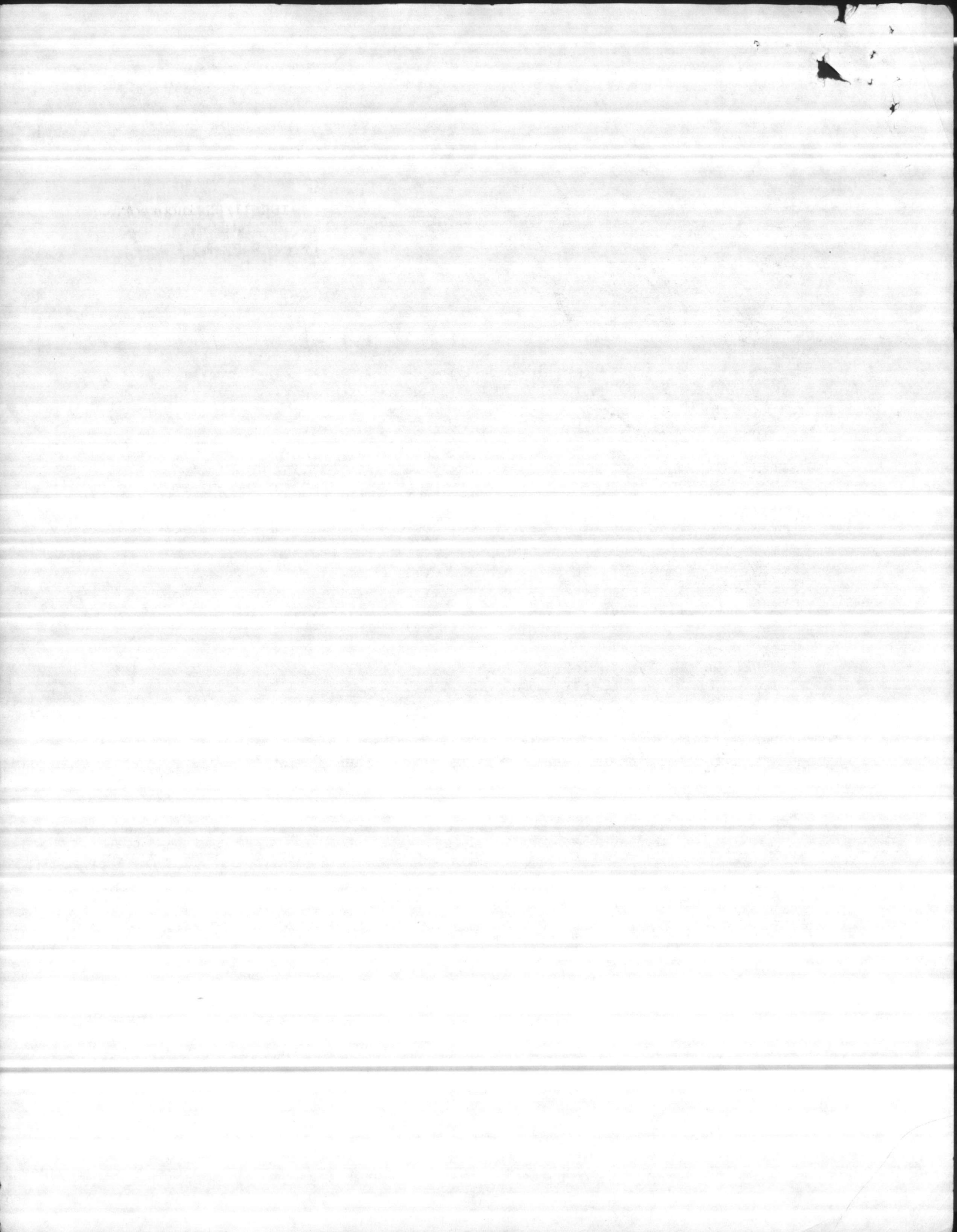
SECTION 16510  
INTERIOR LIGHTING

ISR 11/85 incorporated

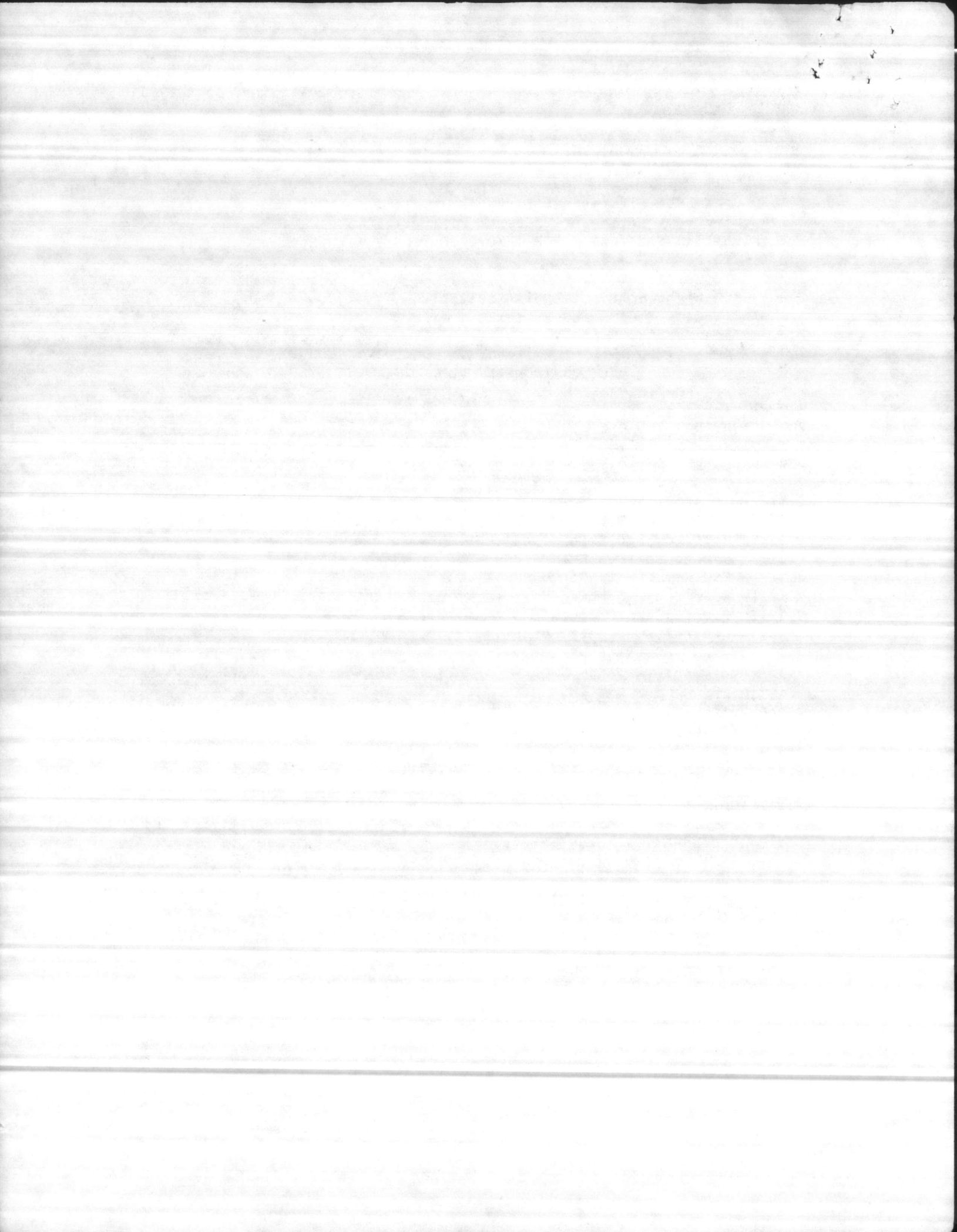
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SECTION 16510

(B)

INTERIOR LIGHTING

(A)

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

(C)

1.1.1 Military Standard (Mil. Std.):

MIL-STD-461B Electromagnetic Emission and Susceptibility  
Requirements for the Control of Electromagnetic  
Interference

1.1.2 American National Standards Institute (ANSI) Publications:

C82.1-77 Fluorescent Lamp Ballasts

C82.2-77 Methods of Measurement of Fluorescent Lamp  
Ballasts

C82.4-78 High-Intensity-Discharge Lamp Ballasts (Multiple  
Supply Type)

1.1.3 Illuminating Engineering Society (IES) Publication:

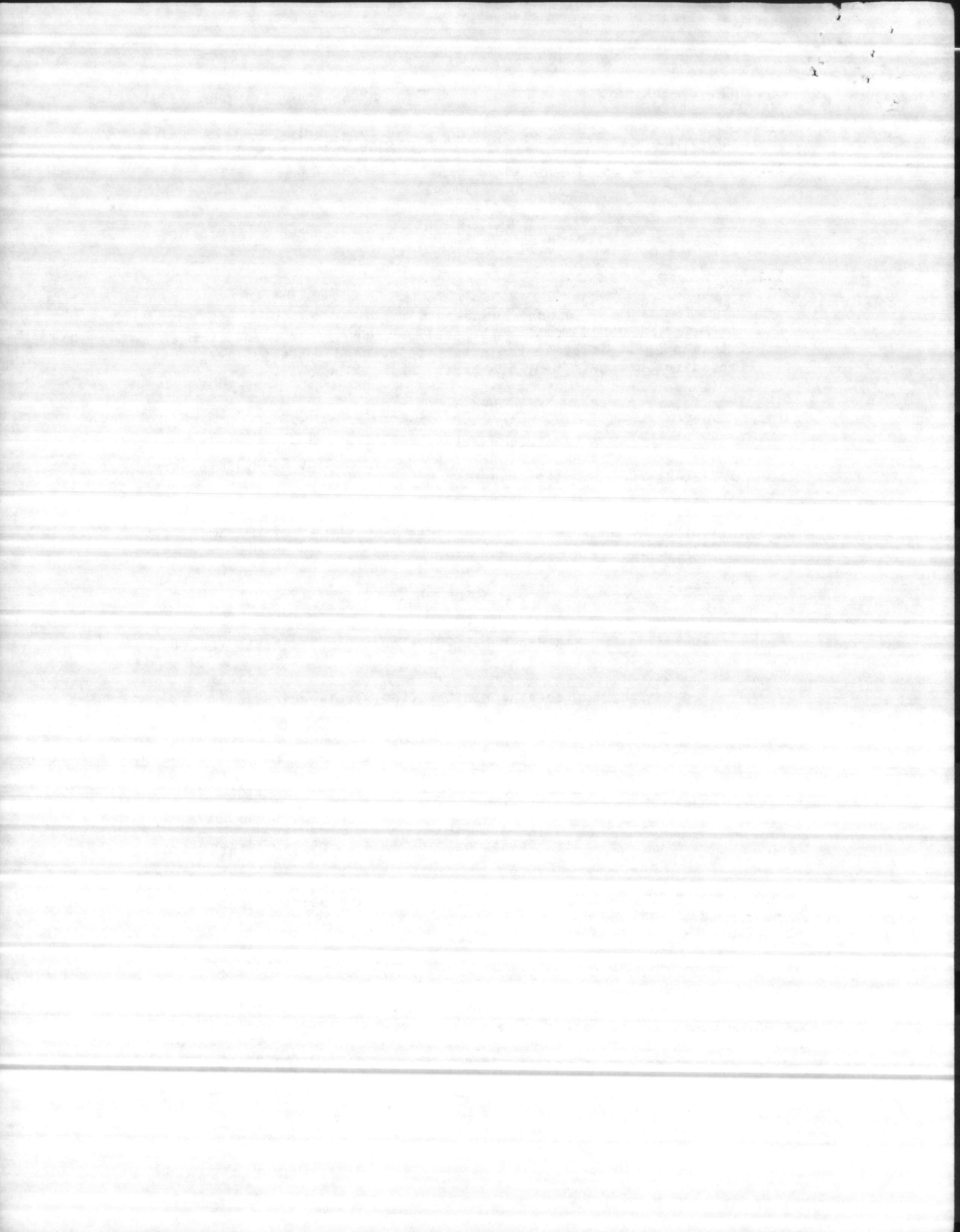
1981 Lighting Handbook, Reference and Application  
Volumes

1.1.4 National Electrical Manufacturers Association (NEMA)  
Publications:

ICS 2-78 Industrial Control Devices, Controllers, and  
(REV 3-82) Assemblies

ICS 6-78 Enclosures for Industrial Controls and Systems  
(REV 1-80)

LE 2-74 H-I-D Lighting System Noise Criterion (LS-NC)  
(R 80) Ratings



1.1.5 National Fire Protection Association (NFPA) Publications:

- 70-84 National Electrical Code (NEC)
- 101-81 Life Safety Code

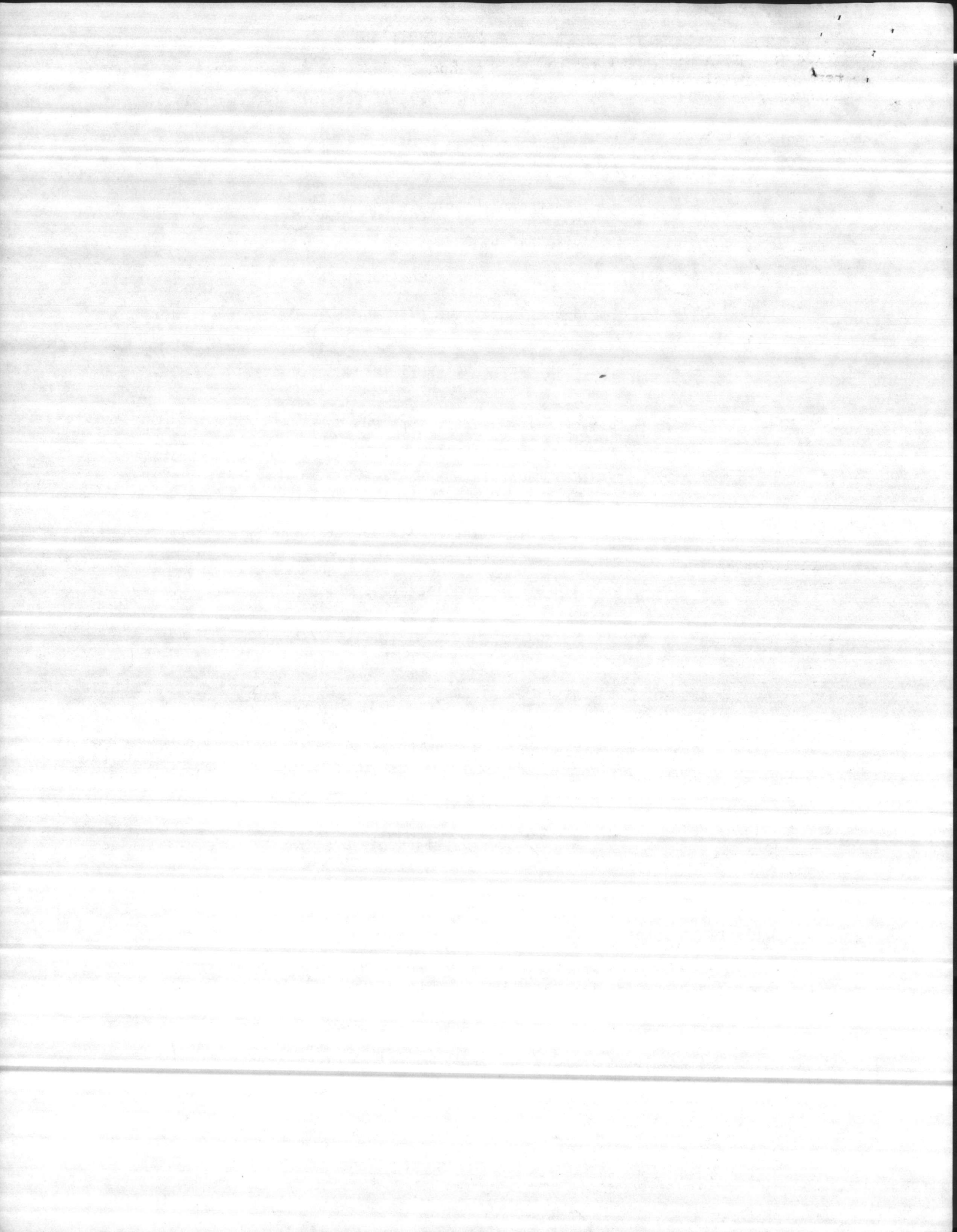
1.1.6 Underwriters Laboratories Inc. (UL) Publications:

- 20-79 General-Use Snap Switches  
(R FEB 82)
- 57-72 Electric Lighting Fixtures  
(R JUL 82)
- 773-82 Plug-In, Locking Type Photocontrols for Use With  
Area Lighting
- 773A-82 Nonindustrial Photoelectric Switches for  
Lighting Control
- 844-78 Electric Lighting Fixtures for Use in  
(R APR 82) Hazardous Locations
- 924-79 Emergency Lighting Equipment  
(R MAY 82)
- 935-78 Fluorescent-Lamp Ballasts  
(R SEP 80)
- 1029-80 High-Intensity-Discharge Lamp Ballasts  
(R OCT 81)
- 1570-82 Fluorescent Lighting Fixtures
- 1571-79 Incandescent Lighting Fixtures  
(R MAR 82)
- 1572-80 High Intensity Discharge Lighting Fixtures  
(R APR 82)

1.2 GENERAL REQUIREMENTS: Section 16011, "Electrical General Requirements," applies to this section, with the additions and modifications specified herein.

1.3 DESCRIPTION OF WORK: The work includes providing lighting fixtures, photocell switches, dimmer switches, time switches, contactors, and battery-powered units and systems for interior use, including lighting fixtures and accessories mounted on the exterior surfaces of buildings. Materials not normally furnished by manufacturers of these devices are specified in Section 16402, "Interior Wiring Systems."

(D,E)





1.4 SUBMITTALS: Data, shop drawings, and reports shall employ the terminology, classifications, and methods prescribed by the IES Lighting Handbook, as applicable, for the lighting system specified.

1.4.1 Manufacturer's Data:

- a. Lighting fixtures, including lamps and ballasts
- b. Lighting contactors
- c. Photocell switch
- d. Time switch
- e. Dimmer switch
- f. Power hooks
- g. Emergency lighting equipment
- h. \_\_\_\_\_

1.4.2 Shop Drawings:

- a. Lighting fixture assemblies [include computerized horizontal footcandle data at a task plane height of \_\_\_\_\_ feet]
- b. Emergency lighting systems
- c. \_\_\_\_\_

1.4.3 Certified Test Reports:

(F)

a. Computerized candlepower distribution data in horizontal plane at angles of every [5] [\_\_\_\_\_] degrees between [0 and 180] [\_\_\_\_\_] degrees, coefficients of utilization, efficiency, and distribution class. Testing shall be by an independent testing laboratory. Excerpts of test data on manufacturer's letterhead are not acceptable.

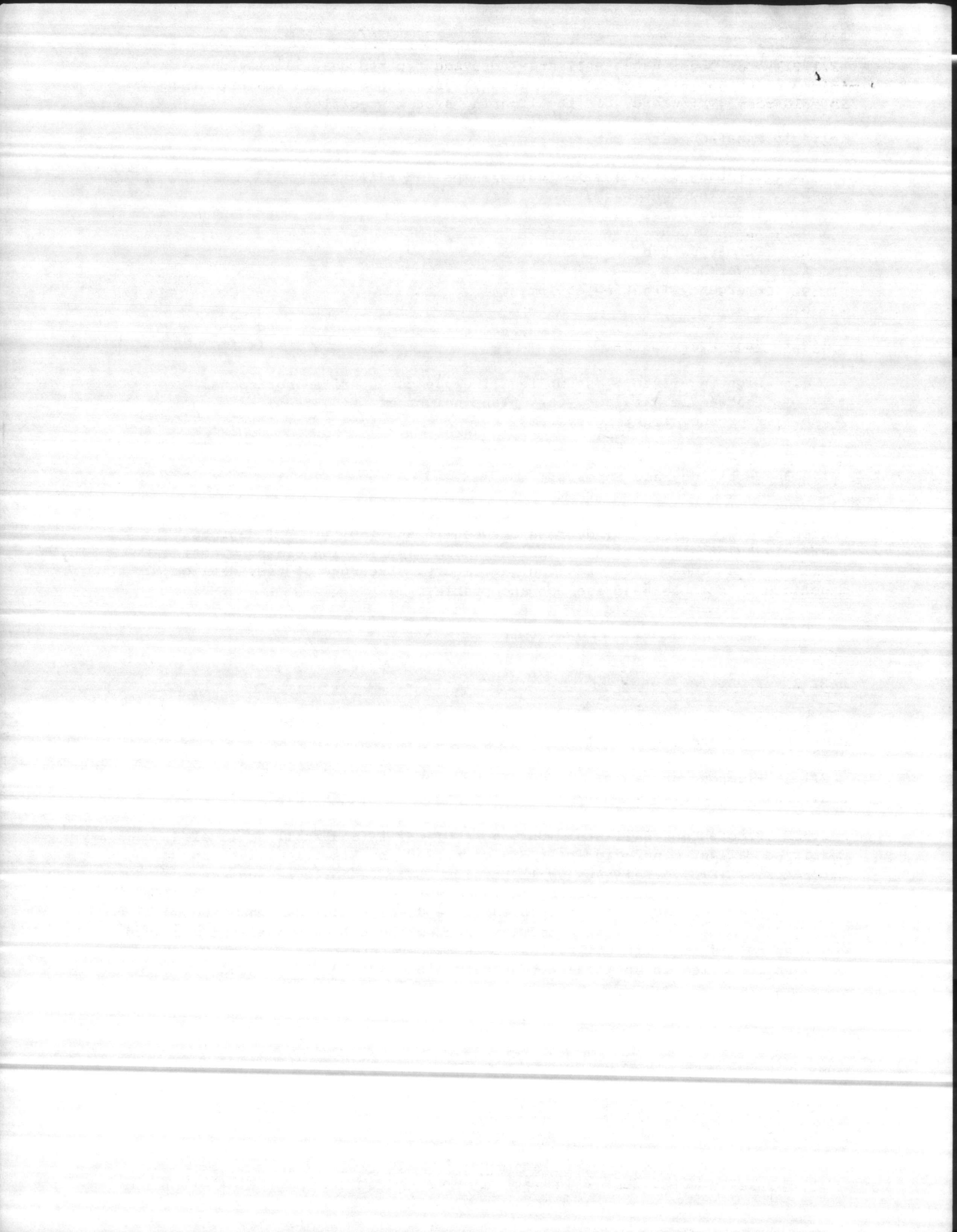
- b. \_\_\_\_\_

PART 2 - PRODUCTS

2.1 FLUORESCENT LIGHTING FIXTURES: UL 1570, except lighting fixtures for damp and wet locations shall conform to UL 57. (G)

2.1.1 Fluorescent Lamps: [Provide the number, type, and wattage indicated.] [Provide lamp Type \_\_\_\_\_ conforming to ANSI C78.\_\_\_\_.] (H)

2.1.2 Fluorescent Ballasts: UL 935, ANSI C82.1, and shall be labeled Certified Ballast Manufacturers (CBM) certified by Electrical Testing Laboratories (ETL). Ballasts shall be high power factor type [unless indicated otherwise] and shall be designed to operate on the voltage system to which they are connected. Ballasts shall be Class P and shall have sound rating "A" [unless otherwise noted]. Fixtures and ballasts shall be designed and constructed to limit the ballast case temperature to 90 degrees Celsius (C) when installed in an ambient temperature of [40] [\_\_\_\_\_] degrees C. (I)



2.1.2.1 Low Temperature Ballasts: Provide fluorescent ballasts having a minimum starting temperature of minus [20] [30] degrees C in fixtures mounted [in cold rooms,] [outdoors,] [in unheated buildings,] [and as indicated]. (J)

2.1.2.2 Energy-Saving Ballasts: Provide energy-saving fluorescent ballasts of the CBM certified full light output type. The ballasts shall have an average input wattage of [86 or less when operating two F40T12 lamps] [50 or less when operating one F40T12 lamp] [159 or less when operating two F96T12 lamps] [ ] or less when operating [ ] lamps] tested in accordance with ANSI C82.2 methods. [Ballast shall be compatible for use with energy-saving lamps.] (K)

2.1.3 Open-Tube Fluorescent Fixtures: Provide with spring-loaded telescoping sockets or lamp retainers (two per lamp).

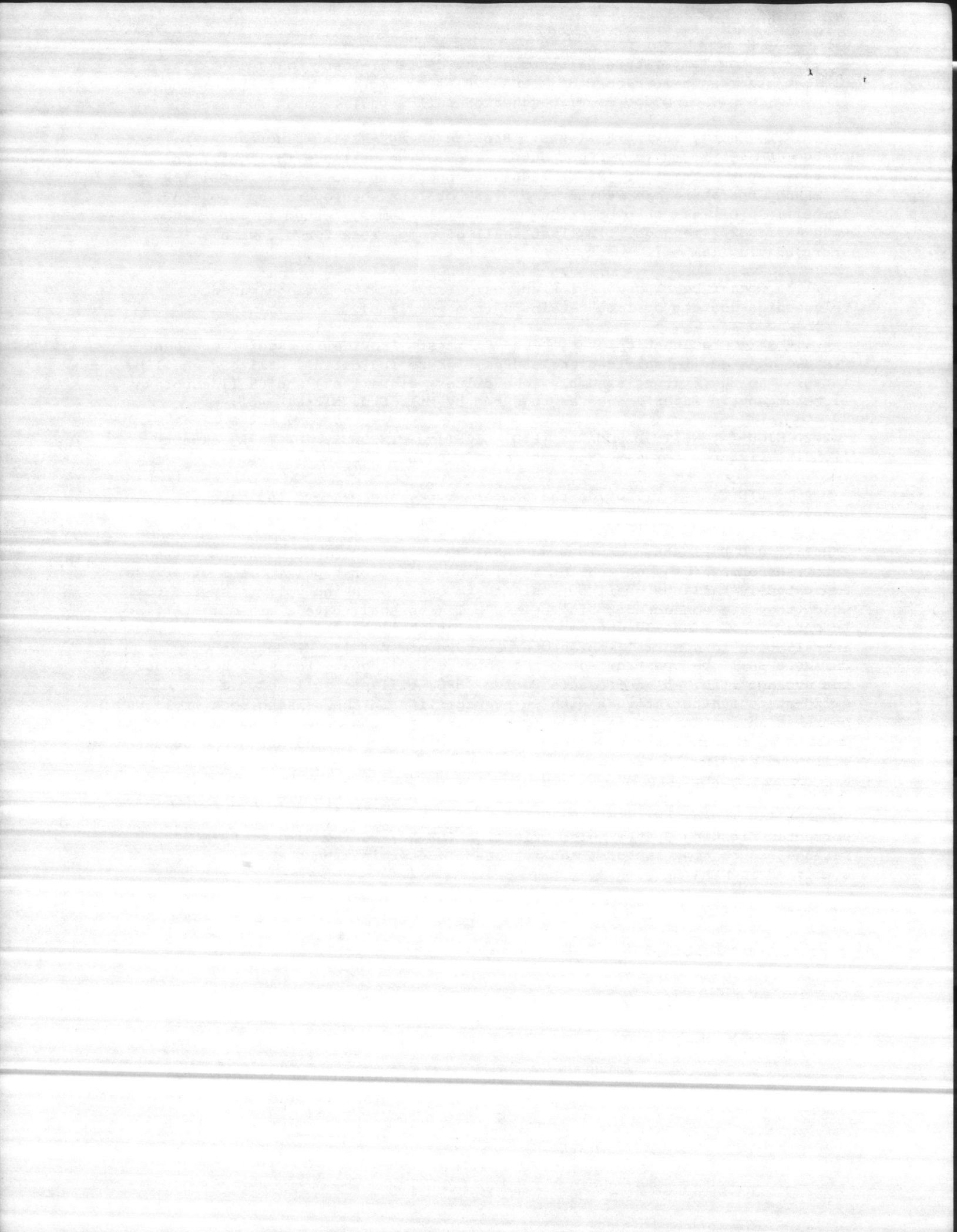
2.1.4 Electromagnetic Interference Filters: Provide in each fluorescent fixture mounted [in shielded enclosures] [where indicated]. Filters shall be integral to the fixture assembly (one filter per ballast) and shall suppress electromagnetic interference as required by Mil. Std. MIL-STD-461.

2.2 HIGH-INTENSITY-DISCHARGE (HID) LIGHTING FIXTURES: UL 1572, except lighting fixtures for damp and wet locations shall conform to UL 57. (L)

2.2.1 HID Lamps: [Provide the number, type, and wattage indicated.] [Provide lamp Type \_\_\_\_\_ conforming to ANSI C78.\_\_\_\_.] (H,V)

2.2.2 HID Ballasts: UL 1029 and ANSI C82.4 and shall be constant wattage autotransformer (CWA) or regulator, high power factor type, [unless otherwise indicated]. Ballasts shall be designed to operate on the voltage system to which they are connected. Single-lamp ballasts shall have a minimum starting temperature of minus 30 degrees C. Ballasts shall be designed for installation in a normal ambient temperature of [40] [ ] degrees C. Ballasts shall be constructed so that open circuit operation will not reduce the average life. High Pressure Sodium (HPS) ballasts shall have a solid-state igniter/starter with an average life in the pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 degrees C. Average life is defined as the time after which 50 percent will have failed and 50 percent will have survived under normal conditions. (M)

2.2.3 HID Lighting System Noise Criteria: Provide HID lighting system[s] located [as indicated] [in library] [in \_\_\_\_\_] which [has] [have] a corrected Lighting System Noise Criterion (LS-NC) rating of \_\_\_\_\_. LS-NC ratings, correction factors, and methods of determination shall be as specified in NEMA LE 2. (N)



2.3 INCANDESCENT LIGHTING FIXTURES: UL 1571, except lighting fixtures for damp and wet locations shall conform to UL 57. (O)

2.3.1 Incandescent Lamps: [Provide the number, type, and wattage indicated.] [Provide lamp Type \_\_\_\_\_ conforming to ANSI C78.\_\_\_\_.] (H)

2.3.2 Incandescent Dimmer Switch: UL 20, single-pole, [600] [\_\_\_\_]-watt, 120-volt ac, full-range rotary on-off type with built-in electromagnetic interference filter. (P)

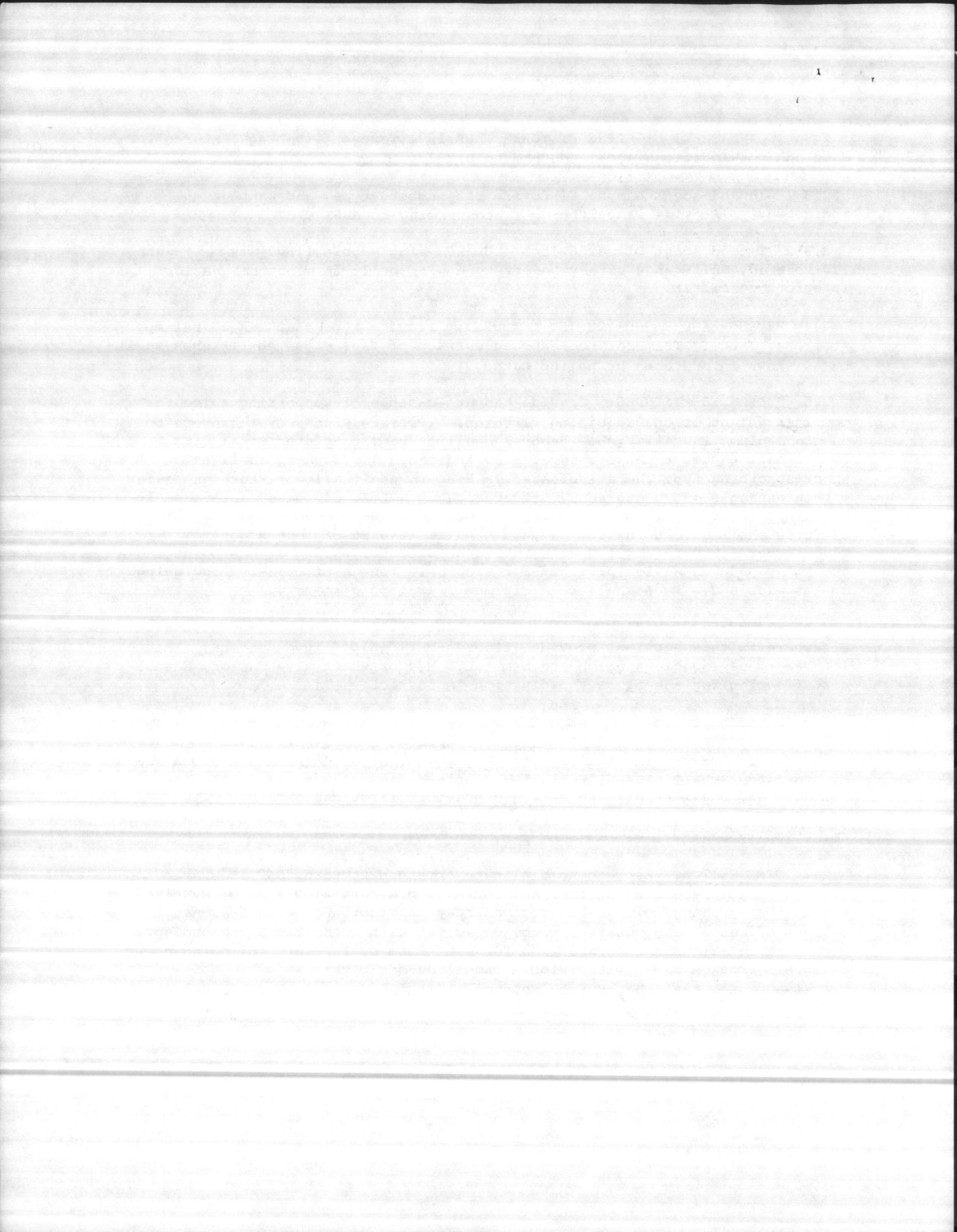
2.4 RECESS- AND FLUSH-MOUNTED FIXTURES: Provide type that can be relamped from the bottom. Trim for the exposed surface of flush-mounted fixtures shall be as shown on sketches or as indicated.

2.5 SUSPENDED FIXTURES: Provide hangers capable of supporting twice the combined weight of the adjoining fixtures. [Provide with swivel hangers to ensure a plumb installation. Hangers shall be cadmium-plated steel with swivel-ball tapped for the conduit size indicated.] [Hangers shall be shock-absorbing type where indicated.] Hangers shall allow fixtures to swing within an angle of 20 degrees. Brace pendants 4 feet or longer [provided in shops or hangars] to limit swinging. Single-unit suspended [fluorescent] fixtures shall have twin-stem hangers. Multiple-unit or continuous row fluorescent fixtures shall have a tubing or stem for wiring at one point and a tubing or rod suspension provided for each unit length of chassis, including one at each end. Rods shall be a minimum 3/16-inch diameter.

2.6 FIXTURES FOR HAZARDOUS LOCATIONS: In addition to requirements stated elsewhere in this section, provide [fluorescent] [HID] [incandescent] fixtures for hazardous locations which conform to UL 844 or which have Factory Mutual certification for the class and division indicated.

2.7 LIGHTING CONTACTOR: NEMA ICS 2, electrically operated, mechanically held contactor rated [\_\_\_\_] volts, \_\_\_\_\_ amperes, \_\_\_\_\_-pole [as indicated]. Provide in NEMA [1] [4] [\_\_\_\_] enclosure conforming to NEMA ICS 6. Contactor shall have silver alloy double-break contacts and coil clearing contacts and shall require no arcing contacts. [Provide contactor with [hand-off-automatic] [on-off] selector switch.] [Contactor shall be hermetically sealed.]

2.8 TIME SWITCH: Astronomic dial type arranged to turn "ON" at sunset and turn "OFF" at predetermined time between 8:30 p.m. and 2:30 a.m. or sunrise, automatically changing the settings each day in accordance with seasonal changes of sunset and sunrise. Provide switch with automatically wound spring mechanism to maintain accurate time for a minimum of 15 hours following power failure. Provide time switch with a manual on-off bypass switch. Housing for the time switch shall be surface mounted, NEMA [1] [3] [\_\_\_\_] enclosure conforming to NEMA ICS 6.



2.9 PHOTOCCELL SWITCH: UL 773 or UL 773A, as applicable, hermetically sealed cadmium-sulphide cell rated \_\_\_\_\_ volts ac, 60 hertz with single-throw contacts rated [1000] [\_\_\_\_\_] watts and \_\_\_\_\_ volts. Mount switch [in a cast weatherproof aluminum housing with swivel arm designed to mount on or beside each floodlight] [integral to the fixture] [in a high-impact-resistant noncorroding and nonconductive molded plastic housing with a locking-type receptacle]. The switch shall turn on below 3 footcandles and off at 3 to 10 footcandles. A time delay shall prevent accidental switching from transient light sources. Mount a directional lens in front of the cell to prevent fixed light sources from creating a turnoff condition. Aim switch according to manufacturer's recommendations.

2.10 POWER HOOK FIXTURE HANGERS: Provide UL listed assembly including through-wired power hook housing, interlocking plug and receptacle, power cord, and fixture support loop. Power hook housing shall be cast aluminum having two 3/4-inch threaded hubs. Fixture support loop shall be cast aluminum with provisions for accepting 3/4-inch threaded fixture stems. Power cord shall include 16 inches of 3-conductor No. 16 Type SO cord. Assembly shall be rated \_\_\_\_\_ volts, \_\_\_\_\_ amperes, \_\_\_\_\_-wire, \_\_\_\_\_-pole.

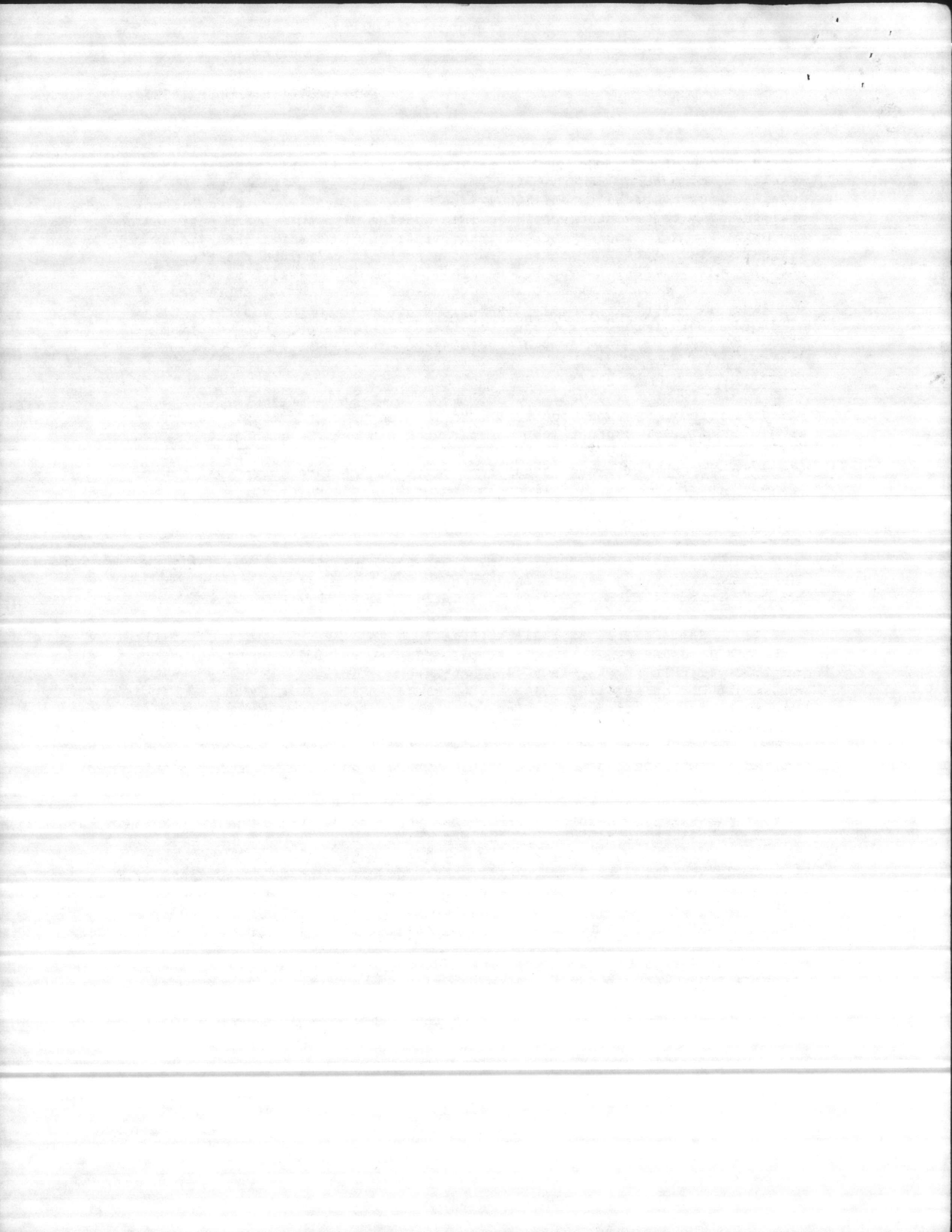
2.11 EXIT SIGNS: UL 924, NFPA 70, and NFPA 101. Exit signs shall be [as indicated] [as described on Sketch No. 16510-48] [self-powered] [remote-powered] type. (Q)

2.11.1 Self-Powered Exit Signs (Battery Type): Provide with automatic power failure device, test switch, pilot light, and fully automatic high/low trickle charger in a self-contained power pack. Battery shall be sealed wet or gel electrolyte type, shall operate unattended, and shall require no maintenance (including additional water) for a period of not less than [5] [10] years.

2.11.2 Self-Powered Exit Signs (Luminous Source Type): Provide signs with solid-state tritium gas energy source which allows legibility in total darkness at 100 feet after 10 years. In addition to the requirements of UL and NFPA, signs shall be licensed for public use by the U.S. Nuclear Regulatory Commission.

2.11.3 Remote-Powered Exit Signs: Provide remote ac/dc exit signs with provisions for wiring to external ac and dc power sources. Provide signs with a minimum of two ac lamps for normal illumination and two bayonet base dc lamps for emergency lighting.

2.12 EMERGENCY LIGHTING EQUIPMENT: UL 924, NFPA 70, and NFPA 101. Provide lamps [in wattage indicated] [or] [as shown on Sketch No. 16510[-51][-52][-53]]. [Provide accessories required for remote-mounted lamps where indicated. Remote-mounted lamps shall be as indicated and as described on Sketch No. 16510-54.] (R)





2.12.1 Emergency Lighting Unit: Provide as indicated and as shown on Sketch No. 16510[-51][-52][-53]. [Emergency lighting units shown on Sketch No. 16510-51 shall be rated for 12 volts, except units having no remote-mounted lamps and having no more than two unit-mounted lamps may be rated 6 volts.] [Units shall be equipped with brown-out sensitive circuit to activate battery when ac input falls to 75 percent of normal voltage [and time delay feature for areas with HID lighting].]

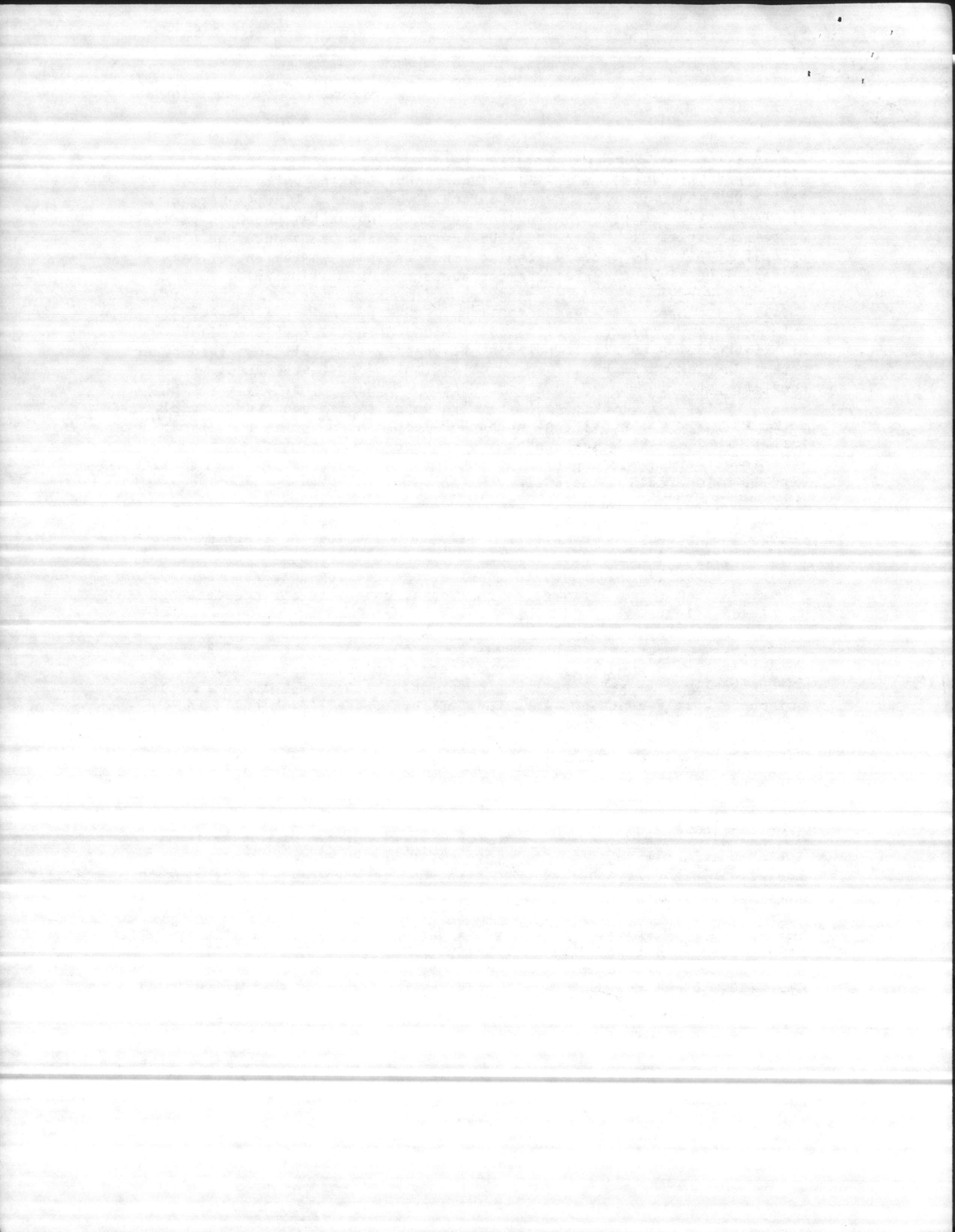
2.12.2 Fluorescent Emergency System: Each system shall consist of an automatic power failure device, cover-mounted test switch and pilot light, and fully automatic solid-state charger in a self-contained power pack. Charger shall be either trickle, float, constant current or constant potential type, or a combination of these. Battery shall be sealed wet or gel electrolyte type with capacity as required to supply power to [\_\_\_\_\_] lamps [the number of lamps shown for each system]. Battery shall operate unattended and require no maintenance (including additional water) for a period of not less than 5 years. System shall be capable of operating a dead fluorescent lamp.

2.12.3 Central Emergency System: Each system shall supply \_\_\_\_\_ watts of emergency power at [[277] [120] [\_\_\_\_\_] volts, 60 hertz sine wave ac] [[32] [\_\_\_\_\_] volts dc] for a minimum period of [90] [\_\_\_\_\_] minutes. The system shall be designed to handle surges during loss and recovery of power. System shall deliver its full rated output to incandescent and fluorescent lamps.

2.12.3.1 Operation: With normal power applied, the batteries shall be automatically charged. Upon loss of normal power, the system shall automatically disengage from the normal input line and, within 1 second, switch to a self-contained inverter. Inverter shall have built-in protection when the output is shorted or overloaded. When normal power resumes, the emergency system shall automatically switch back to normal operation before the power loss. The transfer switch for this function shall be sized to handle 125 percent of full load.

2.12.3.2 Battery Charger: [Provide two-rate charger for lead-calcium batteries] [Provide three-rate charger for nickel-cadmium batteries]. The charger shall be solid-state, completely automatic, maintaining the batteries in a fully charged condition, and recharging the batteries to full capacity within 16 hours after full discharge.

2.12.3.3 Batteries: The batteries shall be [sealed lead-calcium], [nickel-cadmium] type, shall operate unattended, and shall be of the maintenance-free type (without additional water) for a period of not less than [10] [5] years.



2.12.3.4 Accessories: Provide visual indicators to indicate normal power, inverter power, and battery charger operation. Provide test switch to simulate power failure by interrupting the input line, [battery voltage meter,] [load ammeter,] [automatic brown-out circuitry to switch to emergency power when input line voltage drops below 75 percent of normal value,] [electrolyte level detector that will activate a visual or audio alarm in the event of a low water condition,] [time delay feature for areas with HID lighting,] [and] [low voltage cutoff to disconnect inverter when battery voltage drops to approximately 80 percent of nominal voltage].

2.12.3.5 Enclosure: Provide a free-standing cabinet with floor stand. Cabinet construction shall be of 12-gage sheet steel with baked-on enamel finish and locking type latch.

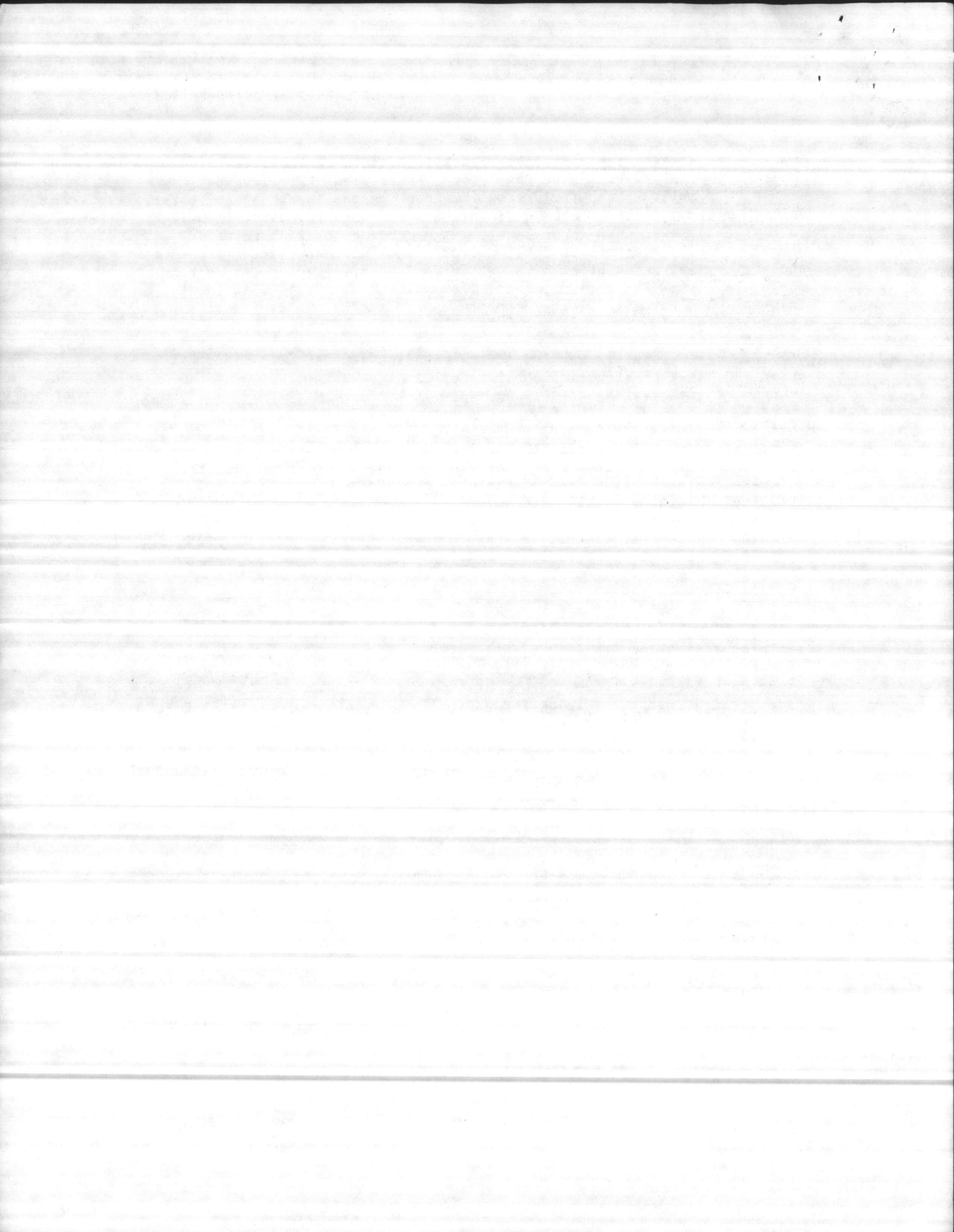
2.13 INSTANT RESTRIKE DEVICE: UL listed, solid-state potted module, suitable for mounting inside the luminaire. Maximum surface temperature of metal mounting surface shall not exceed 80 degrees C. Instant restrike device shall be compatible with mogul-based HPS lamps, ballasts, and lamp sockets up to 150 watts. Restrike range shall be 105 to 130 volts ac. Voltage shall not exceed 250 volts peak or 150 volts ac rms. [Provide one instant restrike device for each HPS fixture.] [Provide instant restrike devices as indicated.] (S)

\*\* OR \*\*

2.13 AUXILIARY INSTANT-ON QUARTZ SYSTEM: UL listed, automatically switched instant-on [150] [250]-watt quartz lamp. Quartz lamp shall come on when the luminaire is initially energized and following a momentary power outage and shall remain on until HID lamp reaches approximately 60 percent light output. Wiring for quartz lamp shall be internal to the ballast and shall be independent of the incoming line voltage to the ballast. [Provide instant-on quartz system for each HPS fixture.] [Provide instant-on quartz system as indicated.] (S)

### PART 3 - EXECUTION

3.1 INSTALLATION: Set lighting fixtures plumb, square, and level with ceiling and walls, in alignment with adjacent lighting fixtures, and secure in accordance with manufacturers' directions and approved shop drawings. The installation shall meet with the requirements of NFPA 70. Mounting heights specified or indicated shall be to bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before installation is commenced and, where applicable, after coordinating with the type, style, and pattern of the ceiling being (T)



installed. Recessed and semirecessed fixtures may be supported from suspended ceiling support system ceiling tees if the ceiling system support rods or wires are provided at a minimum of four rods or wires per fixture and located not more than 6 inches from each corner of each fixture. For round fixtures or fixtures smaller in size than the ceiling grid, provide a minimum of four rods or wires per fixture and locate at each corner of the ceiling grid in which the fixture is located. Do not support fixtures by ceiling acoustical panels. Where fixtures of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support such fixtures independently or with at least two 3/4-inch metal channels spanning, and secured to, the ceiling tees. Provide rods or wires for lighting fixture support under this section of the specifications. Rods or wires shall conform to the requirements of Section 09500, "Acoustical Treatment." Additionally, for recessed fixtures, provide support clips securely fastened to ceiling grid members, a minimum of one at or near each corner of each fixture.

3.1.1 Exit and Emergency Lights: Wire exit lights on separate circuits and serve from [an emergency panel] [a separate breaker] [a fused disconnect switch]. Connect this [panel] [breaker] [switch] ahead of the main service disconnect switch. The lights shall have only one control, which shall be [the circuit breaker in the emergency panel] [the disconnect switch]. Wire emergency lights ahead of the switch to the normal lighting circuit located in the same room or area. (U)

3.2 GROUNDING: Ground noncurrent-carrying parts of equipment as specified in Section 16402, "Interior Wiring Systems." Where the copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

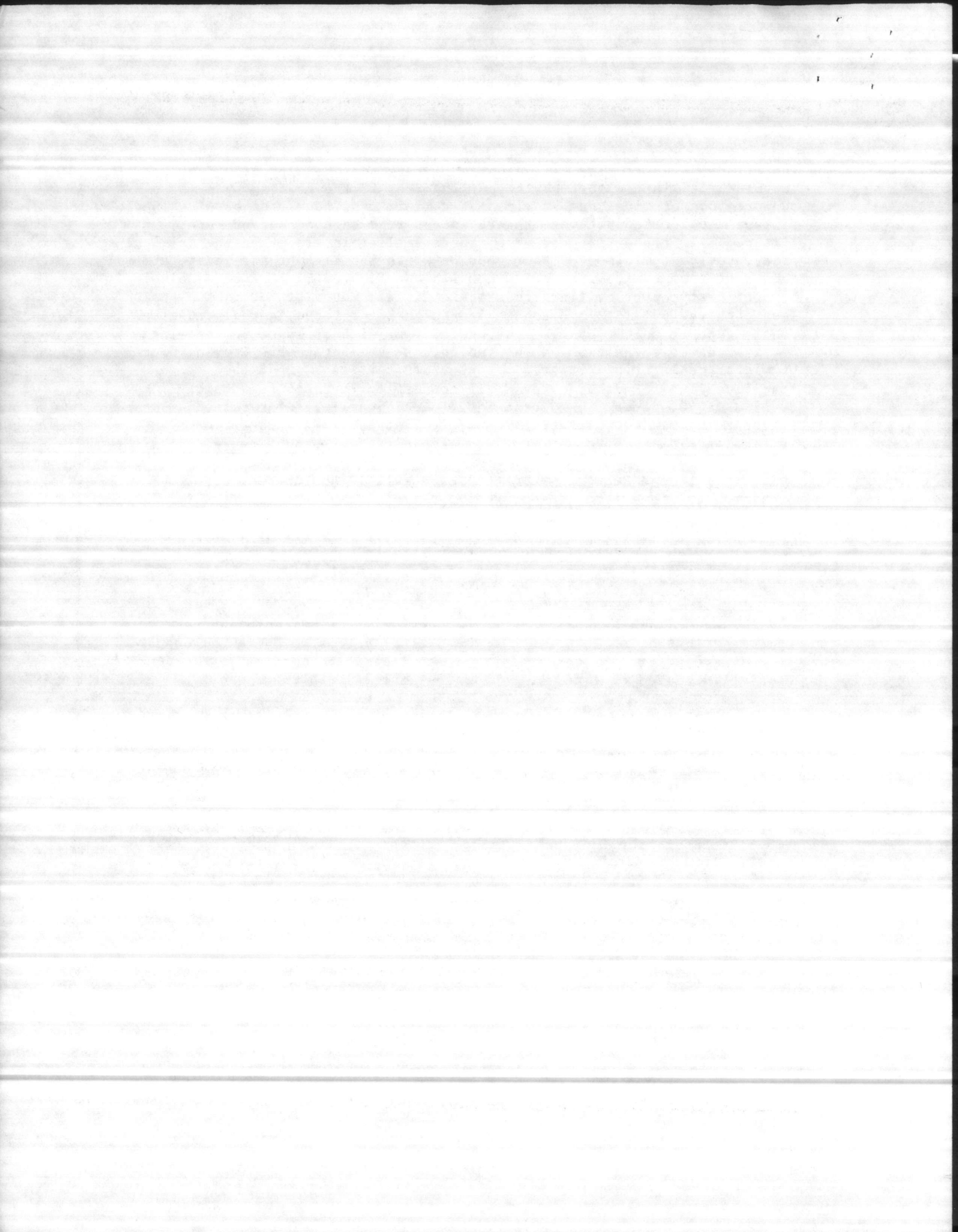
3.3 FIELD TESTS: The Government will provide electric power required for field tests.

3.3.1 Operating Test: Upon completion of the installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this section.

3.3.2 Insulation Resistance Test: Perform as specified in Section 16402, "Interior Wiring Systems," both before and after connection of fixtures and equipment.

3.3.3 Ground Resistance Tests: Perform as specified in Section 16402, "Interior Wiring Systems."

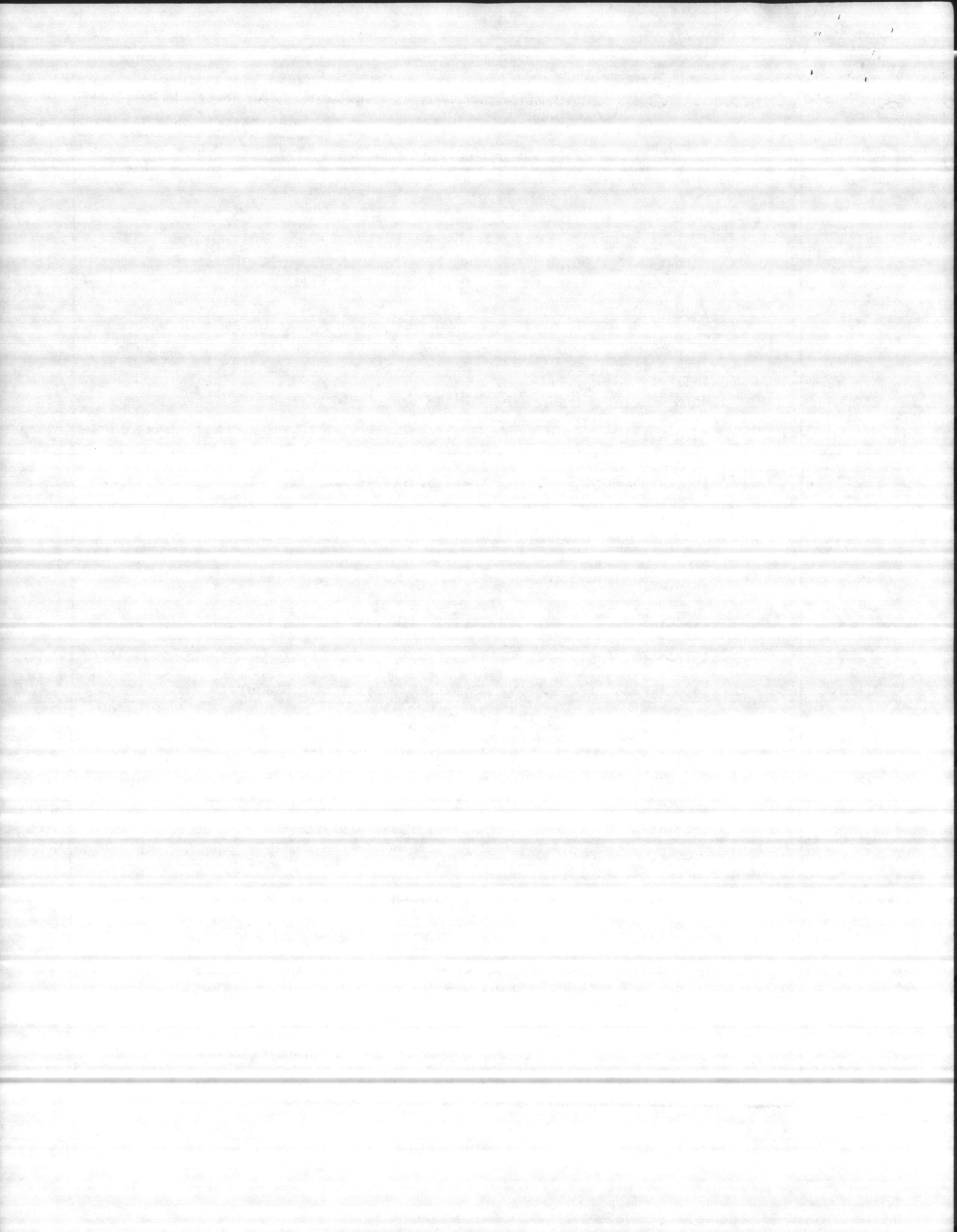
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16510-3	Fluorescent Troffer Luminaire
16510-4	Wall-Mounted Fluorescent
16510-5	Wall-Mounted Indirect Fluorescent Wood Shielding
16510-6	Industrial Fluorescent
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16510-8	Wet/Damp Location Luminaire
16510-9	Parabolic Troffers - 2 x 2 and 2 x 4
16510-10	Parabolic Troffers - 1 x 4
16510-11	Surface, Pendant or Bracket-Mounted Parabolic Luminaire
16510-12	Steel Sided Surface Fluorescent
16510-13	Round Surface Fluorescent
16510-14	Surface 1-Lamp Nonbreakable Luminaire
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16510-22	High Bay Industrial HID
16510-23	Low Bay Industrial HID
16510-24	Indirect HID Luminaire

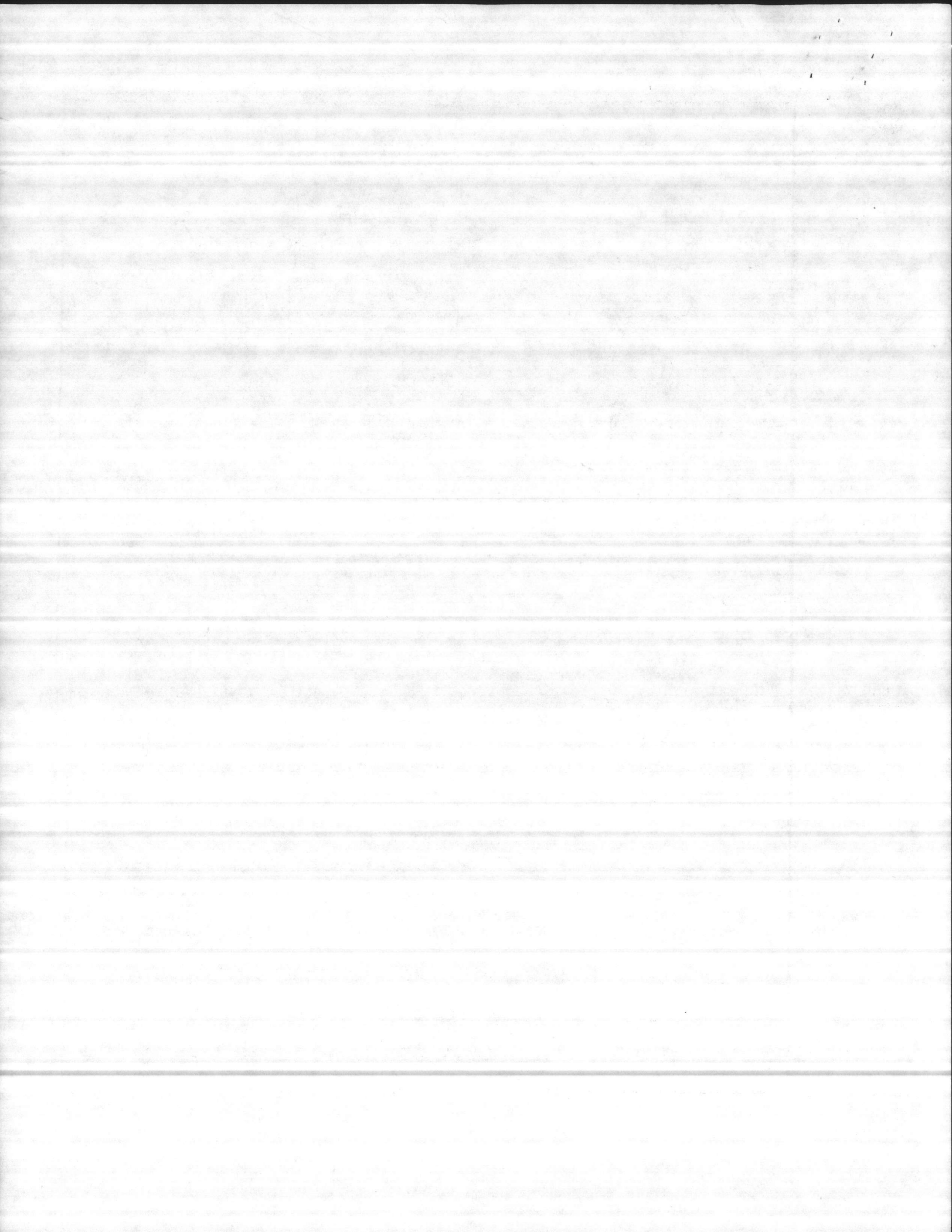




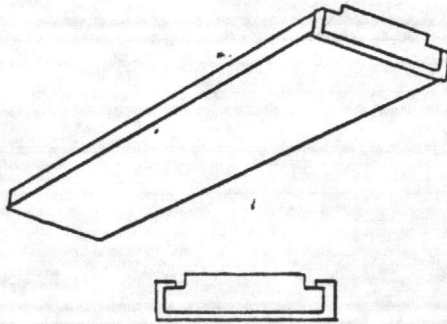
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16510-42	Semi-Recessed Baffle Downlight (Incandescent)
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16510-53	Cylinder Type Emergency Lighting Unit
16510-54	Remote Fixtures for Use With Battery Unit
16510-55	Low Voltage Recessed Incandescent
16510-56 thru 98	Reserved for Future Incandescent/Specialty Luminaires
16510-99	Sample-Lighting Fixture Schedule



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. 0.032" MIN. THICKNESS FORMED STEEL HOUSING. CHEMICAL TREATMENT FOR RUST PREVENTION. BAKED WHITE ENAMEL FINISH. 85% MIN. REFLECTANCE (INTERIOR). ENTIRE HOUSING SHALL BE PAINTED WHITE, AFTER FABRICATION. HOUSING SHALL NOT PERMANENTLY DEFORM NOR SHALL IT DEFLECT MORE THAN ONE INCH (TWO INCHES FOR TYPE B) WHEN LIFTED BY ONE CORNER.
2. SECURE HOUSING ENDS BY RIVETS OR SCREWS. PROVIDE A KNOCKOUT IN EACH END AND TWO IN TOP OF HOUSING. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.
3. OVERALL LUMINAIRE LENGTH SHALL BE 48 INCHES NOMINAL. OVERALL WIDTH SHALL BE 12 INCHES MINIMUM FOR 2 LAMP, 15-1/2 INCHES MINIMUM FOR 4 LAMP. OVERALL HEIGHT SHALL BE 3-1/2 INCHES MAXIMUM.
4. LENS SHALL BE CLEAR 100% ACRYLIC HAVING A MINIMUM OVERALL (BOTTOM OF LENS) THICKNESS OF 0.140 INCH WITH A MAXIMUM PRISM PENETRATION DEPTH OF 0.07 INCHES (0.55 INCH MIN. OVERALL SIDE THICKNESS).
5. LENS SHALL BE PRISMATIC TYPE, INJECTION MOLDED INTO A SINGLE 5 SIDED UNIT WITH 1/2 INCH MINIMUM RE-ENTRANT FLANGE ON EACH LONG SIDE FOR ADDITIONAL STRENGTH.
6. LENS SHALL BE CAPABLE OF HINGING AND LATCHING FROM EITHER SIDE OF FIXTURE.
7. LUMINAIRE SHALL HAVE LUMINOUS ENDS.
8. BALLAST: HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLASTS TO HOUSING WITH AT LEAST ONE SCREW AND SLIP ON BRACKET OR TWO SCREWS-ONE AT EACH END.
9. PHOTOMETRICS: MINIMUM COEFFICIENT OF UTILIZATION (CU) FOR THE FOLLOWING CAVITY REFLECTANCES: CEILING = 80% WALL = 50% FLOOR = 20% LUMINANCE USING 3100L LAMP WITH AVG:MAX. RATIO NOT TO EXCEED 1:5.

	<u>TYPE A</u>	<u>TYPE B</u>	<u>AVG. LUMINANCE (f1)</u>
RCR = 1	CU = 0.71	0.67	45° = 2250
2	0.64	0.60	55° = 1605
3	0.57	0.54	65° = 1125
4	0.51	0.48	75° = 750
MIN. EFFICIENCY	69%	62%	85° = 495 (800 FOR TYPE B)

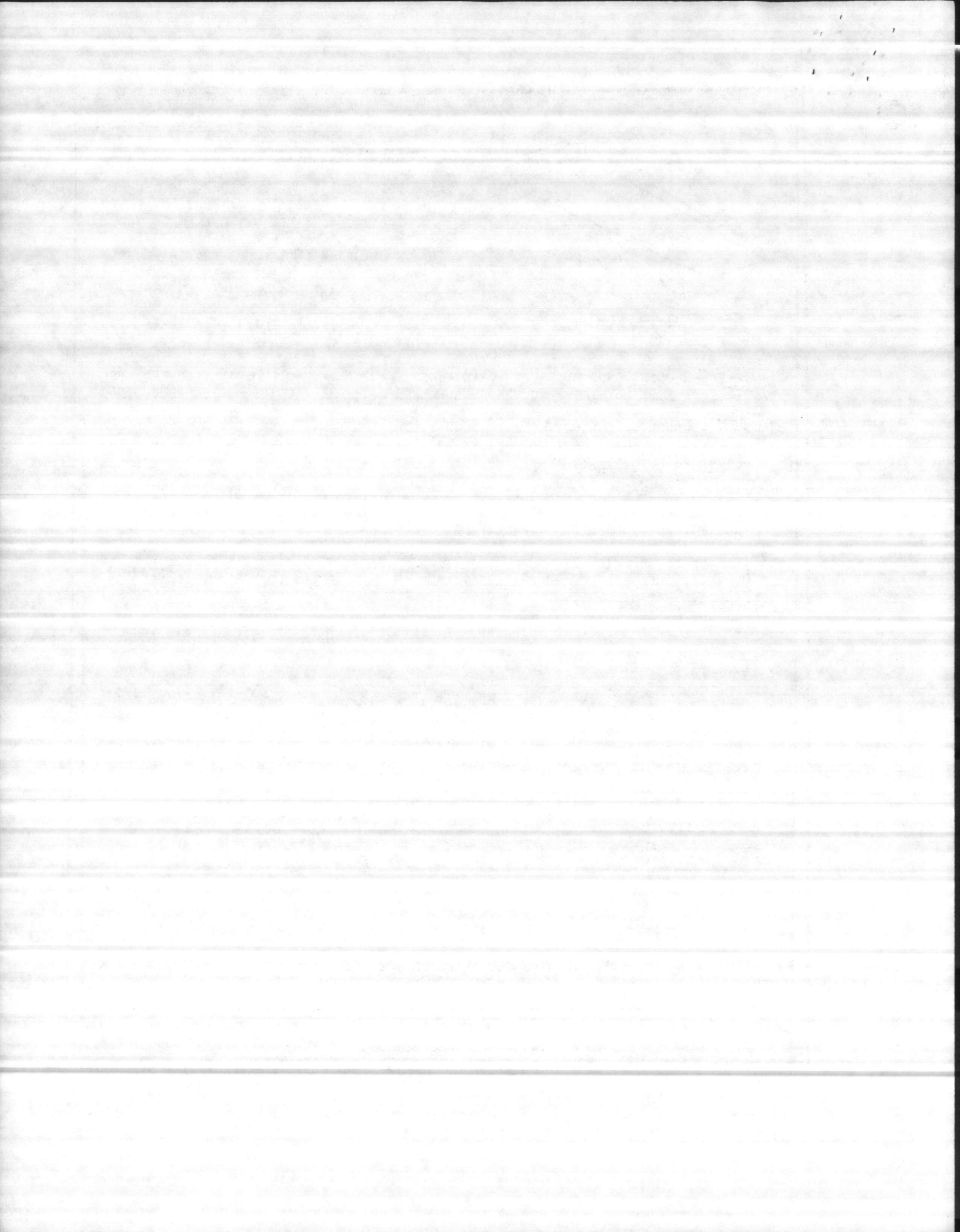
10. MINIMUM SPACING TO MOUNTING HEIGHT RATIO: 1.35 (TYPE A), 1.3 (TYPE B).

SURFACE MOUNTED WRAP-AROUND LUMINAIRE  
FOR OFFICE/CLASSROOM TYPE SPACES

TYPE A - 2 LAMP  
TYPE B - 4 LAMP

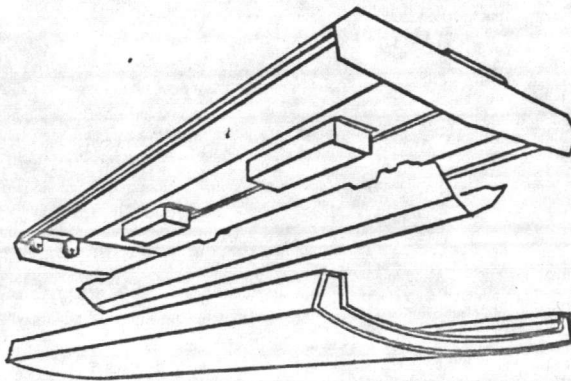
SKETCH No. 16510-1

NL-1



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS



1. 0.026" MIN. THICKNESS FORMED STEEL HOUSING. CHEMICAL TREATMENT FOR RUST PREVENTION. BAKED WHITE ENAMEL FINISH. 85% MIN. REFLECTANCE (INTERIOR). ENTIRE HOUSING SHALL BE PAINTED WHITE. HOUSING SHALL NOT PERMANENTLY DEFORM NOR SHALL IT DEFLECT MORE THAN THE FOLLOWING WHEN LIFTED BY ONE CORNER: TYPE A-1/2", TYPE B-1", TYPE C-2".
2. SECURE HOUSING ENDS BY RIVETS OR SCREWS. PROVIDE A KNOCKOUT IN EACH END AND TWO IN TOP OF

HOUSING. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.

3. OVERALL LUMINAIRE NOMINAL DIMENSIONS ( $\pm 10\%$ ) SHALL BE:

TYPE	LENGTH	WIDTH	DEPTH
A	48"	7"	4 1/2"
B	48"	10"	3 1/2"
C	48"	15"	3 1/2"

4. LENS SHALL BE CLEAR EXTRUDED 100% ACRYLIC HAVING A MINIMUM OVERALL (BOTTOM OF LENS) THICKNESS OF 0.10 INCHES WITH A MAXIMUM PRISM PENETRATION DEPTH OF 0.07 INCHES (0.055 INCH MINIMUM OVERALL SIDE THICKNESS) AND WELDED END PLATES TO FORM A SINGLE PIECE, 5 SIDED BASKET.
5. LENS SHALL BE PRISMATIC TYPE.
6. LENS SHALL HINGE ALONG ENTIRE LENGTH OF FIXTURE (LIFT AND SHIFT TYPE). LENS SHALL BE CAPABLE OF HINGING FROM BOTH SIDES OF FIXTURE.
7. BALLAST: HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLAFF P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS - ONE AT EACH END.

8. PHOTOMETRICS: MINIMUM COEFFICIENT OF UTILIZATION (CU) FOR THE FOLLOWING CAVITY REFLECTANCES: CEILING - 80% WALL = 50% FLOOR = 20% LUMINANCE USING 3100L LAMP WITH AVG:MAX. RATIO NOT TO EXCEED 1:5.

ROOM CAVITY RATIO	TYPE A	TYPE B	TYPE C
1	CU = 0.76	0.69	0.67
2	0.66	0.62	0.60
3	0.59	0.55	0.54
4	0.52	0.49	0.48

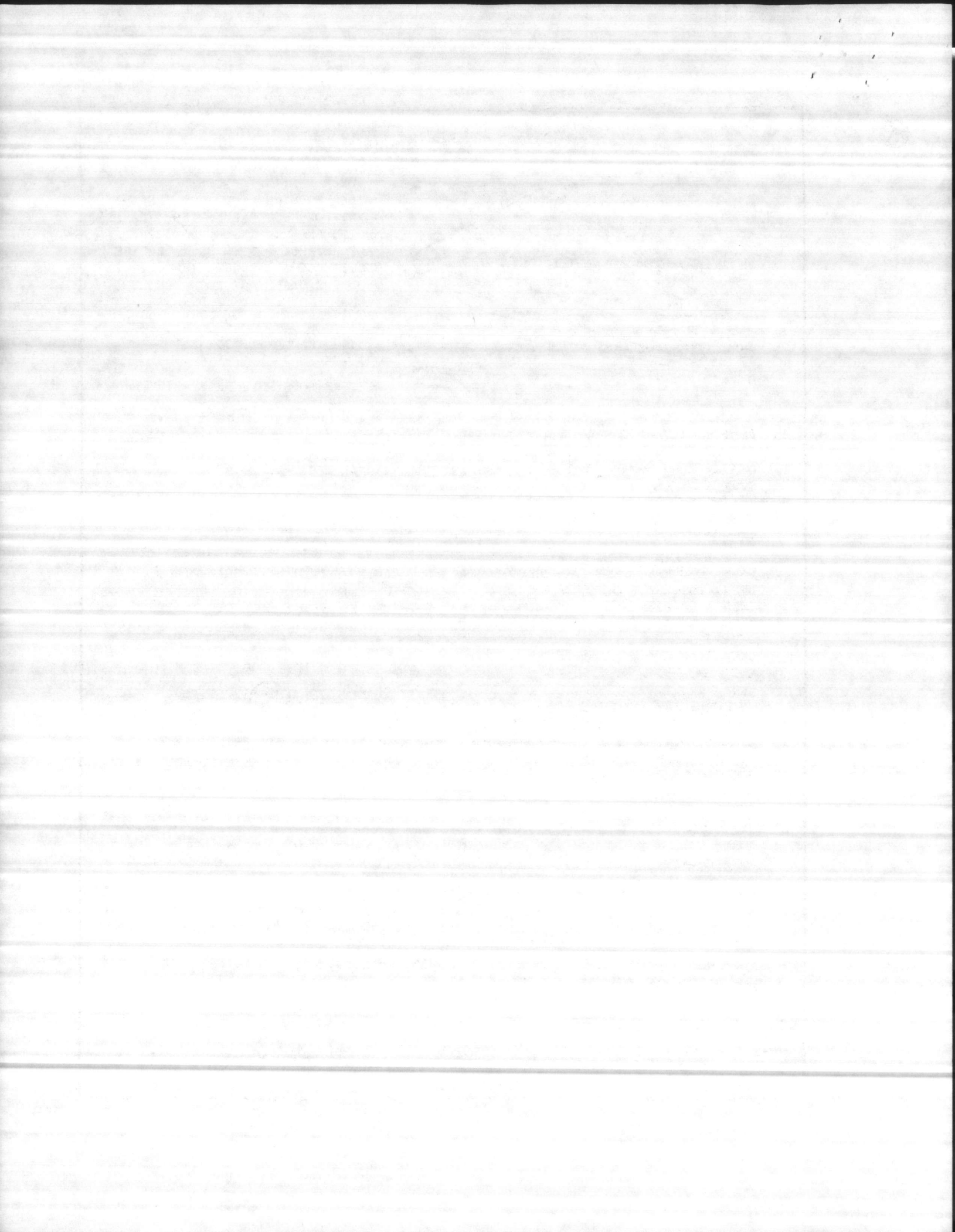
9. SPACING TO MOUNTING HEIGHT RATIO SHALL BE NOT LESS THAN 1.3.

SURFACE MOUNTED WRAP-AROUND LUMINAIRE FOR OTHER THAN OFFICE TYPE SPACES

TYPE A - 1 LAMP  
 TYPE B - 2 LAMP  
 TYPE C - 4 LAMP

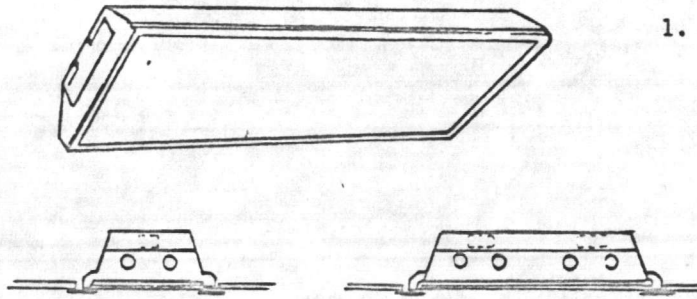
SKETCH No. 16510-2

NL-2



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS



1. HOUSING SHALL BE 0.026" MIN. THICKNESS, 5" MAX. HEIGHT AND SHALL NOT PERMANENTLY DEFORM WHEN LIFTED BY ONE CORNER WITH LENS DOOR IN PLACE NOR WITH LENS DOOR REMOVED. LENS DOOR SHALL NOT OPEN WHEN LUMINAIRE IS LIFTED BY ONE CORNER. LUMINAIRE SHALL HAVE LESS THAN THE FOLLOWING DEFLECTION WHEN LIFTED BY ONE CORNER WITH LENS DOOR REMOVED:

TYPE:	A	B	C, D & E
	3"	2 1/2"	4"

2. HOUSING SHALL BE CHEMICALLY TREATED FOR RUST PREVENTION AND HAVE BAKED WHITE ENAMEL FINISH 85% MIN. REFLECTANCE (INTERIOR). ENDS SHALL BE SECURED BY RIVETS OR SCREWS. PAINT ENTIRE HOUSING AND LENS DOOR WHITE, AFTER FABRICATION.
3. LATCHES SHALL BE 0.032" MINIMUM THICKNESS STEEL OR 0.015" MINIMUM THICKNESS SPRING STEEL. DIRECTION OF TRAVEL TO OPEN SHALL BE STAMPED ON LENS FRAME WHEN NOT OBVIOUS.
4. LENS DOOR SHALL BE 0.032" MINIMUM THICKNESS STEEL, SHALL BE ASSEMBLED WITH SCREWS (FOR LENS REPLACEMENT). PROVIDE LIGHT TIGHT FIT WITHOUT MOVABLE BAFFLES. GASKETING SHALL NOT BE A MEANS OF ACHIEVING LIGHT TIGHT DOOR.
5. LENS SHALL BE 0.156" (FOR TYPES A, C, D, E) AND 0.125" (FOR TYPE B) PLUS OR MINUS 10% OVERALL (0.09 MAX, PRISM PENETRATION) CLEAR PRISMATIC 100% ACRYLIC.
6. DOOR SHALL BE CAPABLE OF HINGING AND LATCHING FROM EITHER SIDE OF LUMINAIRE. PROVIDE SAFETY TYPE HINGES.
7. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS ONE AT EACH END. PROVIDE GROUNDING SCREW ON INTERIOR OF HOUSING.
8. PHOTOMETRICS: MINIMUM COEFFICIENT OF UTILIZATION (CU) FOR THE FOLLOWING CAVITY REFLECTANCES: CEILING = 80% WALL = 50% FLOOR = 20% LUMINANCE USING 3100L LAMP WITH AVG:MAX RATIO NOT TO EXCEED 1:5

ROOM CAVITY RATIO	TYPE:	A	B	C	D	E	AVG. LUMINANCE (f1)
1	CU	0.67	0.60	0.73	0.68	0.67	45° - 2250
2		0.60	0.54	0.66	0.61	0.60	55° - 1605
3		0.54	0.48	0.59	0.55	0.54	65° - 1125
4		0.49	0.44	0.53	0.50	0.49	75° - 750
MIN. S/MH		1.2	1.1	1.3	1.3	1.3	85° - 495

PROVIDE MIN. VISUAL COMFORT PROBABILITY (VCP) OF 65 (ASSUME 30'X30'X10'H ROOM). WHEN "OFFICE TYPE" INDICATED, PROVIDE MIN. VCP OF 70.

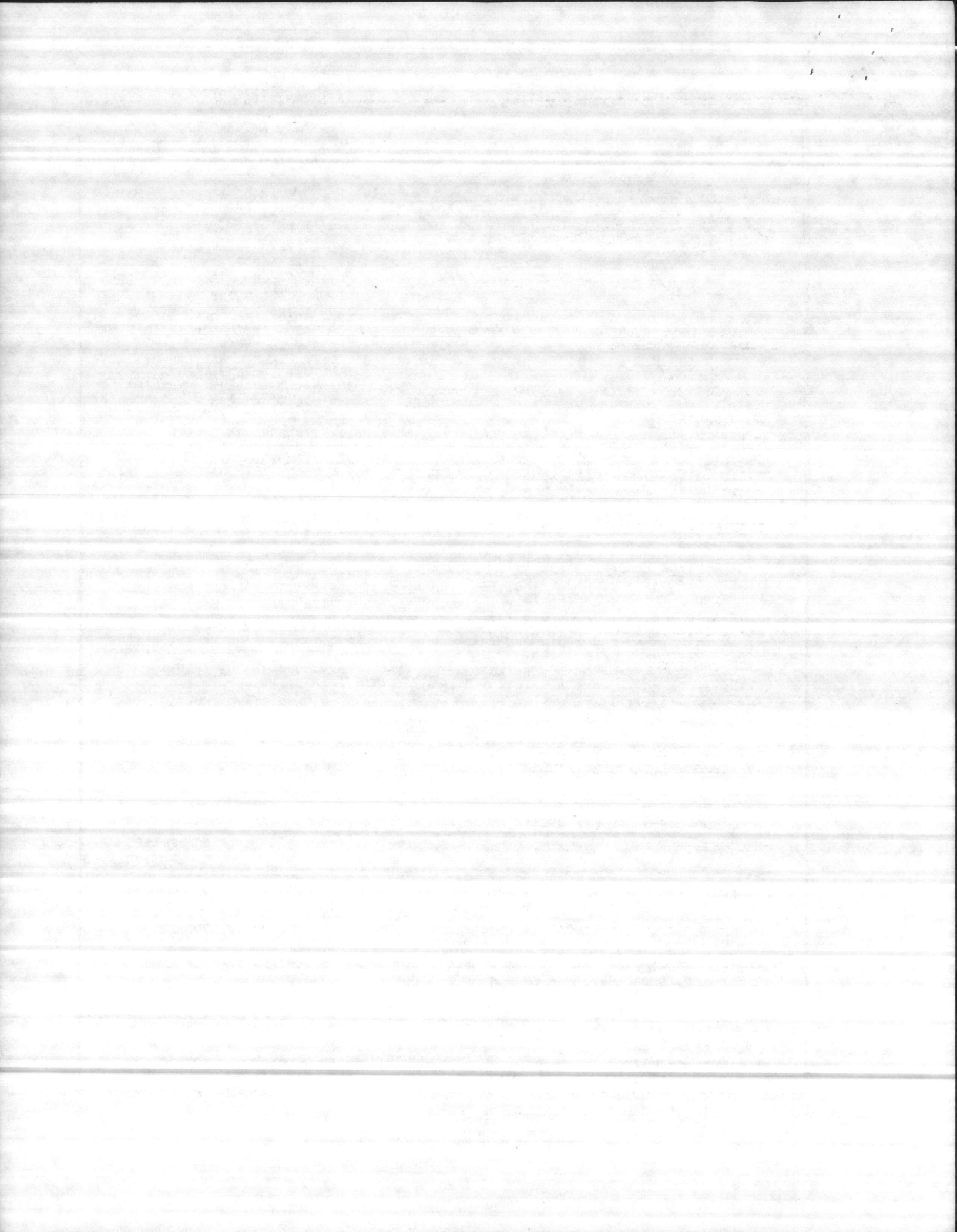
9. PROVIDE MOUNTING HARDWARE COMPATIBLE WITH CEILING MATERIAL IN WHICH LUMINAIRE IS TO BE INSTALLED.

- TYPE A - 2'X2' 2 LAMP
- TYPE B - 1'X4' 2 LAMP
- TYPE C - 2'X4' 2 LAMP
- TYPE D - 2'X4' 3 LAMP
- TYPE E - 2'X4' 4 LAMP

TROFFER

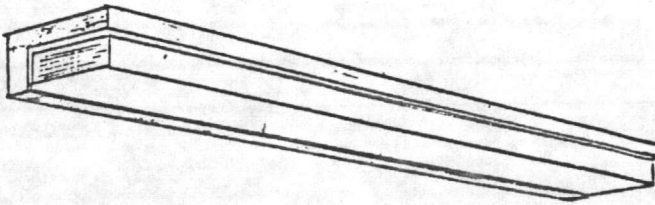
SKETCH No. 16510-3

NL-3





SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

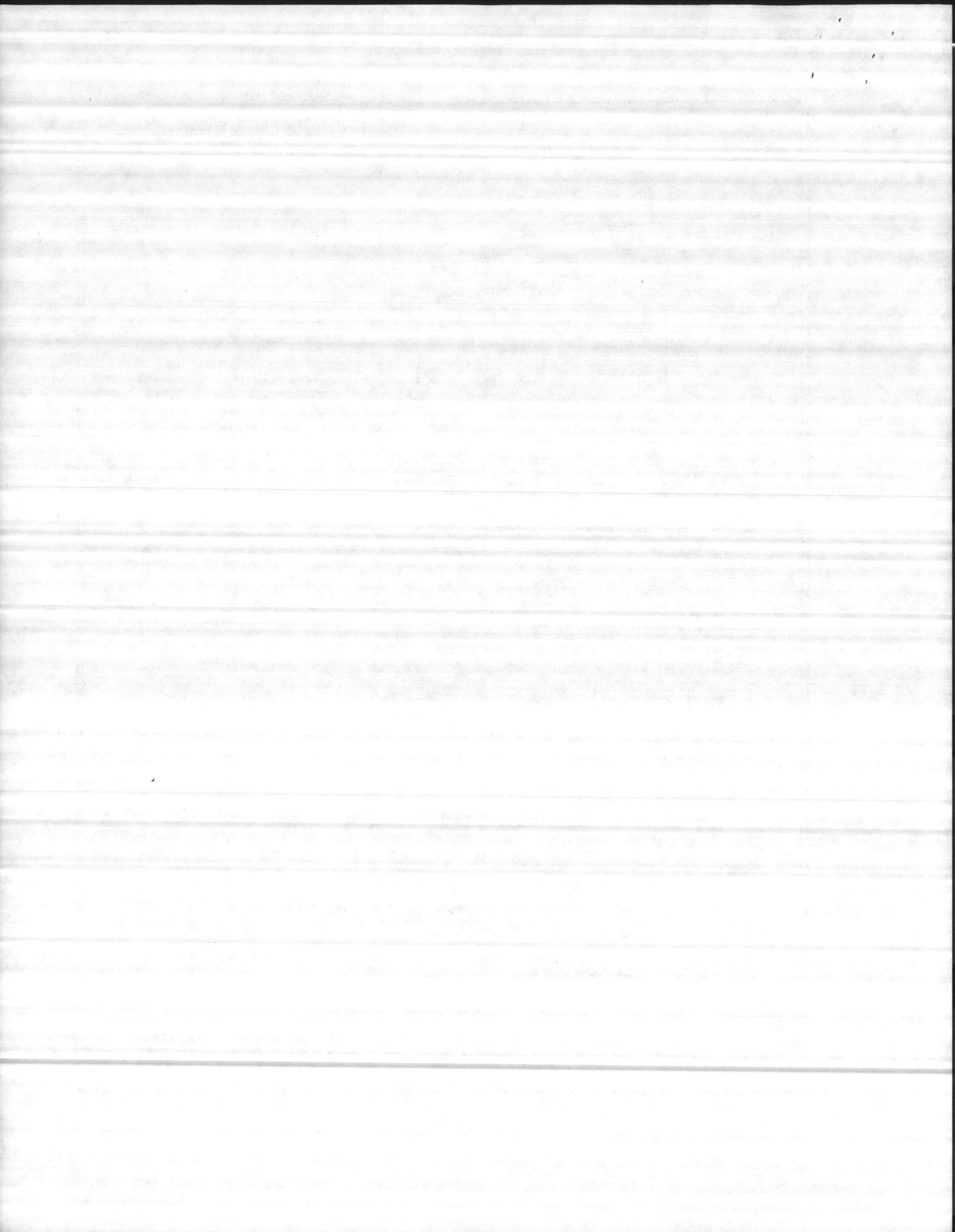
1. 0.032" MINIMUM THICKNESS STEEL BACK PLATE AND REFLECTOR. CHEMICAL TREATMENT FOR RUST PREVENTION. BAKED WHITE ENAMEL FINISH. PROVIDE KNOCKOUTS THRU BACK PLATE. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.
2. 0.032" MINIMUM THICKNESS DIE FORMED STEEL OR EXTRUDED ALUMINUM HOUSING. BAKED BLACK ENAMEL OR BRUSHED ALUMINUM FINISH OR WOOD GRAIN VINYL ON ALUMINUM HOUSING, UNLESS INDICATED OTHERWISE. STEEL HOUSINGS SHALL HAVE ALL JOINTS WELDED AND GROUND SMOOTH.
3. MAXIMUM OVERALL LUMINAIRE HEIGHT SHALL BE 5-1/2 INCHES. MAXIMUM LUMINAIRE DEPTH SHALL BE 8 INCHES. MAXIMUM LUMINAIRE LENGTH SHALL BE
  - 26 INCHES - TYPE A
  - 38 INCHES - TYPE B
  - 50 INCHES - TYPE C
4. LOWER LENS SHALL BE CLEAR SINGLE PIECE 100% ACRYLIC HAVING AN OVERALL NOMINAL THICKNESS OF 0.110 INCHES PLUS OR MINUS 10%. UPLIGHT LENS SHALL BE 100% ACRYLIC WITH A MINIMUM OF 0.09 INCHES OVERALL THICKNESS.
5. LENS SHALL BE PRISMATIC (TO REDIRECT LIGHT, PREVENTING DIRECT GLARE AT HIGH VIEWING ANGLES) OR LUMINAIRE SHALL HAVE OPAQUE FRONT.
6. LENS SHALL HAVE SPRING STEEL LATCHES FOR RETAINING LENS, OR POSITIVE MEANS OF HOLDING LENS IN PLACE.
7. LUMINAIRE SHALL PROVIDE UP AND DOWN LIGHT. UP LIGHT SHALL BE SEPARATELY SWITCHED WHERE INDICATED. LAMPS SHALL BE ENCLOSED ON TOP AND BOTTOM.
8. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL CBM APPROVED CLASS P WITH SOUND RATING OF "A" - BALLASTS FOR 30- AND 40-WATT LAMPS SHALL BE RAPID START. BALLASTS FOR 20-WATT LAMPS SHALL BE TRIGGER START. BALLASTS FOR 40-WATT LAMPS SHALL BE ENERGY SAVING TYPE. SECURE BALLASTS TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS - ONE AT EACH END.
9. WHERE LUMINAIRE REQUIRES SEPARATELY SWITCHED UP LIGHT, LUMINAIRE SHALL HAVE 2 BALLASTS AND METAL BAFFLE BETWEEN LAMPS.

WALL-MOUNTED FLOURESCENT

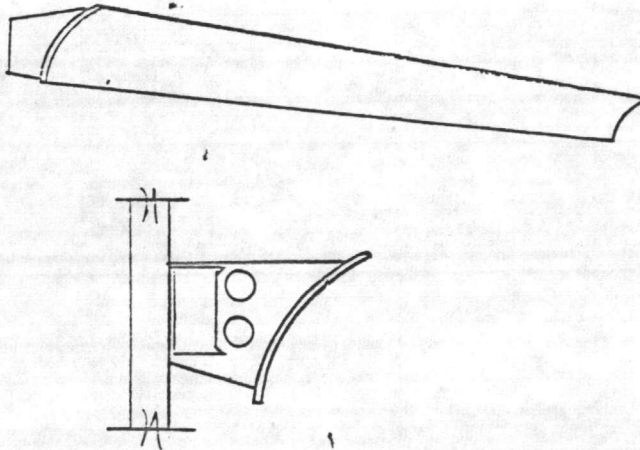
TYPE A 2 - 20 W LAMPS  
 TYPE B 2 - 30 W LAMPS  
 TYPE C 2 - 40 W LAMPS

SKETCH No. 16510-4

NL-4



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

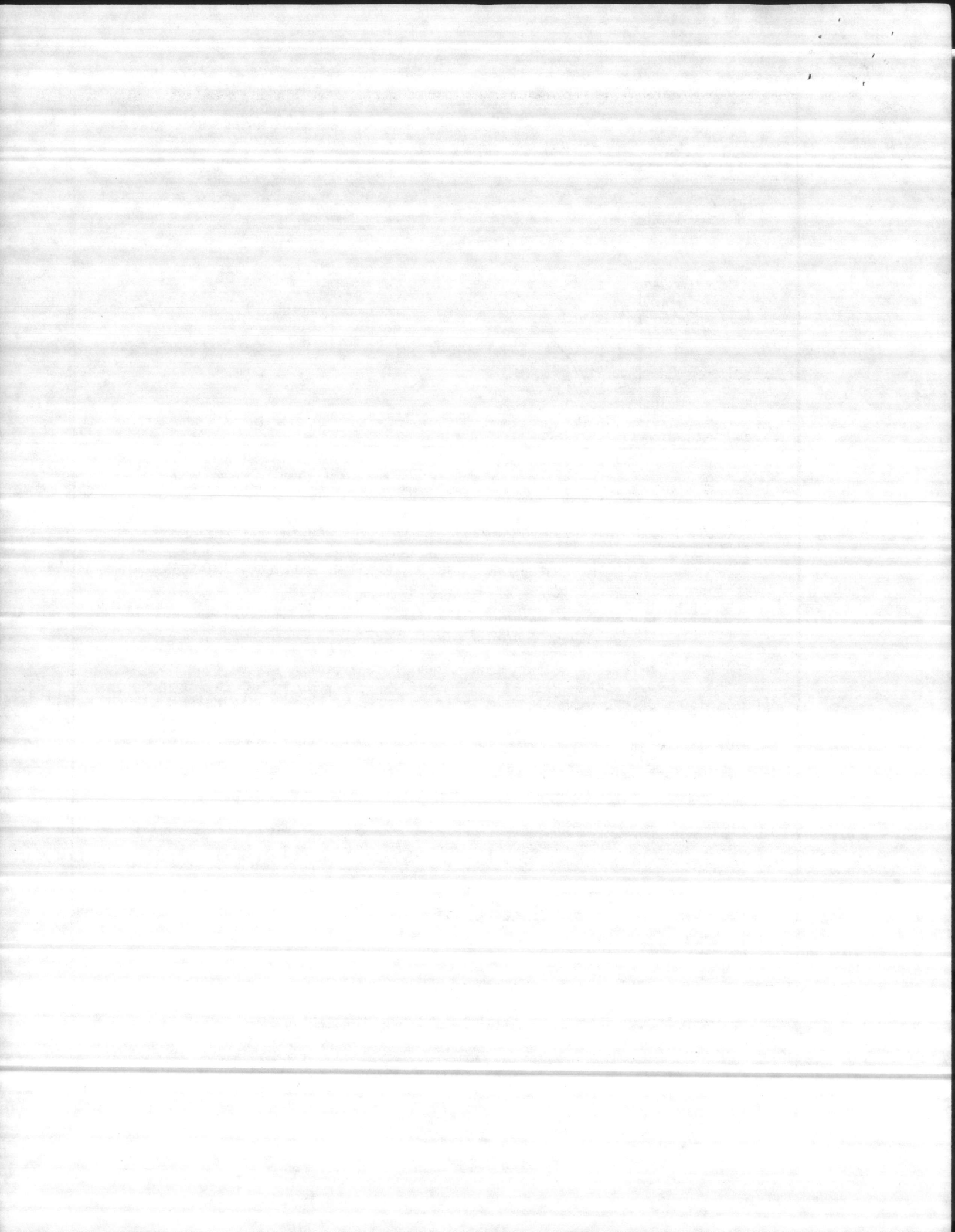
1. 0.032" MINIMUM THICKNESS STEEL CHANNEL AND COVER HOUSING BALLAST AND SUPPORTING WOOD SHIELDING. CHEMICALLY TREAT FOR RUST PREVENTION AND FINISHED WITH BAKED WHITE ENAMEL FINISH. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.
2. PROVIDE SHIELD SUPPORT SUCH THAT NO FASTENERS, SCREWS, TABS OR UNNECESSARY KNOCKOUTS ARE VISIBLE WHEN LUMINAIRE IS IN PLACE.
3. SHIELD SHALL BE 1/4" MOLDED PLYWOOD CURVED TO PROVIDE OPTIMUM LIGHT DISTRIBUTION. FINISH WITH WALNUT VENEER AND CLEAR MATT LACQUER. PROVIDE MATCHING WOOD END CAPS AT EACH END OF EACH RUN TO COVER STEEL CHANNEL.
4. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL CBM APPROVED RAPID START ENERGY SAVING TYPE CLASS P WITH A SOUND RATING OF A.
5. PROVIDE SPRING LOADED PLUNGER TYPE LAMP SOCKETS.

WALL-MOUNTED INDIRECT FLUORESCENT  
WOOD SHIELDING

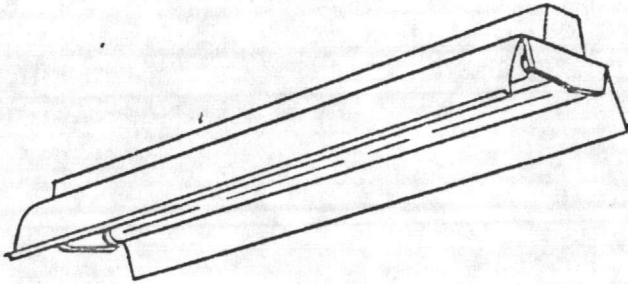
TYPE A - 2 LAMP 4 FT (NOMINAL)  
TYPE B - 4 LAMP 8 FT (NOMINAL)

SKETCH No. 16510-5

NL-5



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. HOUSING SHALL BE 0.032" MINIMUM THICKNESS DIE FORMED COLD ROLLED STEEL, CHEMICALLY TREATED FOR RUST PREVENTION AND FINISHED WITH WHITE BAKED ENAMEL OR POLYESTER FINISH. PROVIDE TOP AND END KNOCKOUTS.
2. HOUSING WELDED OR SECURED BY SCREWS OR RIVETS INTO A SINGLE ASSEMBLY. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.
3. REFLECTOR SHALL BE 0.026" MINIMUM THICKNESS STEEL (SOLID WHEN LUMINAIRE IS MOUNTED BELOW CATWALKS, ETC. 10-25% APERTURED WHEN PROTECTED FROM FALLING OBJECTS.) PROVIDE 30° SHIELDING CENTER VEE. CHEMICALLY TREAT FOR RUST PREVENTION AND FINISH WITH WHITE BAKED ENAMEL, PORCELAIN ENAMEL, OR POLYESTER FINISH. MINIMUM REFLECTANCE SHALL BE 85%.
4. THE LUMINAIRE SHALL NOT PERMANENTLY DISTORT WHEN LIFTED BY ONE CORNER.
5. SPACING TO MOUNTING HEIGHT RATIO = 1.3.
6. LUMINAIRE SHALL BE CAPABLE OF CONTINUOUS ROW AND SINGLE UNIT PLACEMENT WITH PENDANT OR SURFACE MOUNTING.
7. PROVIDE SPRING LOADED PLUNGER TYPE LAMP SOCKETS.
8. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED CLASS P ENERGY SAVING BALLAST WITH A SOUND RATING OF B (RAPID START OR SLIMLINE).
9. MINIMUM COEFFICIENT OF UTILIZATION (CU) WITH THE FOLLOWING CAVITY REFLECTANCE OF: CEILING = 80%      WALL = 50%      FLOOR = 20%  
LUMINANCE USING 3100 LAMP WITH AVG:MAX. RATIO NOT TO EXCEED 1:5

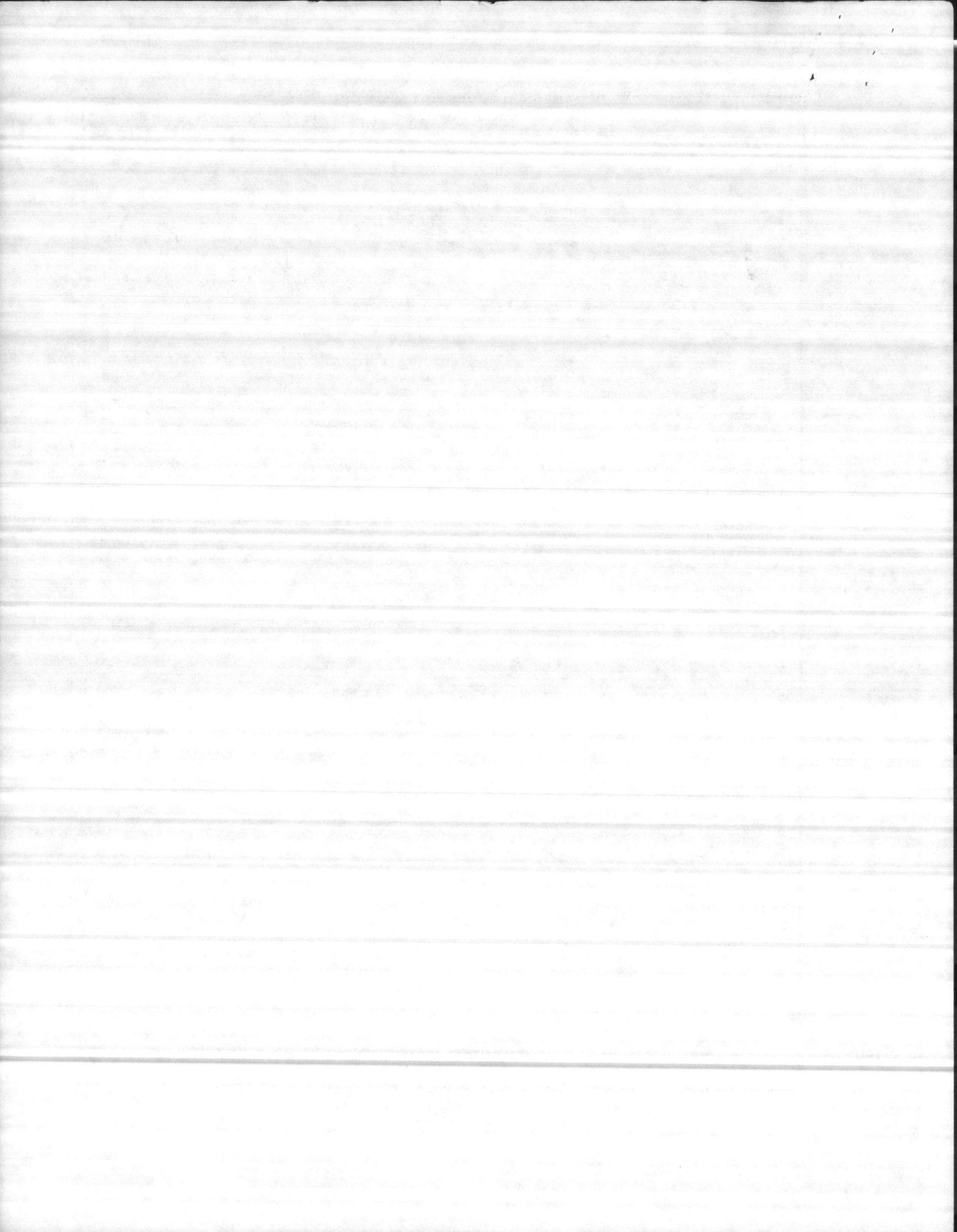
ROOM CAVITY RATIO	CU	AVG. LUMINANCE (f1)
1	0.85	45° - 1350
2	0.73	55° - 1250
3	0.68	65° - 1250
4	0.60	75° - 850
		85° - 600

INDUSTRIAL FLUORESCENT

TYPE A - 48" 2 LAMP 430 MA.  
TYPE B - 96" 2 LAMP 430 MA.

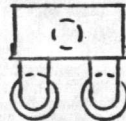
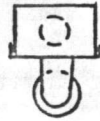
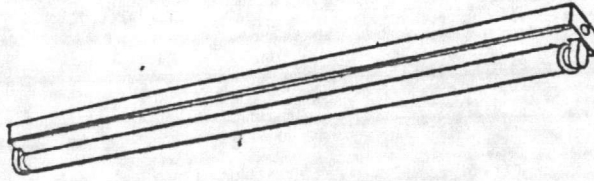
SKETCH No. 16510-6

NL-6



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS



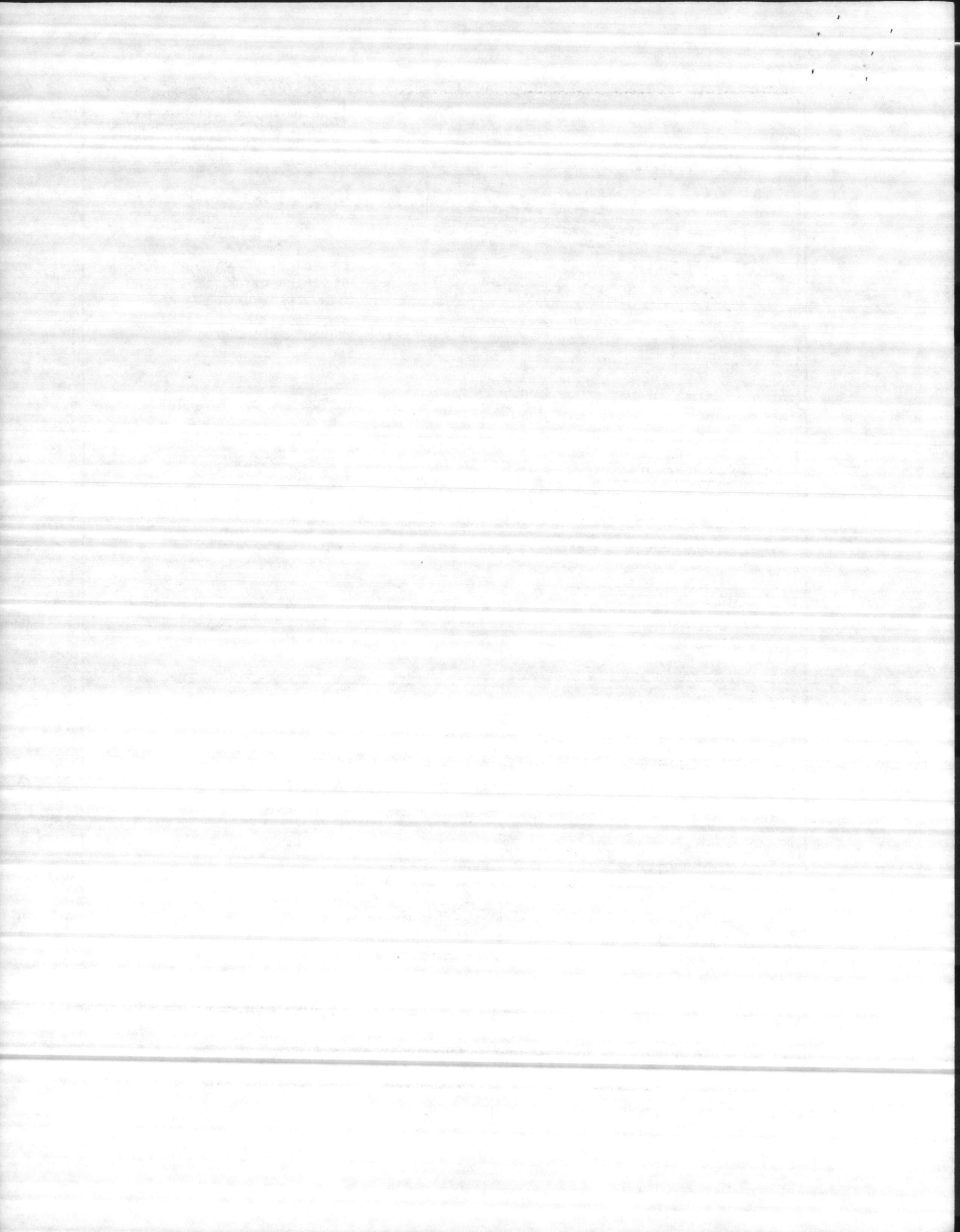
1. 0.026" MINIMUM THICKNESS STEEL CHANNEL. WELD RIVET OR SCREW END PLATES IN PLACE.
2. CHEMICALLY TREAT STEEL FOR RUST PREVENTION AND FINISH WITH BAKED WHITE ENAMEL.
3. PROVIDE SPRING LOADED PLUNGER TYPE LAMP SOCKETS.
4. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED, ENERGY SAVING CLASS P BALLAST WITH A SOUND RATING OF C.
5. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.
6. PROVIDE 0.02" MINIMUM THICKNESS STEEL REFLECTOR (SYMMETRIC OR ASYMMETRIC AS INDICATED) WHEN INDICATED.

STRIP FLUORESCENT

- TYPE A - 1 LAMP 48" LONG 430 MA.
- TYPE B - 2 LAMPS 48" LONG 430 MA.
- TYPE C - 1 LAMP 96" LONG 430 MA.
- TYPE D - 2 LAMPS 96" LONG 430 MA.
- TYPE E - 2 LAMPS F40 (IN TANDEM) 96" LONG 430 MA.
- TYPE F - 4 LAMPS F40 (IN TANDEM) 96" LONG 430 MA.

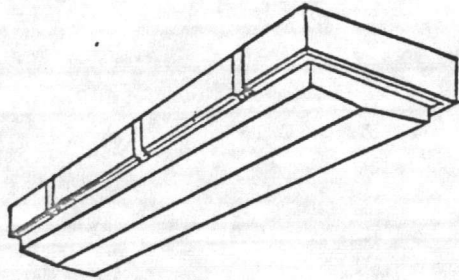
SKETCH No. 16510-7

NL-7





SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

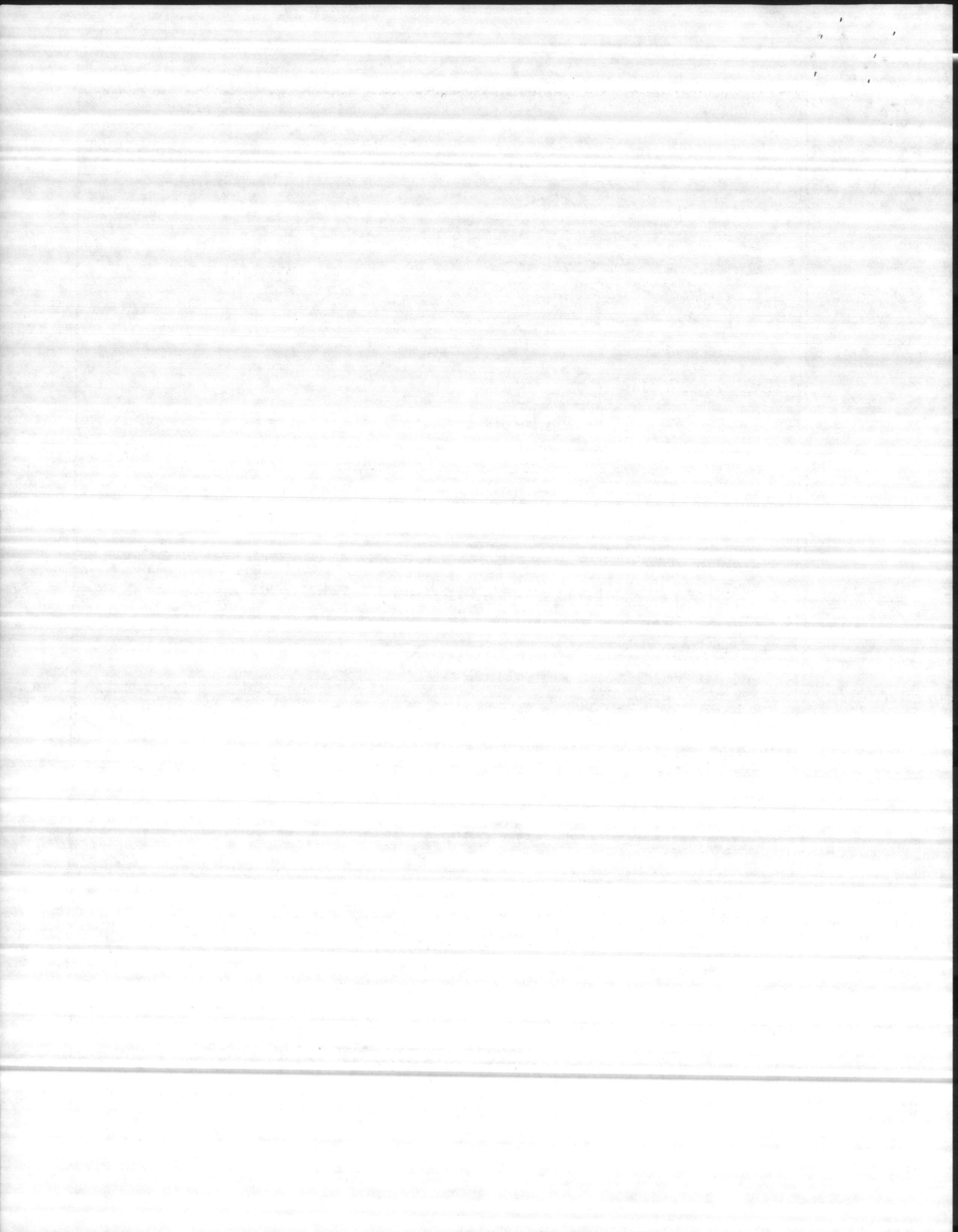
1. MOLDED 100% ACRYLIC DIFFUSE LENS (NOT CLEAR) FULLY GASKETED WITH FIBERGLASS OR PLASTIC HOUSING.
2. PROVIDE A MINIMUM OF 6 PLASTIC LATCHES TO SECURE LENS.
3. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH A SOUND RATING OF A. SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS - ONE AT EACH END.
4. UL LISTED FOR DAMP LOCATION. PROVIDE UL "WET" LABEL WHEN INDICATED.
5. OVERALL LUMINAIRE LENGTH SHALL BE 48" NOMINAL.
6. MINIMUM COEFFICIENT OF UTILIZATION (CU) WITH CAVITY REFLECTANCES OF 80% CEILING, 50% WALLS AND 20% FLOOR SHALL BE:
 

<u>RCR</u>	<u>CU</u>
1	0.67
2	0.55
3	0.50
4	0.45
7. MINIMUM SPACING TO MOUNTING HEIGHT RATIO SHALL BE 1.3.
8. HOUSING SHALL HAVE INTERNAL PROVISIONS FOR GROUNDING.

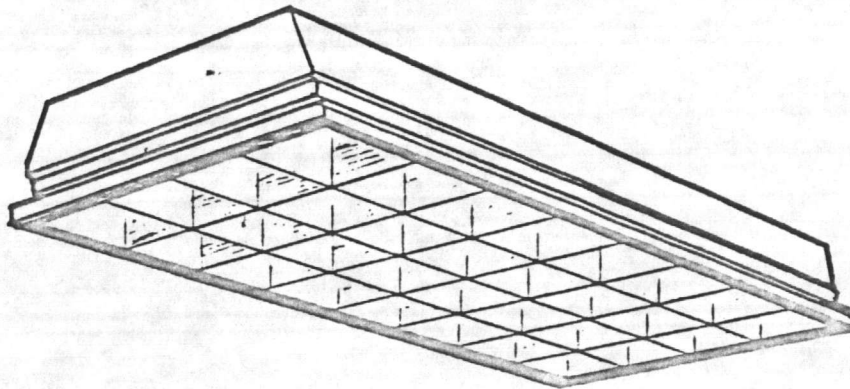
WET/DAMP LOCATION LUMINAIRE

SKETCH No. 16510-8

NL-8



SKETCH DATE: MARCH 1983



### LUMINAIRE REQUIREMENTS

1. HOUSING SHALL BE MINIMUM 0.26" THICK STEEL. HOUSING SHALL BE CHEMICALLY TREATED FOR RUST PREVENTION AND PAINT ADHESION. ENDS SHALL BE SECURED WITH SCREWS OR WELDED. HOUSING SHALL BE COMPLETELY PAINTED AFTER FABRICATION WITH MINIMUM 85% REFLECTANCE WHITE ENAMEL. MINIMUM DEPTH OF HOUSING 6" ±1".
2. LUMINAIRE SHALL HAVE FULL MATTE BLACK REVEAL. FOR FLOATING DOOR EFFECT. PROVIDE MOUNTING TRIM AND HARDWARE COMPATIBLE WITH CEILING MATERIAL.
3. LUMINAIRE SHALL BE HIGH EFFICIENCY, LOW BRIGHTNESS TYPE WITH INTERLOCKED\* LOUVERS CONTOURED TO A PARABOLIC SHAPE. LOUVERS SHALL BE OF MINIMUM .025" SEMI-SPECULAR ANODIZED ALUMINUM IN NATURAL OR GOLD FINISH AS INDICATED.
4. FIXTURE HOUSING SHALL HAVE INTERNAL GREEN GROUNDING SCREW.
5. NO EXPOSED INTERNAL WIRING.
6. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS, ONE AT EACH END.
7. LOUVER SHALL BE SUITABLE FOR HINGING FROM EITHER SIDE AND SHALL HAVE TWO SAFETY HINGES AND TWO SPRING LOADED LATCHES OR FOUR SPRING LOADED LATCHES.

TYPE A - 2'X2' - 2 U-LAMPS - 9 OR 16 CELLS

TYPE B - 2'X2' - 3 U-LAMPS - 9 OR 16 CELLS

TYPE C - 2'X4' - 2 LAMP - 12, 14 OR 32 CELLS

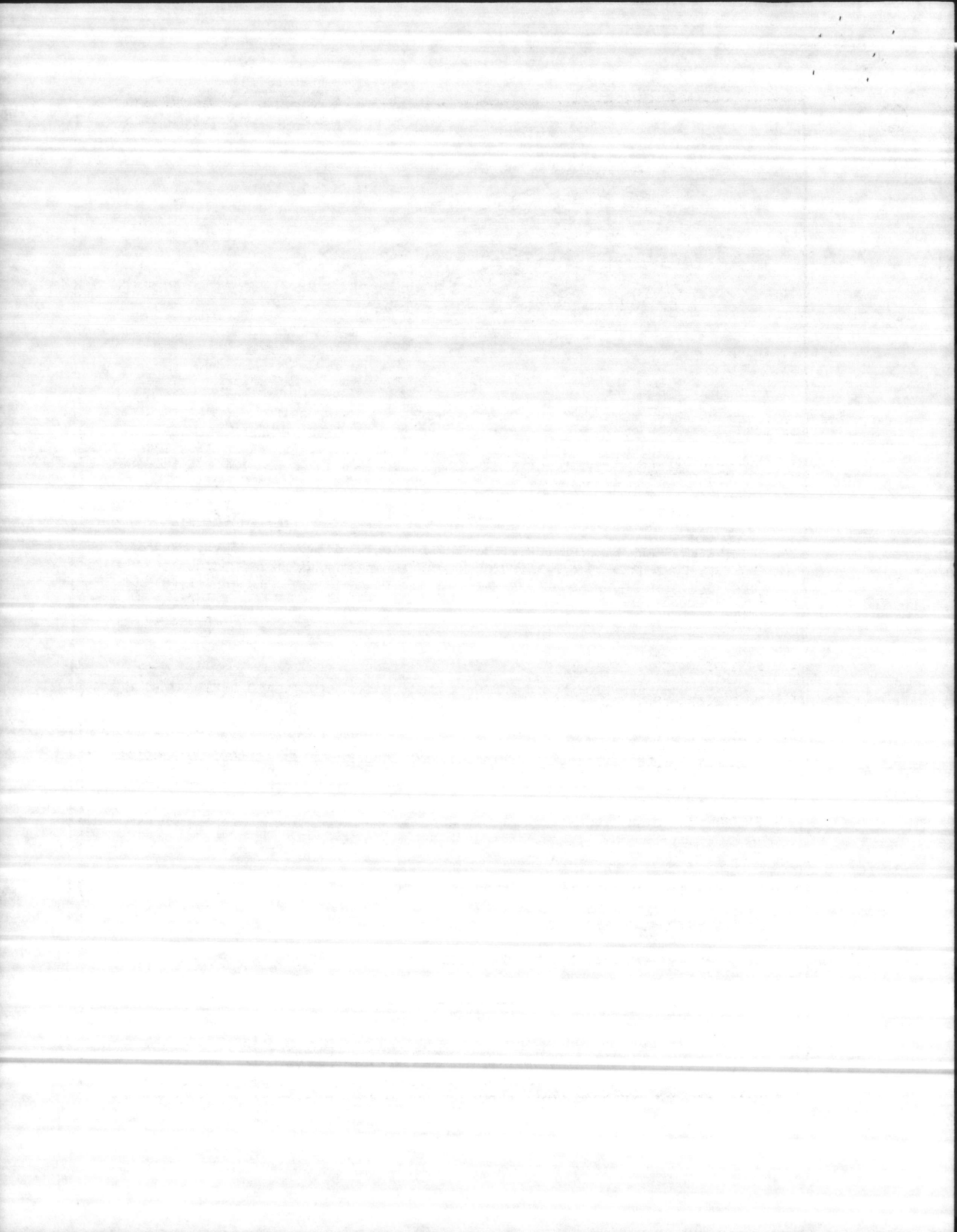
TYPE D - 2'X4' - 3 LAMP - 18 OR 21 CELLS

TYPE E - 2'X4' - 4 LAMP - 28 OR 32 CELLS

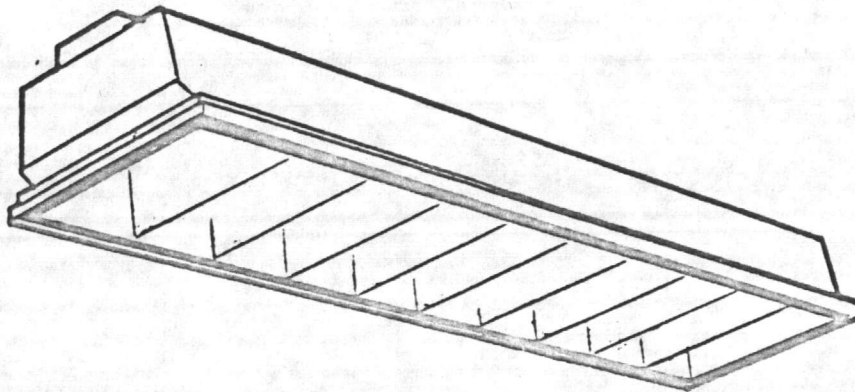
2'X2' AND 2'X4' PARABOLIC TROFFERS

SKETCH No. 16510-9

NL-9



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

1. HOUSING SHALL BE MINIMUM 0.26" THICK STEEL. HOUSING SHALL BE CHEMICALLY TREATED FOR RUST PREVENTION AND PAINT ADHESION. ENDS SHALL BE SECURED WITH SCREWS OR WELDED. HOUSING SHALL BE COMPLETELY PAINTED AFTER FABRICATION WITH MINIMUM 85% REFLECTANCE WHITE ENAMEL. MINIMUM DEPTH OF HOUSING 6" ±1".
2. LUMINAIRE SHALL HAVE FULL MATTE BLACK REVEAL. FOR FLOATING DOOR EFFECT. ♦ PROVIDE MOUNTING TRIM AND HARDWARE COMPATIBLE WITH CEILING MATERIAL.
3. LUMINAIRE SHALL BE HIGH EFFICIENCY, LOW BRIGHTNESS TYPE WITH INTERLOCKED LOUVERS CONTOURED TO A PARABOLIC SHAPE. LOUVERS SHALL BE OF MINIMUM .025" SEMI-SPECULAR ANODIZED ALUMINUM IN NATURAL OR GOLD FINISH AS INDICATED.
4. FIXTURE HOUSING SHALL HAVE INTERNAL GREEN GROUNDING SCREW.
5. NO EXPOSED INTERNAL WIRING.
6. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS, ONE AT EACH END.
7. LOUVER SHALL BE SUITABLE FOR HINGING FROM EITHER SIDE AND SHALL HAVE TWO SAFETY HINGES AND TWO SPRING LOADED LATCHES OR FOUR SPRING LOADED LATCHES.

TYPE A - 1 - 48" T-12 LAMP - 8 OR 10 CELLS

TYPE B - 2 - 48" T-12 LAMPS - 8 OR 10 CELLS

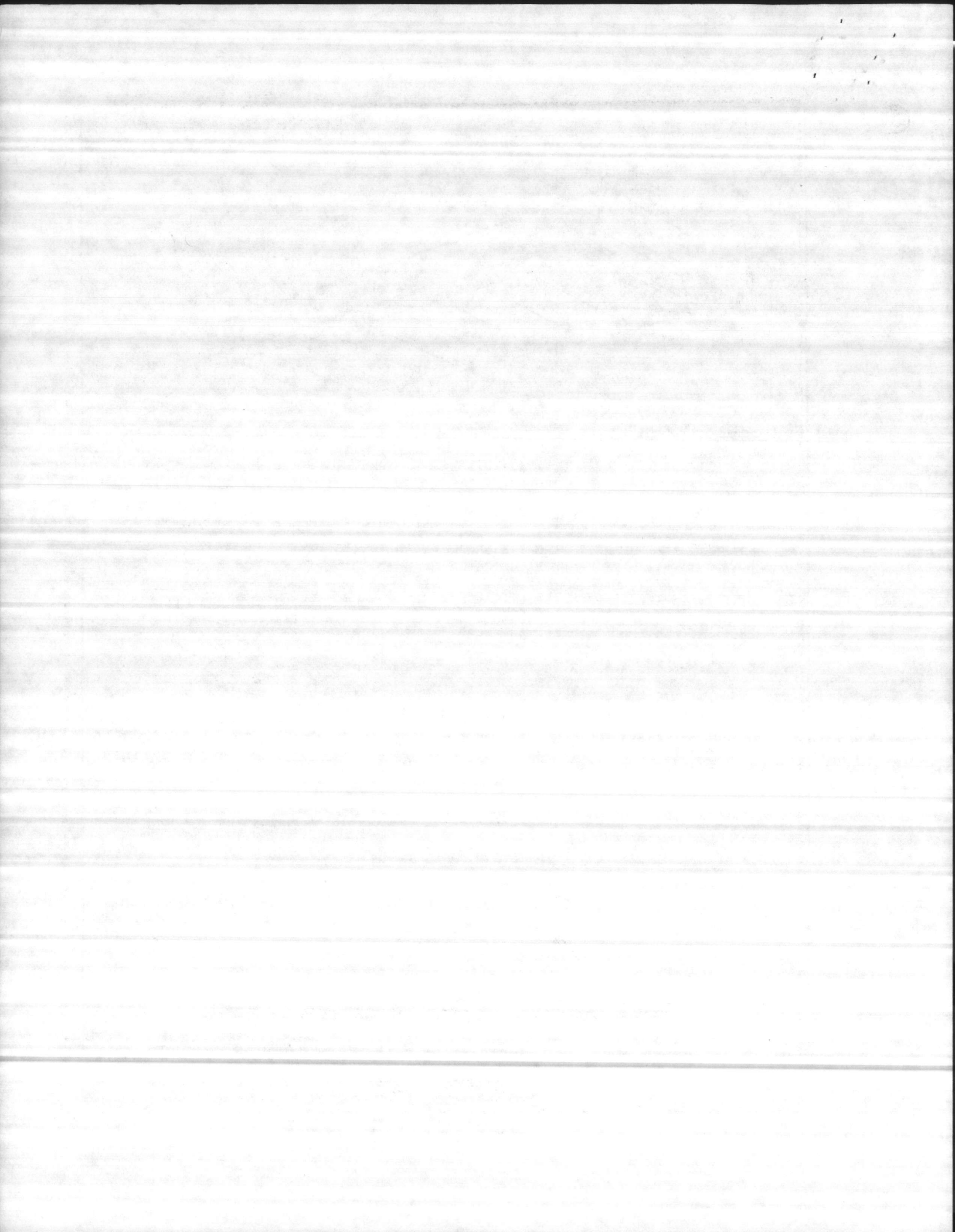
TYPE C - 1 - 48" T-12 LAMP - 20 CELLS

TYPE D - 2 - 48" T-12 LAMPS - 20 CELLS

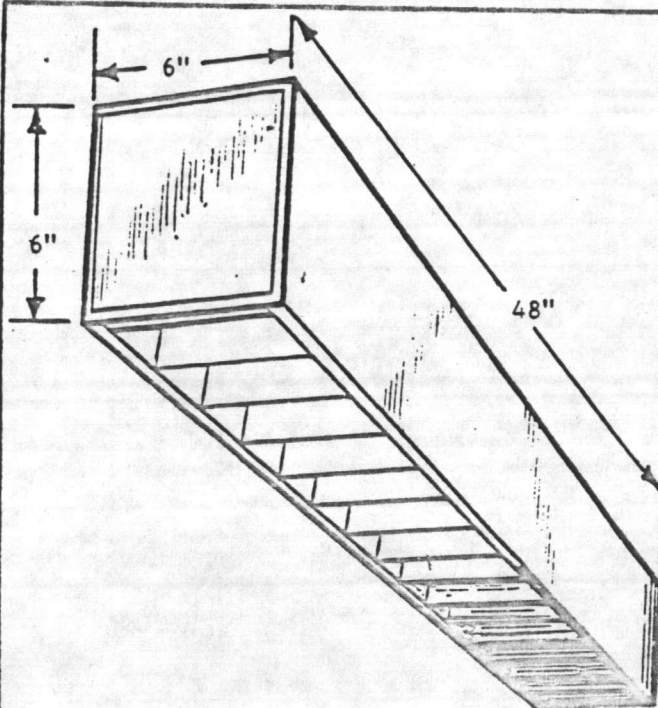
1'X4' PARABOLIC TROFFERS

SKETCH No. 16510-10

NL-10



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

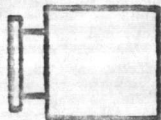
1. HOUSING SHALL BE MINIMUM 0.026 THICK STEEL, OR STEEL AND ALUMINUM CONSTRUCTION, AND SHALL BE CHEMICALLY TREATED FOR RUST PREVENTION AND PAINT ADHESION. HOUSING SHALL BE ASSEMBLED WITH SCREWS OR BY WELDED JOINTS.
2. INTERIOR OF HOUSING SHALL BE PAINTED WITH MINIMUM 85% REFLECTANCE HIGH GLOSS WHITE ENAMEL.
3. REFLECTOR SHALL BE SEMI-SPECULAR NATURAL ANODIZED ALUMINUM.
4. PARABOLIC LOUVER SHALL BE ANODIZED NATURAL ALUMINUM AND SHALL HAVE POSITIVE ACTION SPRING LOADED LATCHES AND SAFETY HINGES.



SURFACE



PENDANT



BRACKET

5. PROVIDE INTERNAL GREEN GROUNDING SCREW.
6. BALLAST: HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLASTS TO HOUSING WITH AT LEAST ONE SCREW AND SLIP ON BRACKET OR TWO SCREWS - ONE AT EACH END.

7. PROVIDE COLORS AS INDICATED.

TYPE A - DIRECT - 1 LIGHT  
 TYPE B - DIRECT - 2 LIGHT

TYPE C - INDIRECT - 1 LIGHT  
 TYPE D - INDIRECT - 2 LIGHT

TYPE E - DIRECT/INDIRECT - 1 LIGHT  
 TYPE F - DIRECT/INDIRECT - 2 LIGHT

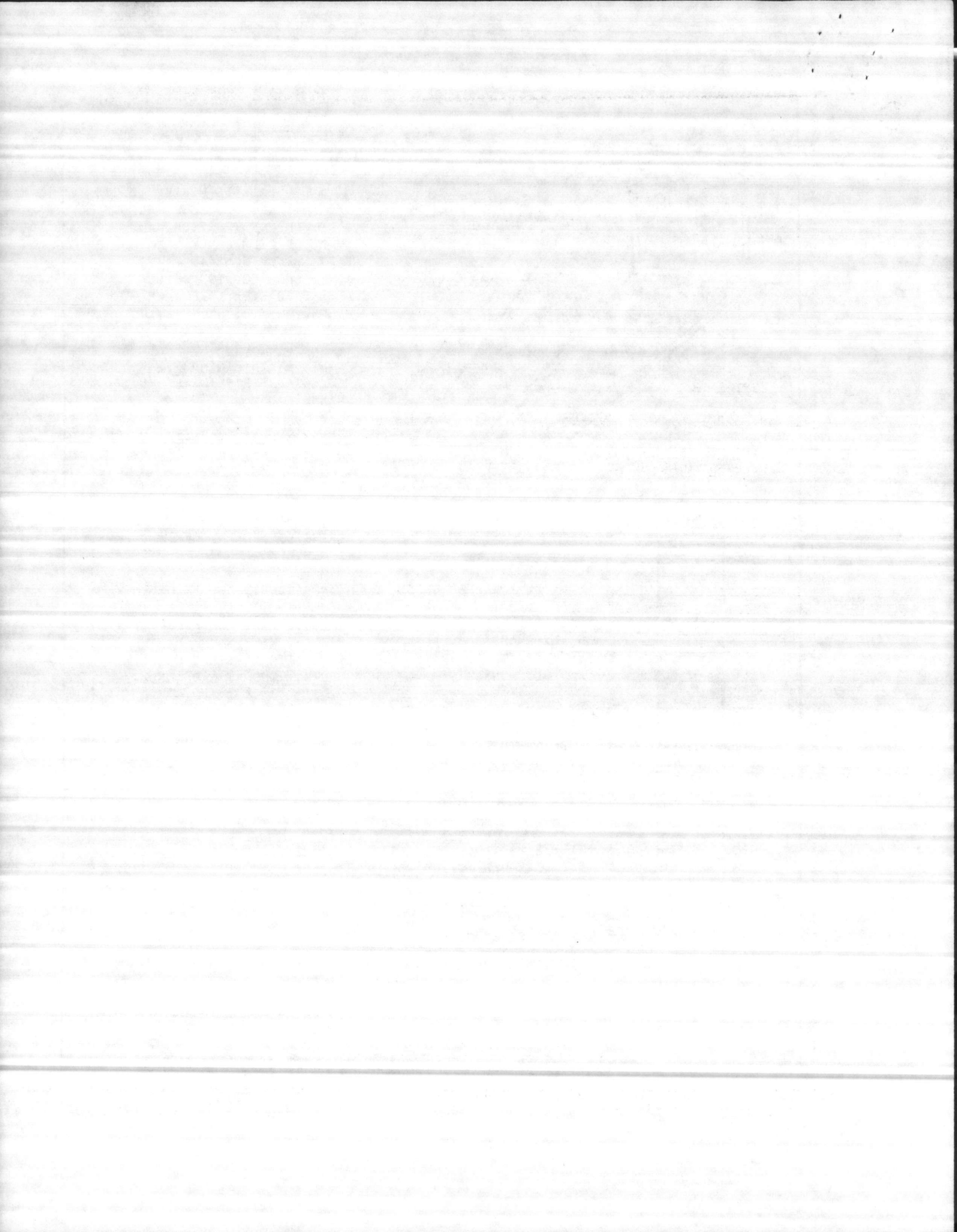
TYPE G - DIRECT ASYMMETRIC

NOTE: TYPES C, D, E & F MAY ONLY BE PENDANT OR BRACKET MOUNTED.

SURFACE, PENDANT OR BRACKET-MOUNTED PARABOLIC LUMINAIRE

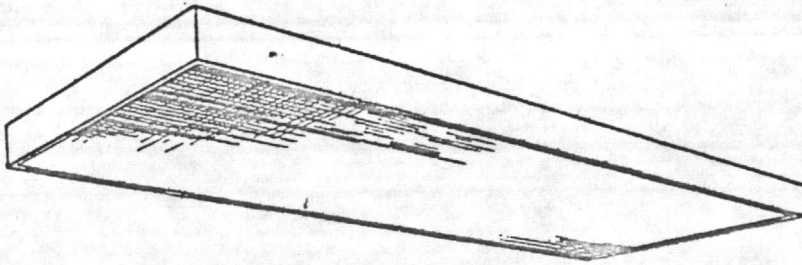
SKETCH No. 16510-11

NL-11





SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

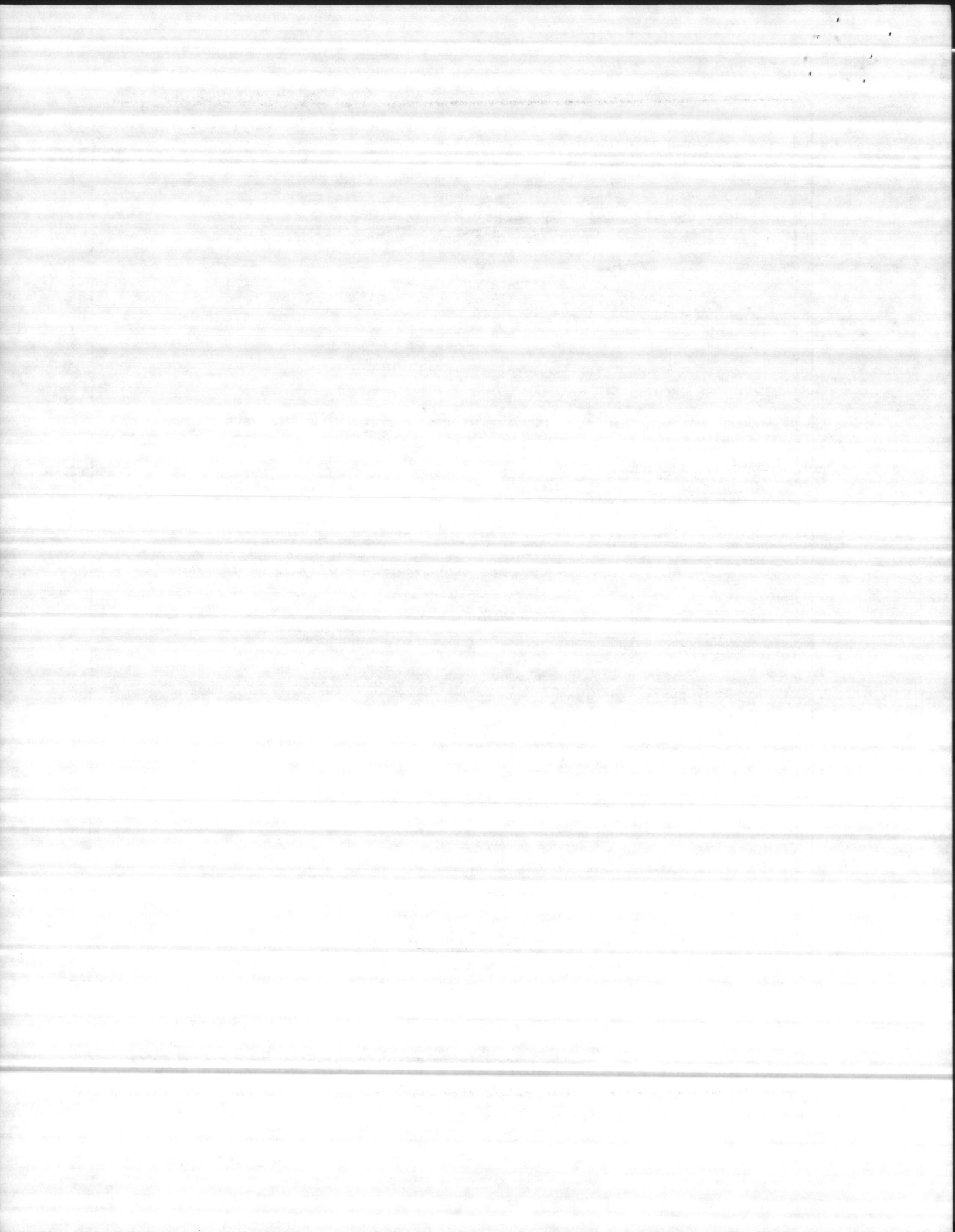
1. 0.032" MINIMUM THICKNESS STEEL HOUSING WITH CORNERS WELDED. ALL 4 SIDES SHALL BE SOLID STEEL WITHOUT HOLES OR PANELS. 4-1/2" MAXIMUM FIXTURE HEIGHT. FINISH WITH RUST INHIBITOR AND BAKED WHITE ENAMEL. (PAINT AFTER FABRICATION.) PROVIDE GROUND LUG.
2. 0.032" MINIMUM THICKNESS STEEL OR ALUMINUM DOOR HELD TOGETHER BY SCREWS (FOR LENS REPLACEMENT). THE DOOR SHALL BE LIGHT TIGHT WITHOUT RELYING ON GASKETS. DOORS SHALL BE HELD IN PLACE BY 2 "T" TYPE HINGES AND 2 SLOT HEAD, CAPTIVE SCREWS.
3. LENS SHALL BE 0.156" PLUS OR MINUS 10% OVERALL (0.09 MAXIMUM PRISM PENETRATION) CLEAR PRISMATIC 100% ACRYLIC. WHEN INDICATED, PROVIDE AN ADDITIONAL 1/4" THICK POLYCARBONATE SHEET BELOW AND ATTACHED TO THE ACRYLIC LENS. (REDUCE LENS THICKNESS TO 0.10 MINIMUM.)
4. BALLAST SHALL BE HIGH POWER FACTOR ( $\geq .9$ ) ETL, CBM APPROVED RAPID START CLASS P ENERGY SAVING BALLAST WITH SOUND RATING OF "A". SECURE BALLAST TO HOUSING WITH AT LEAST ONE SCREW AND SLIP-ON BRACKET OR 2 SCREWS (ONE AT EACH END).

TYPE A	-	2' X 2'	2 LAMP
TYPE B	-	1' X 4'	2 LAMP
TYPE C	-	2' X 4'	2 LAMP
TYPE D	-	2' X 4'	3 LAMP
TYPE E	-	2' X 4'	4 LAMP

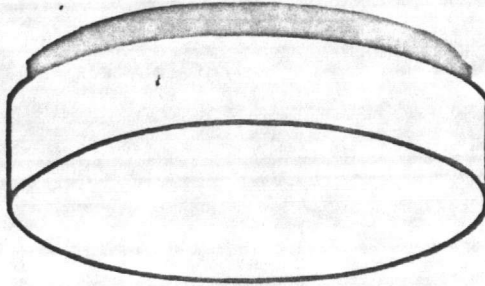
STEEL SIDED SURFACE FLUORESCENT

SKETCH No. 16510-12

NL-12



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

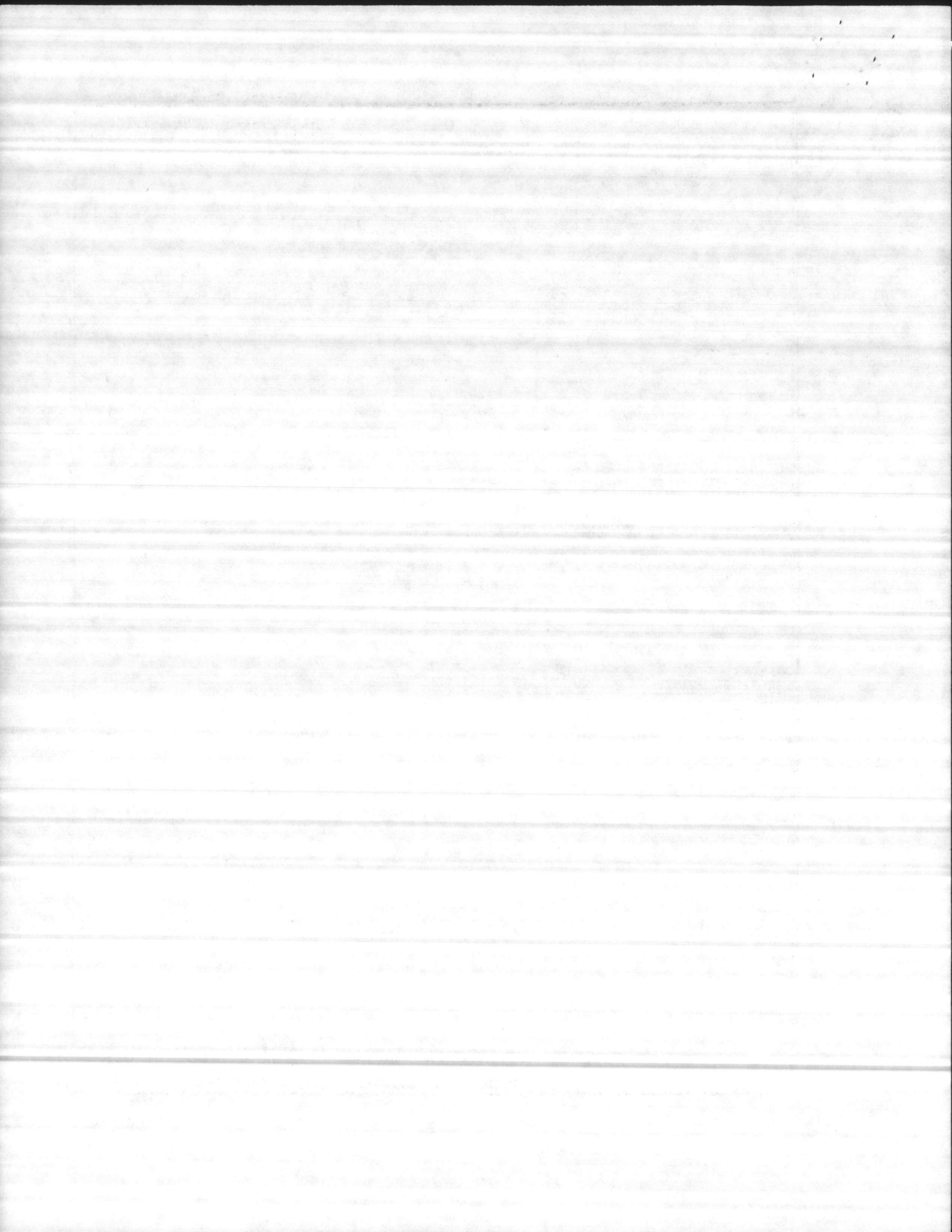
1. ALUMINUM HOUSING WITH MATTE BLACK FINISH.
2. POLYCARBONATE OR ACRYLIC OPAL GLOBE.
3. PROVIDE SPRING STEEL CLIPS, SET SCREWS OR TORSION SPRINGS TO KEEP GLOBE IN PLACE.
4. PROVIDE DAMP LABEL WHEN INDICATED.
5. PROVIDE CIRCLINE LAMPS AS INDICATED, WITH LUMINAIRE MAXIMUM SIZES AS FOLLOWS:

<u>LAMP WATTAGE</u>	<u>LUMINAIRE DEPTH</u>	<u>LUMINAIRE DIAMETER</u>
19 TO 22	4"	11"
32 OR 22+32	4"	14"
40 OR 32+40	5"	20"

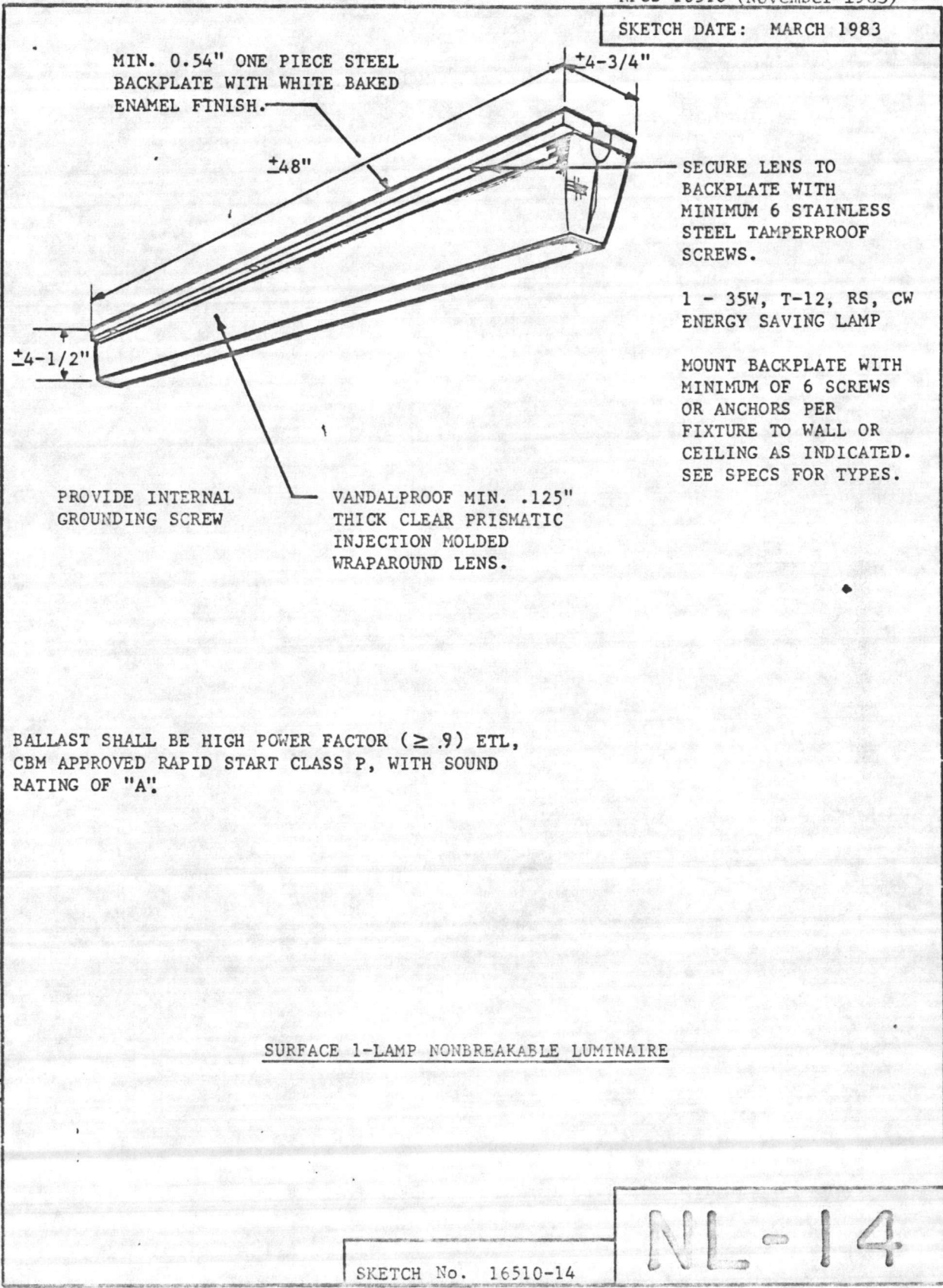
ROUND SURFACE FLUORESCENT

SKETCH No. 16510-13

NL-13



SKETCH DATE: MARCH 1983



MIN. 0.54" ONE PIECE STEEL BACKPLATE WITH WHITE BAKED ENAMEL FINISH.

±48"

±4-3/4"

SECURE LENS TO BACKPLATE WITH MINIMUM 6 STAINLESS STEEL TAMPERPROOF SCREWS.

1 - 35W, T-12, RS, CW ENERGY SAVING LAMP

MOUNT BACKPLATE WITH MINIMUM OF 6 SCREWS OR ANCHORS PER FIXTURE TO WALL OR CEILING AS INDICATED. SEE SPECS FOR TYPES.

±4-1/2"

PROVIDE INTERNAL GROUNDING SCREW

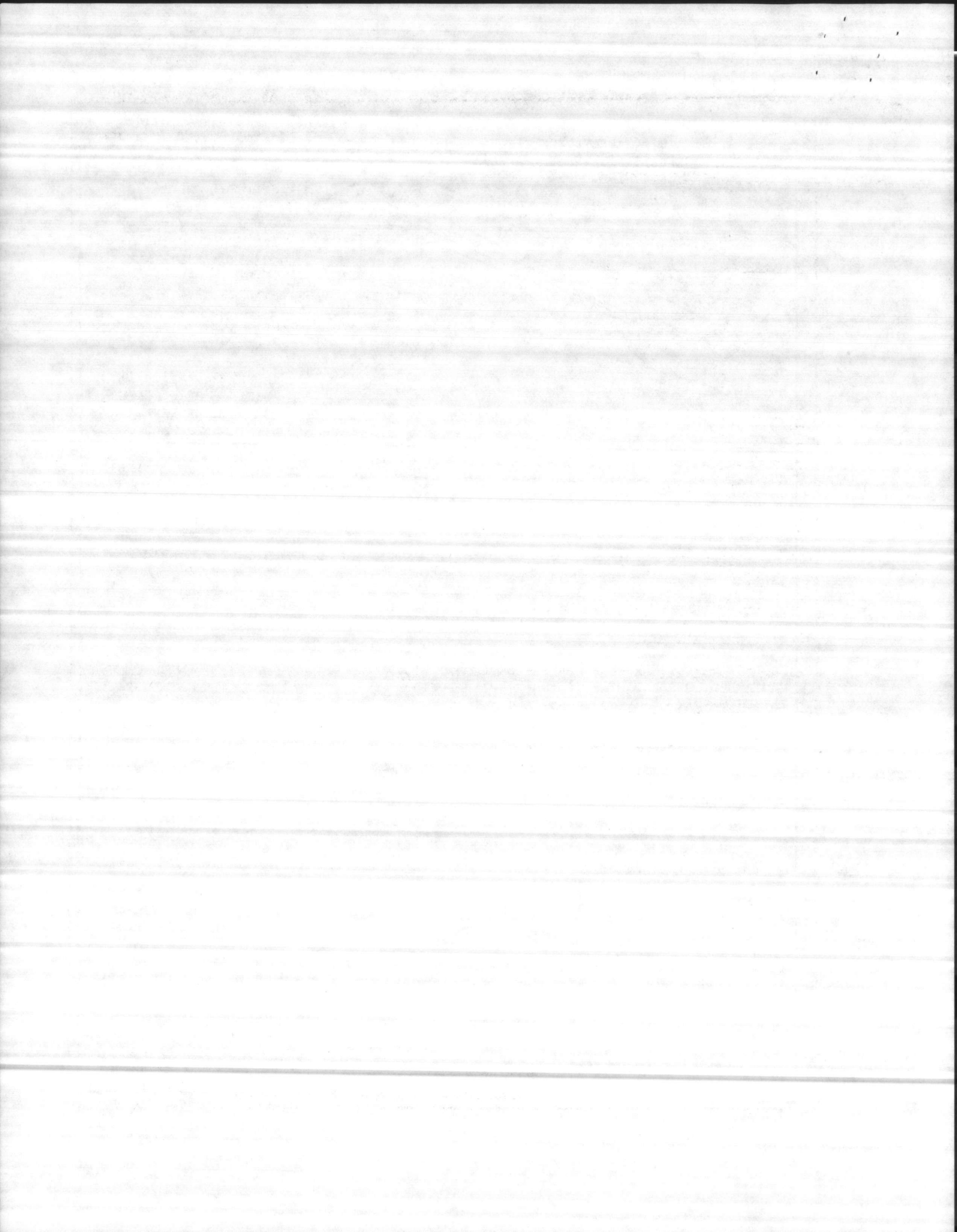
VANDALPROOF MIN. .125" THICK CLEAR PRISMATIC INJECTION MOLDED WRAPAROUND LENS.

BALLAST SHALL BE HIGH POWER FACTOR (≥ .9) ETL, CBM APPROVED RAPID START CLASS P, WITH SOUND RATING OF "A".

SURFACE 1-LAMP NONBREAKABLE LUMINAIRE

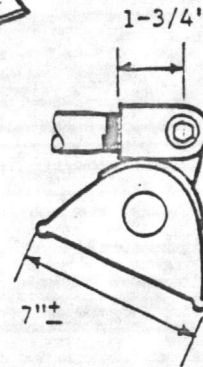
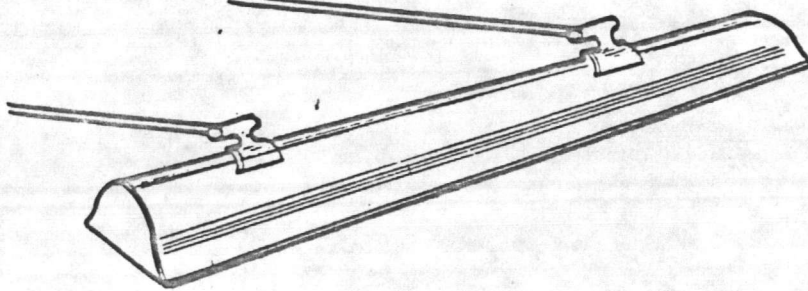
NL-14

SKETCH No. 16510-14



SKETCH DATE: MARCH 1983

SUPPORT ARMS AT 1/4 POINTS  
OF LUMINAIRE



TYPE A - 1 - 48" T-12-H.O. - 4'  
 TYPE B - 1 - 72" T-12-H.O. - 6'  
 TYPE C - 1 - 96" T-12-H.O. - 8'  
 TYPE D - 2 - 72" T-12-H.O. - 12'

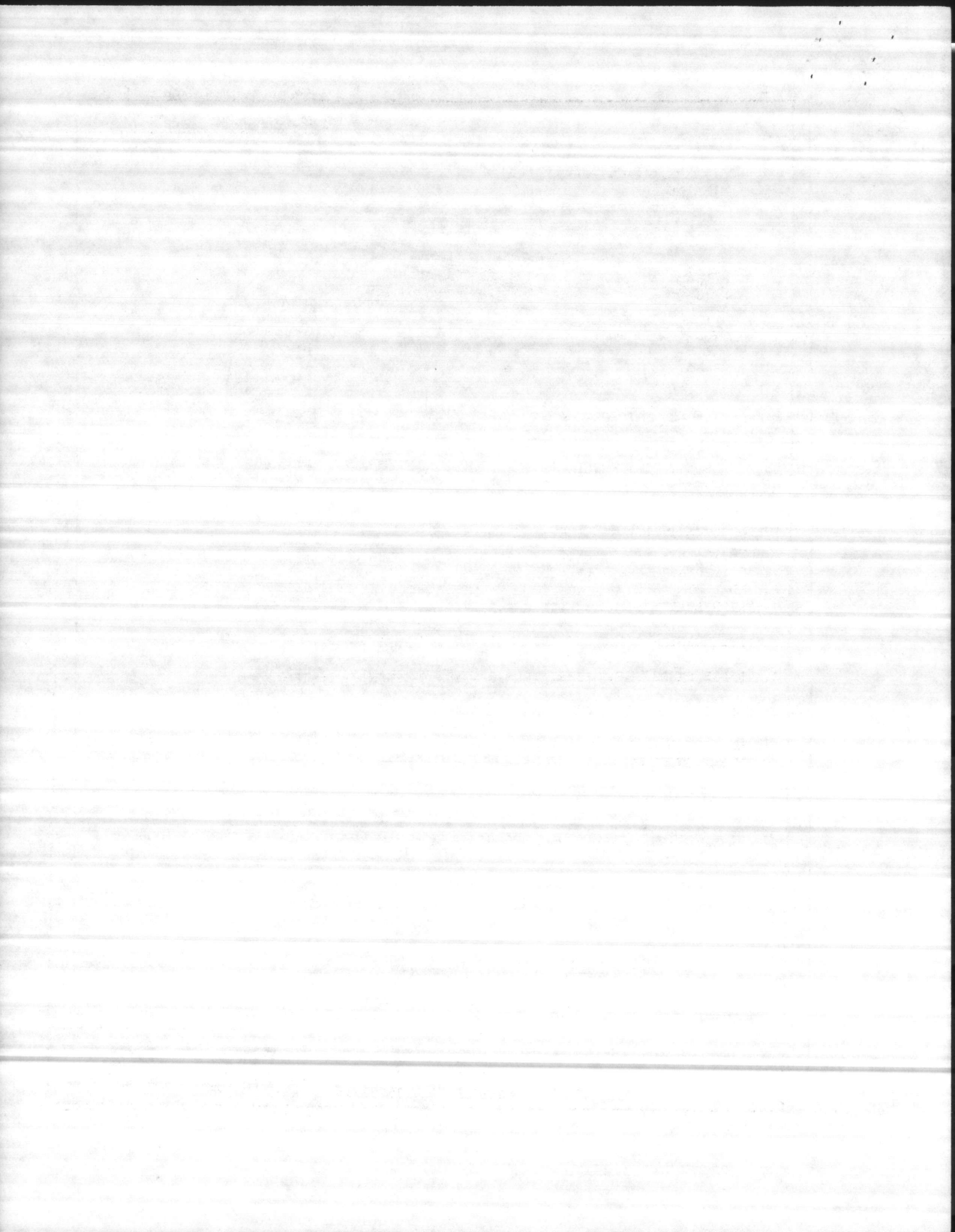
LUMINAIRE REQUIREMENTS

1. HOUSING, HEAVY DUTY EXTRUDED ANODIZED ALUMINUM WITH PARABOLIC SHAPED SPECULAR ANODIZED ALUMINUM REFLECTORS.
2. SPRING LOADED SOCKETS WITH GASKET FACING.
3. HIGH IMPACT ACRYLIC ENCLOSING SHIELD OR LENS.
4. ALL FASTENERS SHALL BE STAINLESS STEEL OR CADMIUM PLATED.
5. LUMINAIRE SHALL BE COMPLETELY PREWIRED.
6. BALLAST TYPE AND LOCATION AS INDICATED.

ARM-MOUNTED OUTDOOR SIGN LUMINAIRE

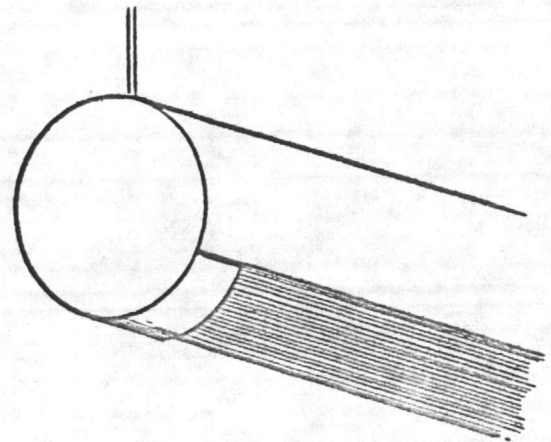
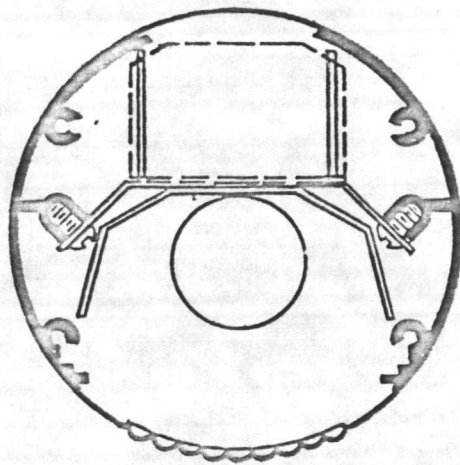
SKETCH No. 16510-15

NL-15





SKETCH DATE: MARCH 1983

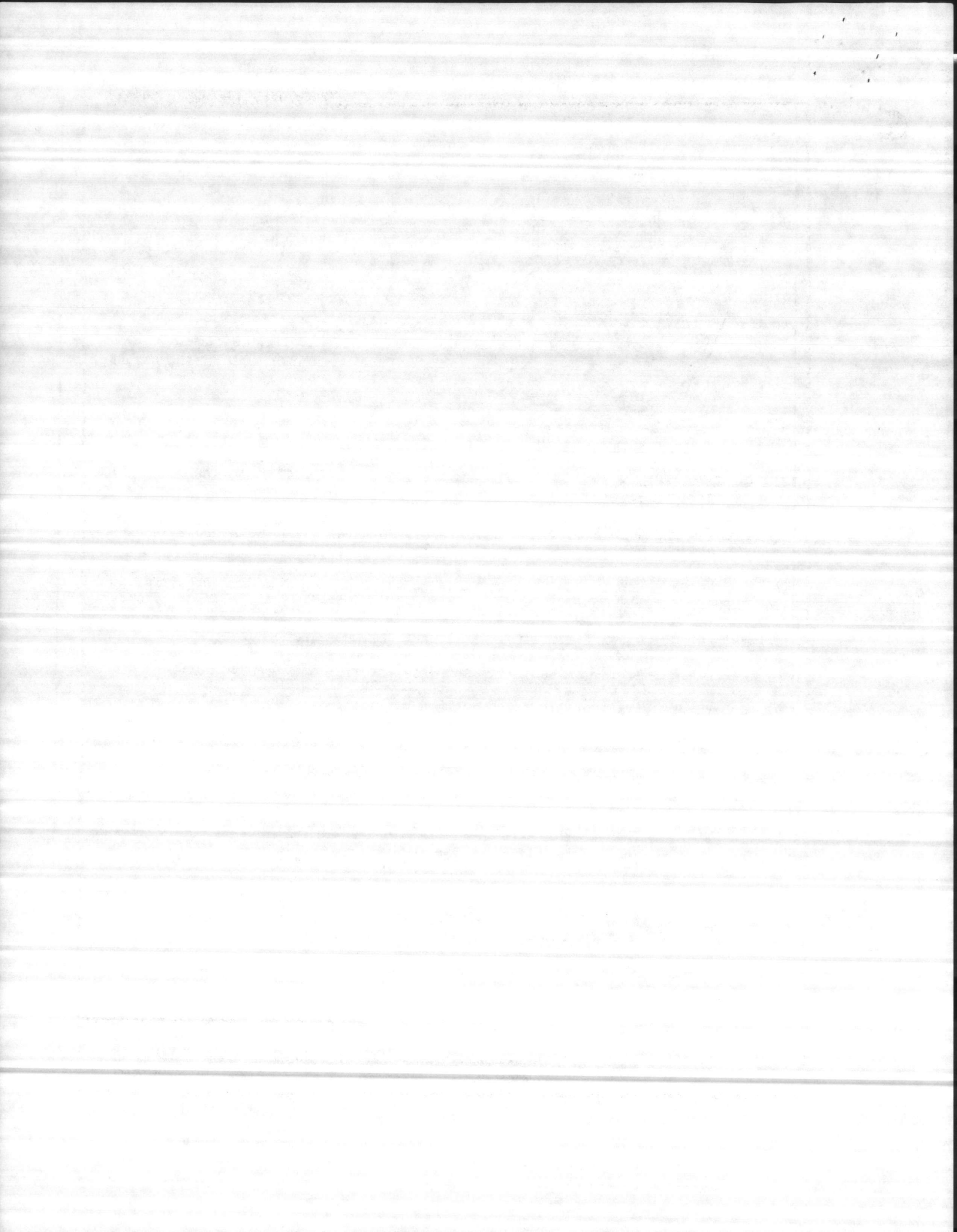
LUMINAIRE REQUIREMENTS

1. HOUSING EXTRUDED ALUMINUM - PRIME PAINT AND PAINT WITH BAKED ENAMEL OF COLOR INDICATED.
2. REFLECTOR - DIE FORMED HIGH GLOSS BAKED WHITE ENAMEL WITH MINIMUM 85% REFLECTANCE.
3. SHIELDING -- CLEAR PRISMATIC LENS TOP AND BOTTOM - 100% ACRYLIC.
4. RAPID START H.P.F. BALLAST; CLASS "P" CBM CERTIFIED BY ETL.
5. END PLATES WITH PROVISIONS FOR THROUGH WIRING.
6. 90° ELBOW CONNECTOR OF CAST ALUMINUM WITH CABLE SUPPORT PROVISIONS. COLOR TO MATCH FIXTURE.
7. IN-LINE CONNECTOR FOR CABLE SUPPORT OF FIXTURE. COLOR TO MATCH FIXTURE.
8. PROVIDE FIXTURES, ELBOWS, AND IN-LINE CONNECTORS AS INDICATED.

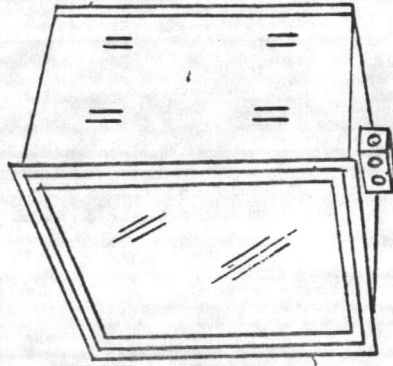
DECORATIVE SPECIALTY 1-LAMP LUMINAIRE

SKETCH No. 15650-16

NL 16



SKETCH DATE: MARCH 1983



TYPE A - 150W TO 250W HIGH  
PRESSURE SODIUM

TYPE B - 175W - 400W METAL HALIDE

LUMINAIRE REQUIREMENTS

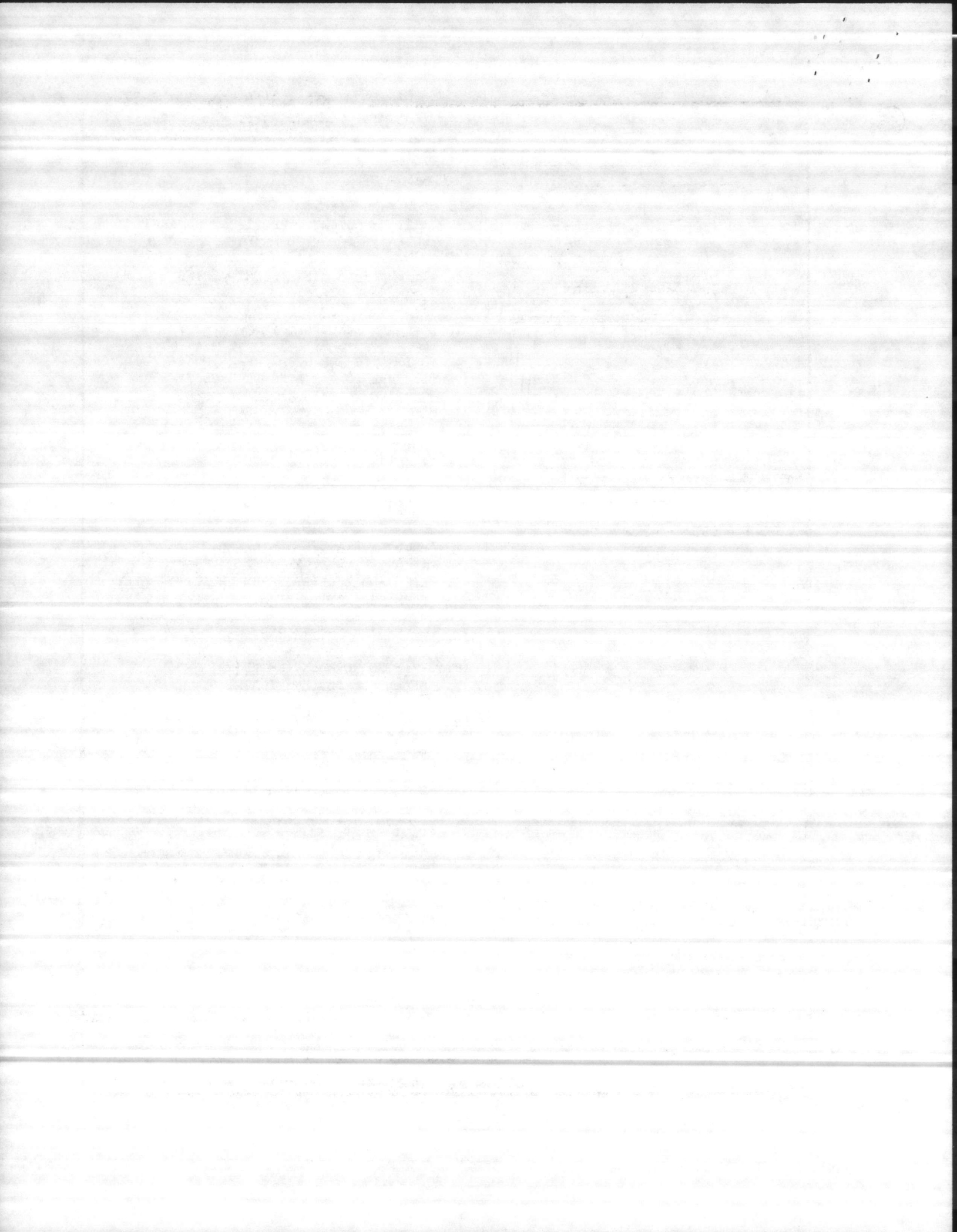
1. 24" X 24" (NOMINAL) SQUARE, 13" MAXIMUM HEIGHT. PROVIDE HARDWARE SUITABLE FOR CEILING MATERIAL USED.
2. STEEL OR ALUMINUM HOUSING WITH CORROSION RESISTANT FINISH.
3. ALUMINUM REFLECTOR.
4. PRISMATIC (OR CLEAR WHEN INDICATED) TEMPERED GLASS LENS SECURED BY CAPTIVE SCREWS OR CAM LATCHES.
5. HIGH POWER FACTOR ( $\geq .9$ ) ENCAPSULATED BALLAST AND AS INDICATED IN THE SPECIFICATIONS.
6. PROVIDE AUXILIARY QUARTZ LAMP AND ARC SENSING RELAY WHERE INDICATED.
7. PROVIDE LAMP AS INDICATED.
8. LAMP AND BALLAST SHALL BE SERVICEABLE FROM THE BOTTOM OF THE FIXTURE UNLESS OTHERWISE NOTED. PROVIDE INTERNAL GROUNDING PROVISIONS.
9. SPACING TO MOUNTING HEIGHT RATIO SHALL NOT BE LESS THAN 1:0.
10. FOR REFLECTANCES OF 80% CEILING, 50% WALLS, 20% FLOORS THE COEFFICIENT OF UTILIZATION SHALL NOT BE LESS THAN THE FOLLOWING:

RCR	CU	
	TYPE A	TYPE B
1	.63	.72
2	.57	.66
3	.49	.60
4	—	.54
5	—	.49

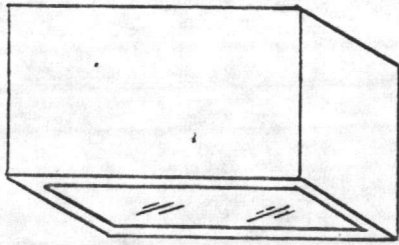
RECESS-MOUNTED COMMERCIAL HID

SKETCH No. 16510-20

NL-20



SKETCH DATE: MARCH 1983



TYPE A - 150W TO 250W HIGH  
PRESSURE SODIUM

TYPE B - 175W - 400W METAL HALIDE

LUMINAIRE REQUIREMENTS

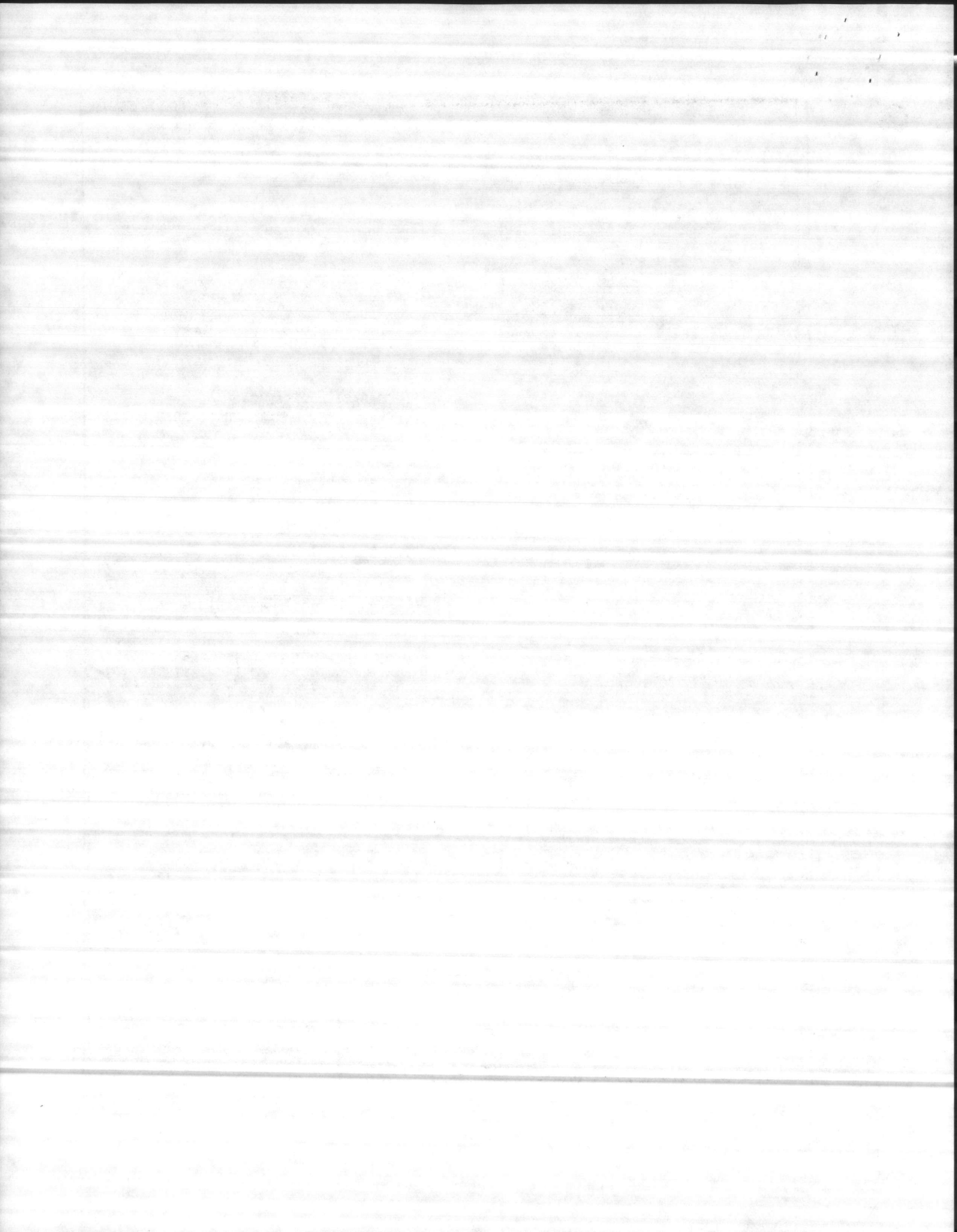
1. LUMINAIRE SHALL BE 24" X 24" (NOMINAL) SQUARE AND SHALL NOT EXCEED 15" IN HEIGHT.
2. 0.032" MINIMUM THICKNESS STEEL OR ALUMINUM HOUSING WITH WHITE POLYESTER OR BAKED ENAMEL FINISH. PROVIDE INTERNAL GROUNDING PROVISIONS.
3. ALUMINUM REFLECTOR.
4. FULL GASKETED PRISMATIC (OR CLEAR WHEN INDICATED) TEMPERED GLASS LENS SECURED BY CAPTIVE SCREWS OR CAM LATCHES.
5. HIGH POWER FACTOR ( $\geq .9$ ) ENCAPSULATED BALLAST AS INDICATED IN THE SPECIFICATIONS.
6. PROVIDE AUXILIARY QUARTZ LAMP AND ARC SENSING RELAY WHERE INDICATED.
7. PROVIDE LAMP AS INDICATED.
8. LAMP AND BALLAST SHALL BE SERVICEABLE FROM THE BOTTOM OF THE FIXTURE UNLESS OTHERWISE NOTED. PROVIDE INTERNAL GROUNDING PROVISIONS.
9. SPACING TO MOUNTING HEIGHT RATIO SHALL NOT BE LESS THAN 1:0.
10. FOR REFLECTANCES OF 80% CEILING, 50% WALLS, 20% FLOORS THE COEFFICIENT OF UTILIZATION SHALL NOT BE LESS THAN THE FOLLOWING:

RCR	CU	
	TYPE A	TYPE B
1	.63	.72
2	.57	.66
3	.49	.60
4	—	.54
5	—	.49

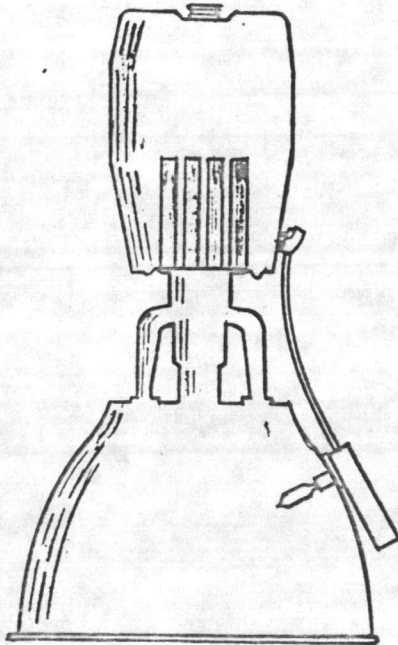
SURFACE-MOUNTED COMMERCIAL HID

SKETCH No. 16510-21

NL-21



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. STEEL OR ALUMINUM BALLAST HOUSING. SPUN ALUMINUM REFLECTOR PROVIDE VENTILATION OPENINGS AT TOP OF REFLECTOR. PROVIDE INTERNAL GROUNDING PROVISIONS.
2. PROVIDE CUSHIONED, SHOCK ABSORBING FIXTURE HANGER. PROVIDE CUSHIONED POWER HOOK WHEN INDICATED.
3. PROVIDE WIRE GUARD OR TEMPERED GLASS LENS WHEN INDICATED.
4. PROVIDE QUARTZ AUXILIARY LAMP AND ARC SENSING RELAY WHEN INDICATED.
5. PROVIDE HIGH POWER FACTOR ENCAPSULATED ( $\geq .9$ ) BALLAST AS INDICATED ON PLANS AND SPECIFICATION.
6. MINIMUM COEFFICIENTS OF UTILIZATION (CU) FOR CAVITY REFLECTANCES OF 80% CEILING, 50% WALLS, 20% FLOOR SHALL BE:

TYPE A - 400W-1000W HIGH PRESSURE SODIUM

TYPE B - 400W-1000W METAL HALIDE

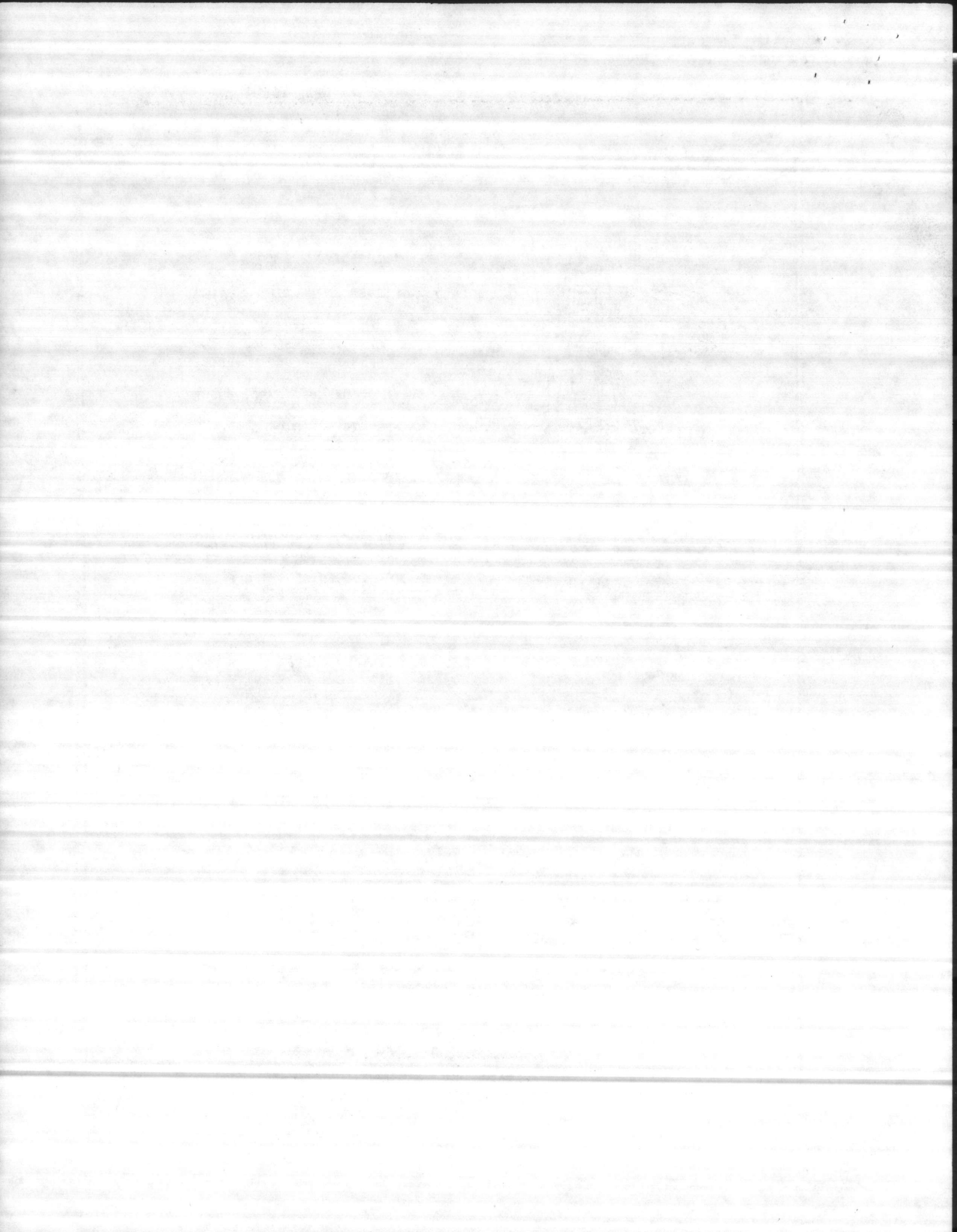
<u>ROOM CAVITY RATIO:</u>	<u>TYPE:</u>	<u>A</u>	<u>B</u>
1	CU	0.93	0.89
2		0.85	0.80
3		0.80	0.70
MIN. EFFICIENCY		84%	80%
MIN. SPACING/MTG. HT. RATIO		.95	.95

7. PROVIDE LAMP AS INDICATED.

HIGH-BAY INDUSTRIAL HID

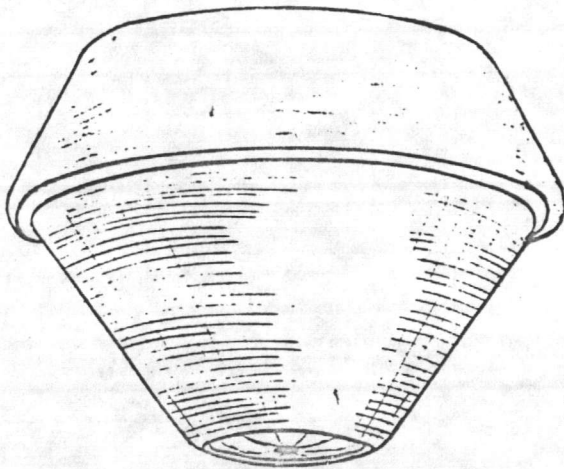
SKETCH No. 16510-22

NL-22





SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. SHEET OR CAST ALUMINUM HOUSING. FINISH WITH ENAMEL OR EPOXY. PROVIDE INTERNAL GROUNDING PROVISIONS.
2. ACRYLIC REFRACTOR OR THERMAL AND SHOCK RESISTANT GLASS LENS.
3. PROVIDE CUSHIONED FIXTURE HANGAR. PROVIDE CUSHIONED POWER HOOK WHEN INDICATED.
4. PROVIDE QUARTZ AUXILIARY LAMP AND ARC SENSING RELAY WHEN INDICATED.
5. PROVIDE ENCAPSULATED HIGH POWER FACTOR ( $\geq .9$ ) BALLAST AS INDICATED ON PLANS AND IN SPECIFICATION.
6. MINIMUM COEFFICIENT OF UTILIZATION (CU) WITH CAVITY REFLECTANCES OF 80% CEILING, 50% WALL, 20% FLOOR SHALL BE:

TYPE A - 100-150W      HIGH PRESSURE SODIUM  
 TYPE B - 250-400W  
 TYPE C -        175W      METAL HALIDE  
 TYPE D - 250-400W

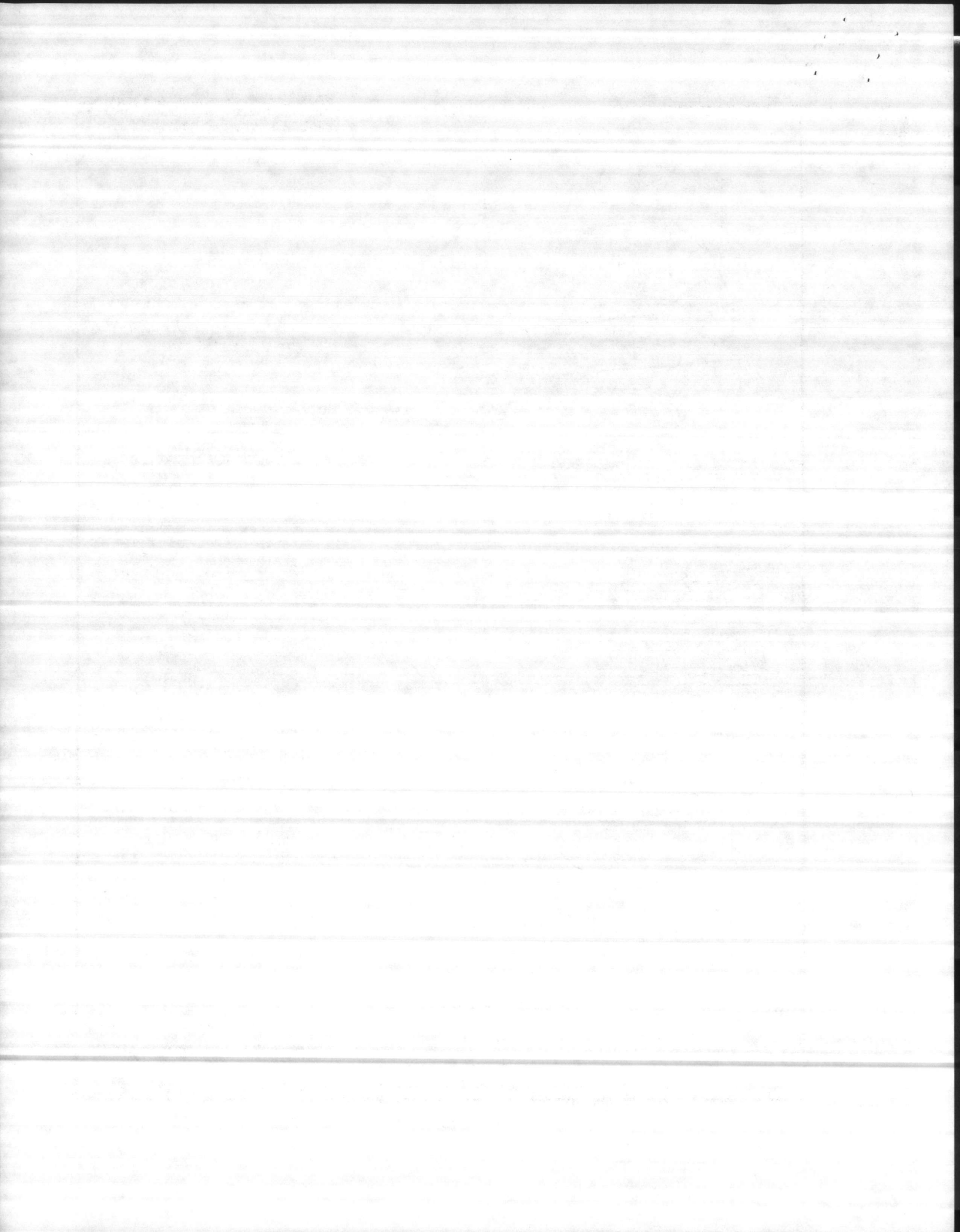
RCR	TYPE:	A	B	C	D
1		0.79	0.85	0.79	0.80
2	CU.	0.68	0.73	0.69	0.70
3		0.59	0.60	0.60	0.60
	MIN. EFFICIENCY	80%	85%	80%	85%
	MIN. SPACING/MTG HT RATIO	1.8	1.8	1.8	1.8

7. PROVIDE LAMP AS INDICATED.

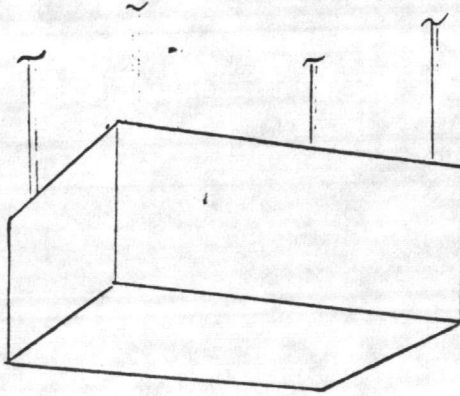
LOW BAY INDUSTRIAL HID

SKETCH No. 16510-23

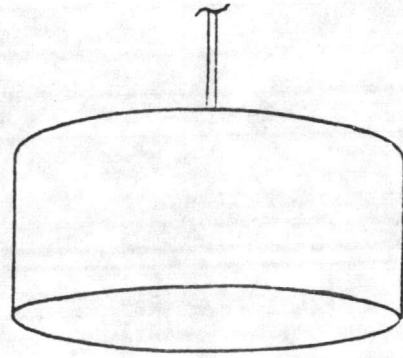
NL-23



SKETCH DATE: MARCH 1983



TYPE A



TYPE B

LUMINAIRE REQUIREMENTS

1. 0.032" MINIMUM THICKNESS STEEL HOUSING WITH ALL SEAMS WELDED AND GROUND SMOOTH. CHEMICALLY TREAT FOR RUST PREVENTION AND PROVIDE BAKED ENAMEL, OR POLYESTER FINISH (BEIGE UNLESS INDICATED OTHERWISE).
2. ALUMINUM REFLECTOR WITH TEMPERED GLASS LENS.
3. PROVIDE 175, 250, 400 WATT METAL HALIDE OR 150, 250, 400 WATT HIGH PRESSURE SODIUM LAMPS (SINGLE OR TWIN) AS INDICATED ON THE PLANS.
4. HIGH POWER FACTOR ( $\geq .9$ ) ENCAPSULATED BALLAST AND AS INDICATED IN THE SPECIFICATIONS.
5. PROVIDE COMPUTER GENERATED DOCUMENTATION OF THE MAXIMUM, MINIMUM AND AVERAGE INITIAL FOOTCANDLE LEVELS FOR THE SYSTEM AS INDICATED ON THE PLANS. ASSUME REFLECTANCES OF 80%, 50%, 20% FOR CEILINGS, WALLS AND FLOORS RESPECTIVELY.
6. PROVIDE 60% MINIMUM FIXTURE LUMEN OUTPUT BETWEEN 30" TO 90" FROM VERTICAL.
7. PROVIDE INTERNAL GROUNDING PROVISIONS.

TYPE A & B  
 CEILING MOUNTED  
 30 INCH MAXIMUM DISTANCE  
 FROM BOTTOM OF FIXTURE  
 TO CEILING UNLESS OTHER-  
 WISE INDICATED.

TYPE C (NOT SHOWN)  
 WALL MOUNT LUMINAIRE-  
 (RIGIDLY MOUNT TO WALL)  
 FORWARD THROW OPTICS.

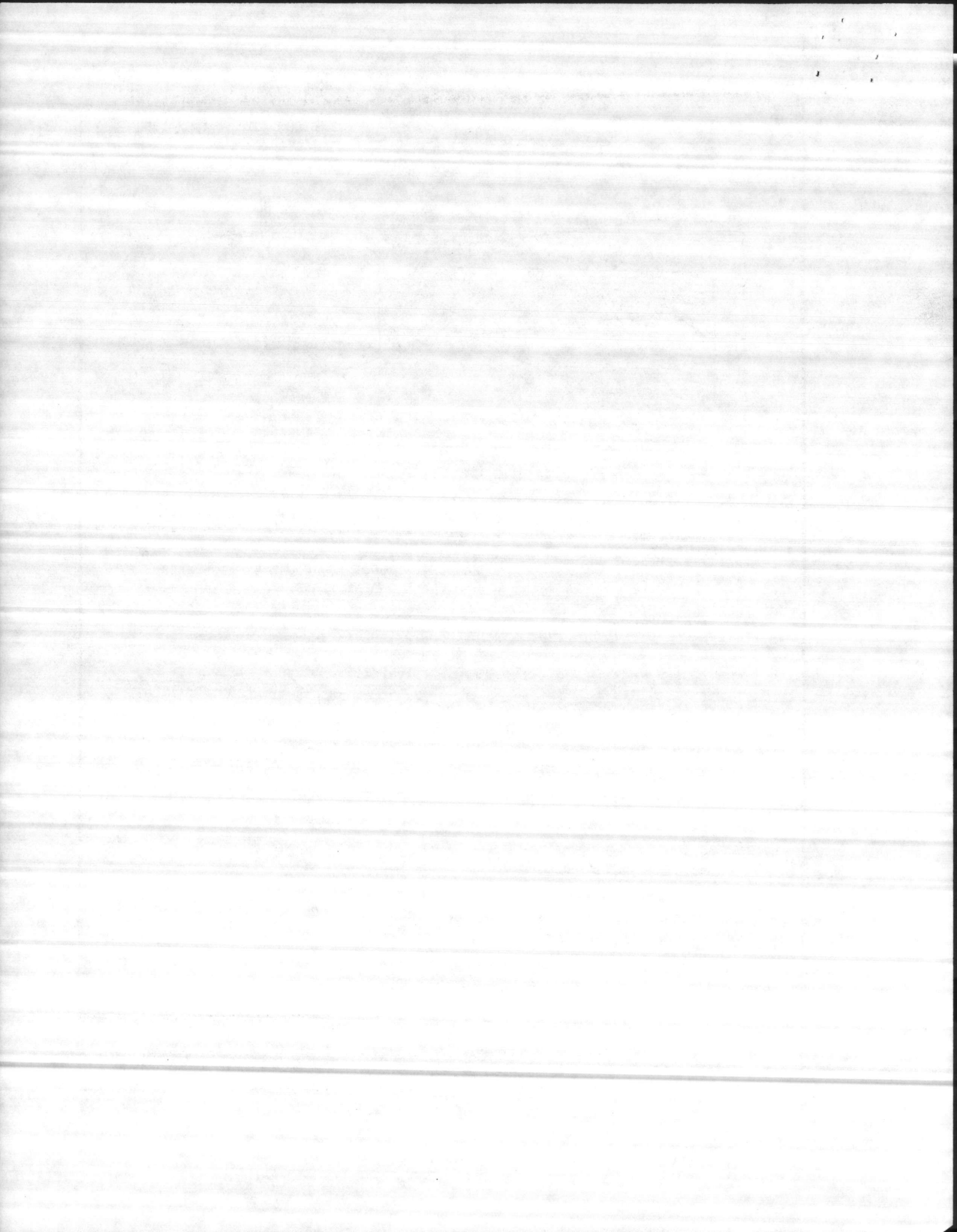
<u>RCR</u>	<u>MIN. CU</u>	
	150-250W	400W
1	0.50	0.56
2	0.43	0.49
3	0.38	0.43
4	0.33	0.38

<u>RCR</u>	<u>MIN. CU</u>
1	0.36
2	0.32
3	0.28
4	0.24

INDIRECT HID LUMINAIRE

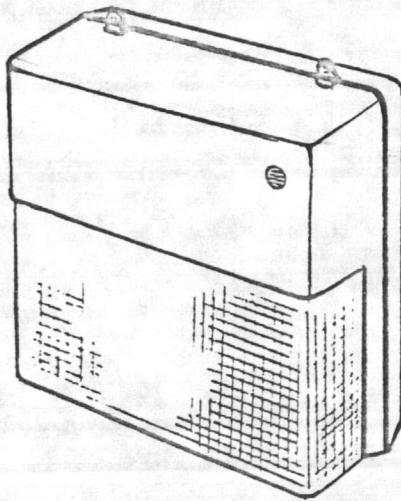
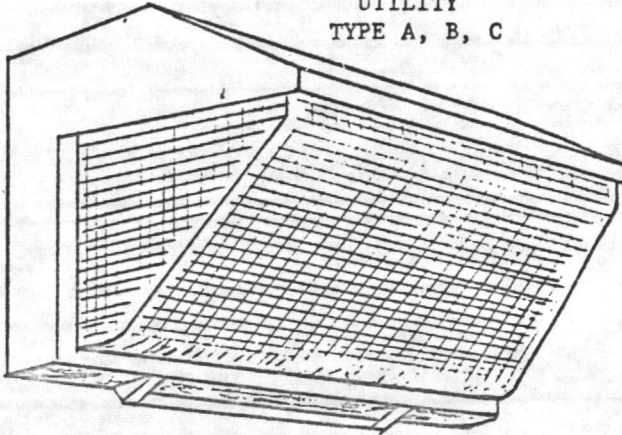
SKETCH No. 16510-24

NL-24



SKETCH DATE: MARCH 1983

UTILITY  
TYPE A, B, C



ARCHITECTURAL  
TYPE D, E

LUMINAIRE REQUIREMENTS

1. CAST ALUMINUM OR 1/8" MIN. THICKNESS EXTRUDED ALUMINUM HOUSING FOR HIGH PRESSURE SODIUM (HPS) AND METAL HALIDE (M.H.) LUMINAIRES.
2. CAST ALUMINUM, 1/8" MIN. THICKNESS EXTRUDED ALUMINUM, ABS PLASTIC OR POLYCARBONATE HOUSING FOR LOW PRESSURE SODIUM (LPS) AND 35/50/70W HPS LUMINAIRES.
3. HINGED, U.V. STABILIZED POLYCARBONATE LENS OR HINGED TEMPERED GLASS WITH POLYCARBONATE SHIELD.
4. LAMP SIZE AS INDICATED IN FIXTURE SCHEDULE.

5. PROVIDE ALUMINUM REFLECTOR.
6. BALLAST SHALL BE HIGH POWER FACTOR TYPE ( $\geq .85$ ) WITH CHARACTERISTICS AS INDICATED.
7. PROVIDE PHOTO ELECTRIC CONTROL WHEN INDICATED.
8. PROVIDE INTERNAL GROUNDING PROVISIONS.

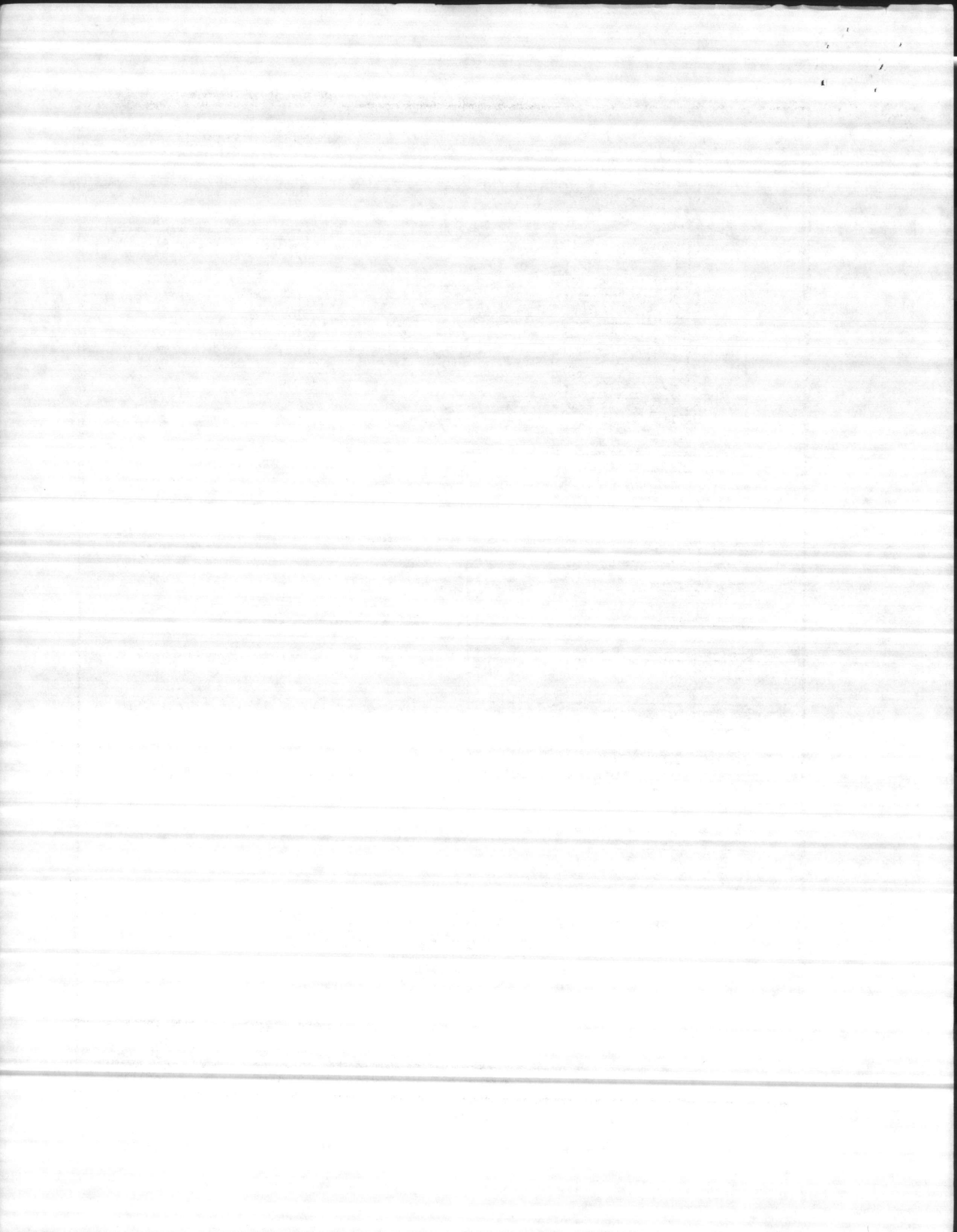
TYPE A, D	35-150W HPS
TYPE B, E	175W M.H.
TYPE C	35, 55W LPS

NOTE: TYPES D AND E MAY BE SUBSTITUTED FOR TYPES A AND B RESPECTIVELY BUT NOT VICE VERSA.

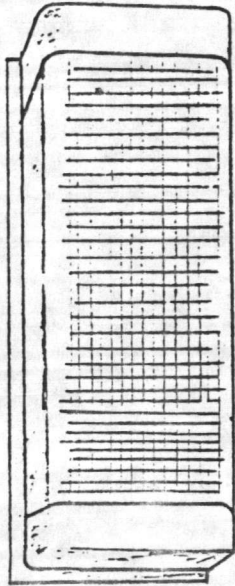
HID WALL-MOUNTED LUMINAIRE

SKETCH NO. 16510-25

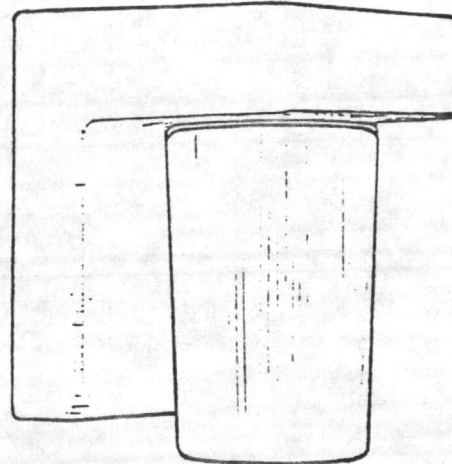
NL-25



SKETCH DATE: MARCH 1983



TYPE A



TYPE B

LUMINAIRE REQUIREMENTS

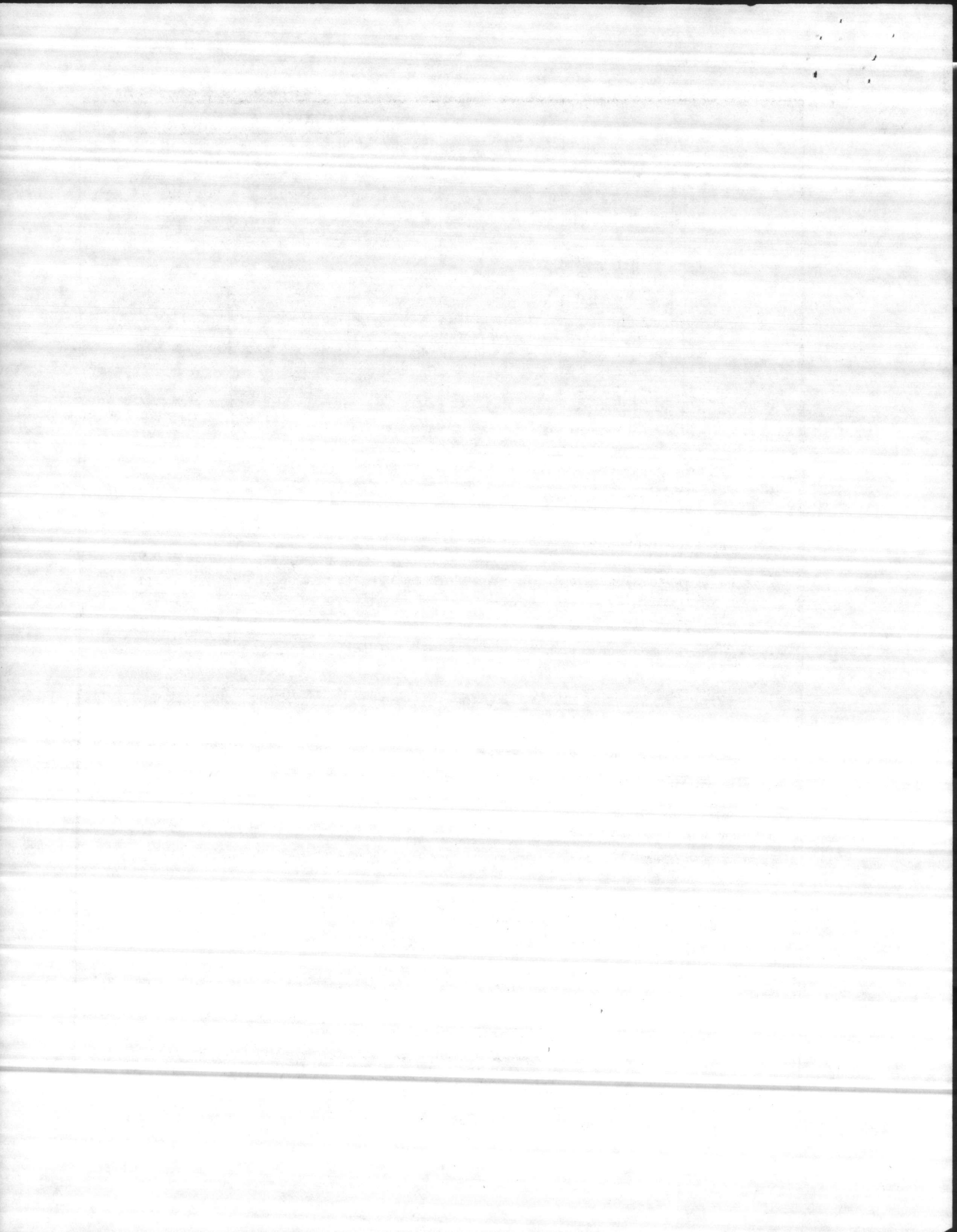
1. PROVIDE WITH ALUMINUM OR POLYCARBONATE BACKPLATE.
2. PROVIDE ACRYLIC OR POLYCARBONATE PRISMATIC (NON-CLEAR) LENS.
3. MAXIMUM DIMENSIONS SHALL BE 8"W X 20"H X 6-1/2"D (TYPE A), 7"W X 12"H X 9"D (TYPE B).
4. PROVIDE SOCKET AND 120 VOLT BALLAST SUITABLE TO SERVE A 18W LOW PRESSURE SODIUM LAMP.
5. PROVIDE HIGH POWER FACTOR ( $\geq .8$ ) BALLAST.
6. PROVIDE INTERNAL GROUNDING LUG.

TYPE A: CEILING MOUNT  
 TYPE B: WALL MOUNT

18-WATT LOW-PRESSURE SODIUM  
WALL MOUNT

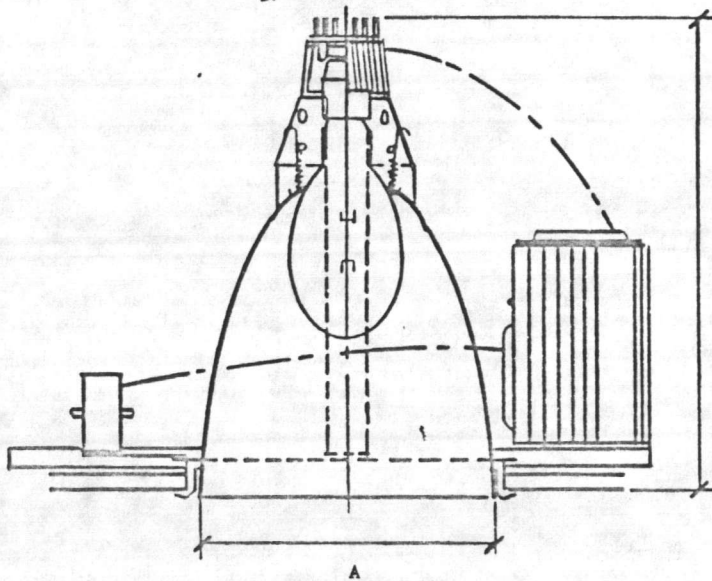
SKETCH No. 16510-26

NL-26





SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. CAST OR EXTRUDED ALUMINUM SOCKET HOUSING WITH PORCELAIN SOCKET FOR VERTICAL BURNING LAMP.
2. 18 GAGE (U.S. STD) SPECULAR ALUMINUM REFLECTOR.
3. WHITE TRIM RING SUITABLE FOR USE WITH CEILING MATERIAL INSTALLED (CAST ALUMINUM ON LENS UNITS).
4. ENCAPSULATED HPF ( $\geq 0.9$ ) BALLAST ARRANGED FOR MAINTENANCE FROM BELOW CEILING.
5. WIRING JUNCTION BOX SUITABLE FOR 75°C BRANCH CIRCUIT THROUGH WIRING.
6. PROVIDE QUARTZ AUXILIARY LAMP AND ARC SENSING RELAY WHEN INDICATED.
7. PROVIDE PROTECTIVE LAMP SHATTER SHIELD FOR METAL HALIDE FIXTURES (175 AND 250W).
8. MULTI GROOVE BAFFLES SHALL BE FLAT BLACK PHENOLIC OR CAST ALUMINUM.
9. LENS SHALL BE TEMPERED GLASS WITH FRESNEL OR PRISMATIC PATTERN.
10. PROVIDED LAMP AS INDICATED ON DRAWINGS HIGH PRESSURE SODIUM (HPS) OR METAL HALIDE (MH).
11. PROVIDE INTERNAL GROUNDING LUG.

OPEN REFLECTOR		MAXIMUM DIMENSIONS	
		A	B
TYPE A	70-150W HPS OR 175-250W MH	10"	18"
A1	400W MH	16"	31"
MULTI GROOVE BAFFLE		A	B
		TYPE B	70-150W HPS OR 175-250W MH
B1	400W MH	12"	31"
REGRESSED LENS		A	B
		TYPE C	70-150W HPS OR 175-250W MH

12. MINIMUM PHOTOMETRICS SHALL BE AS FOLLOWS:  
 BRIGHTNESS CUTOFF ANGLE ABOVE NADIR (< 500) FOOTLAMBERT LINE) SHALL BE 65° OR LESS FOR OPEN AND BAFFLE FIXTURES AND 85° OR LESS FOR LENS TYPE FIXTURES.

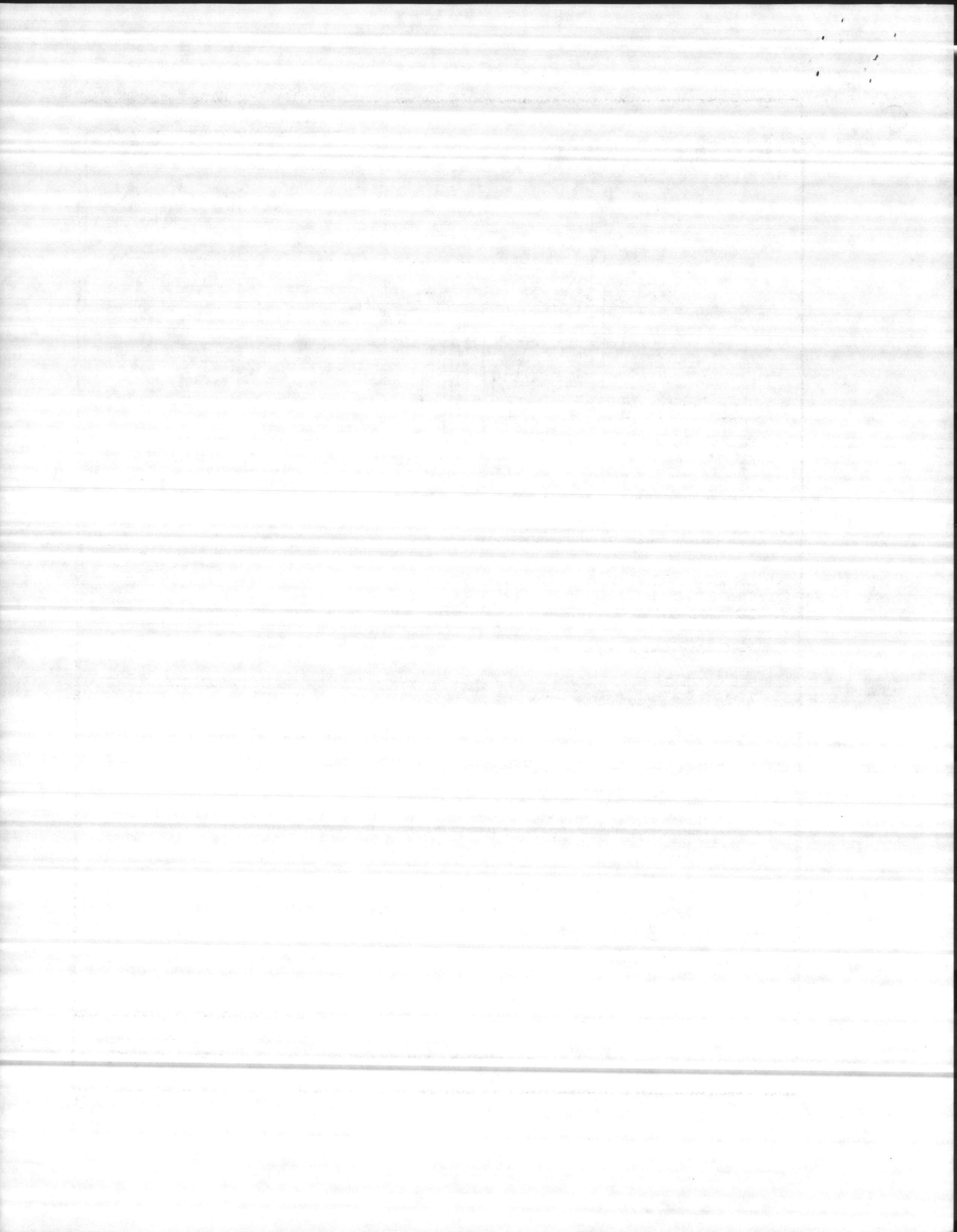
USING REFLECTANCES OF 80% CEILING, 50% WALLS AND 20% FLOOR, MINIMUM COEFFICIENT OF UTILIZATION SHALL BE AS FOLLOWS:

RCR	TYPE	A	A1	B	B1	C
1		0.65	0.70	0.45	0.55	0.55
2		0.60	0.67	0.40	0.50	0.50
3		0.55	0.64	0.37	0.45	0.45
4		0.50	0.60	0.35	0.40	0.40
S/MH RATIO		1.2	1.0	1.2	1.2	1.0

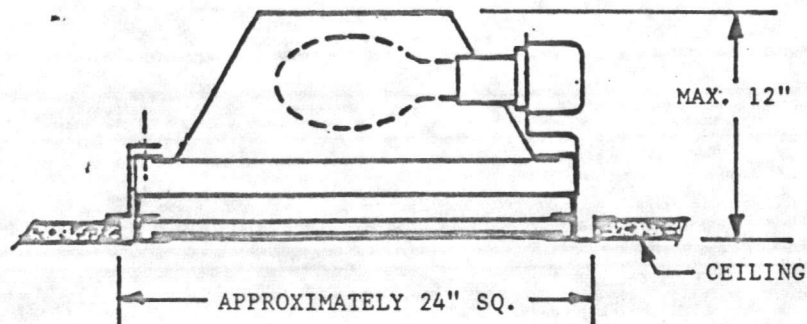
RECESSED ROUND HID

SKETCH No. 16510-27

NL-27



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

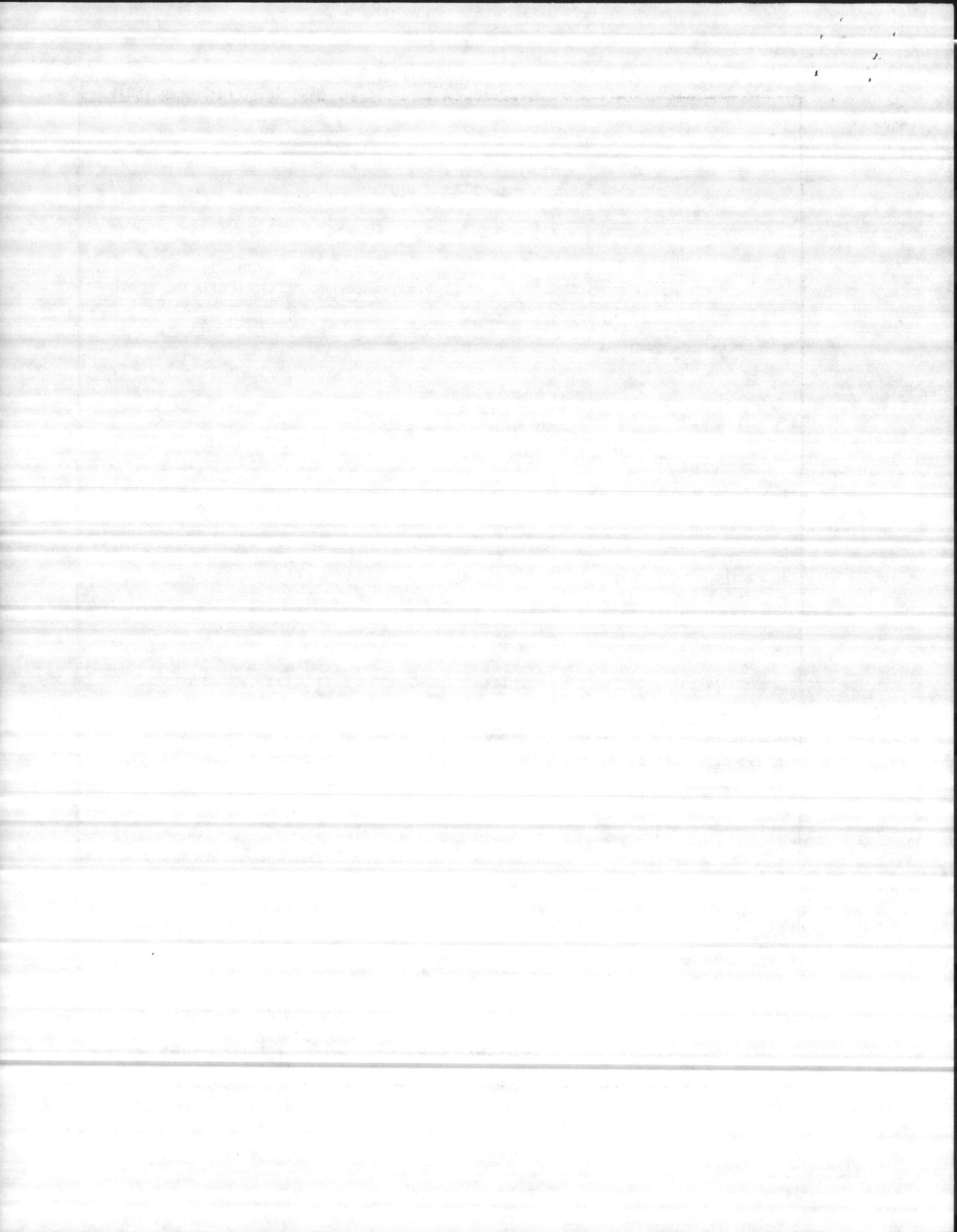
1. MINIMUM 0.026" THICK DIE FORMED STEEL HOUSING WELDED OR PUT TOGETHER WITH SCREWS TO FORM A RIGID UNIT.
2. ENTIRE LUMINAIRE SHALL BE FLUSH WITH CEILING, NO PROTRUDING FASTENERS OR HINGES.
3. STEEL DOOR FRAME MINIMUM 0.032" THICK STEEL WITH BAKED WHITE ENAMEL FINISH.
4. REFLECTOR SHALL BE CLEAR ANODIZED ALUMINUM.
5. TEMPERED IMPACT-RESISTANT PRISMATIC GLASS LENS.
6. PORCELAIN LAMPHOLDER.
7. ALL STEEL PARTS SHALL BE CHEMICALLY TREATED FOR RUST PREVENTION AND PAINT ADHESION AND SHALL BE PAINTED WITH WHITE BAKED ENAMEL FINISH.
8. BALLAST SHALL BE SOUND RATED AND ENCAPSULATED. CWA TYPE VOLTAGE AS INDICATED.

TYPE A - 250-WATT METAL HALIDE  
 TYPE B - 400-WATT METAL HALIDE  
 TYPE C - 150-WATT HIGH PRESSURE SODIUM  
 TYPE D - 250-WATT HIGH PRESSURE SODIUM  
 TYPE E - 400-WATT HIGH PRESSURE SODIUM

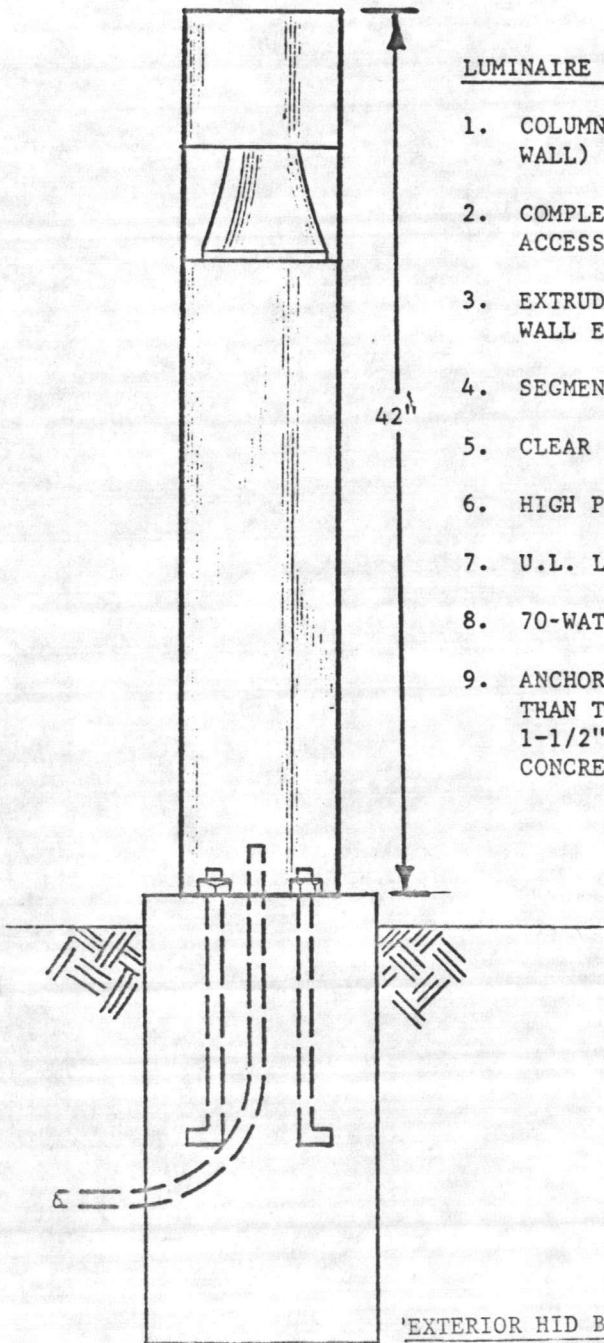
HANDBALL AND RACQUET BALL COURT LUMINAIRE

SKETCH No. 16510-28

NL-28



8" DIA. ± 1"



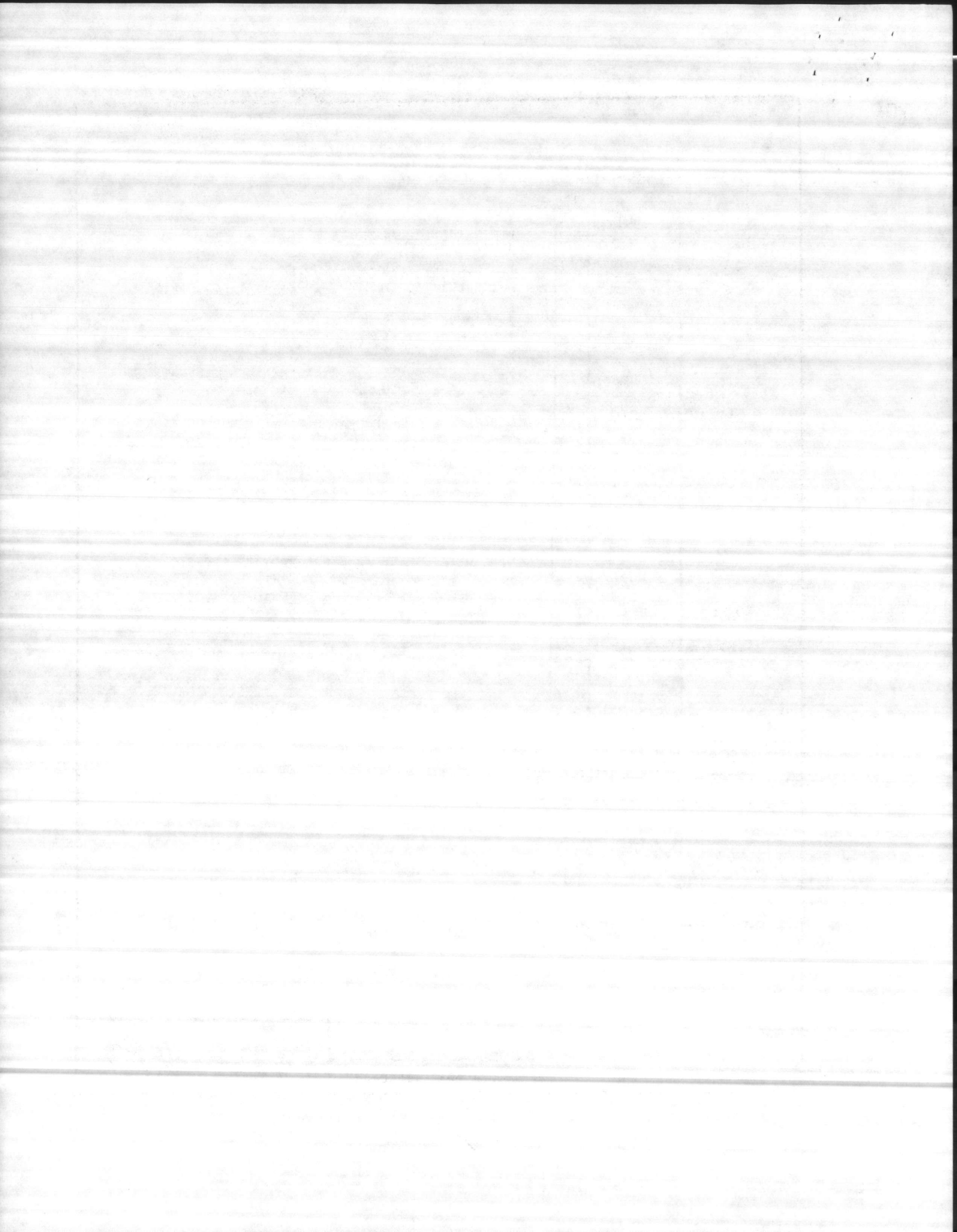
LUMINAIRE REQUIREMENTS

1. COLUMN, EXTRUDED ALUMINUM (MINIMUM .148" THICK WALL) WITH MEDIUM BRONZE ANODIZED FINISH.
2. COMPLETELY GASKETED WEATHERPROOF TOP LAMP ACCESSORY PLATE.
3. EXTRUDED CLEAR ACRYLIC MINIMUM .188" THICK WALL ENCLOSURE.
4. SEGMENTED SPECULAR CLEAR ALZAK REFLECTOR.
5. CLEAR ALZAK REFLECTING CONE.
6. HIGH POWER FACTOR BALLAST.
7. U.L. LISTED FOR WET LOCATIONS.
8. 70-WATT HIGH PRESSURE SODIUM LAMP.
9. ANCHOR BOLT KIT PER MANUFACTURER, BUT NOT LESS THAN TWO 1/2" Ø X 9" LONG ANCHOR BOLTS WITH 1-1/2" "L" BEND SET IN 12" Ø X 24" DEEP CONCRETE BASE. TOP OF BASE 2" ABOVE GRADE.

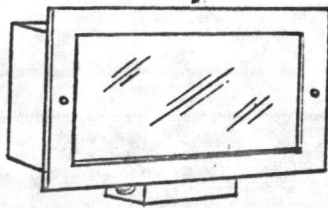
'EXTERIOR HID BOLLARD LUMINAIRE

NL-29

SKETCH No. 16510-29



SKETCH DATE: MARCH 1983



TYPE A



TYPE B

NOTE:

TYPE B FIXTURE, MAY BE PROVIDED MINUS GLASS FRONT, WHEN USED ON INTERIOR.

TYPE A - DIFFUSE TEMPERED GLASS OR POLYCARBONATE FRONT

TYPE B - LOUVER FRONT

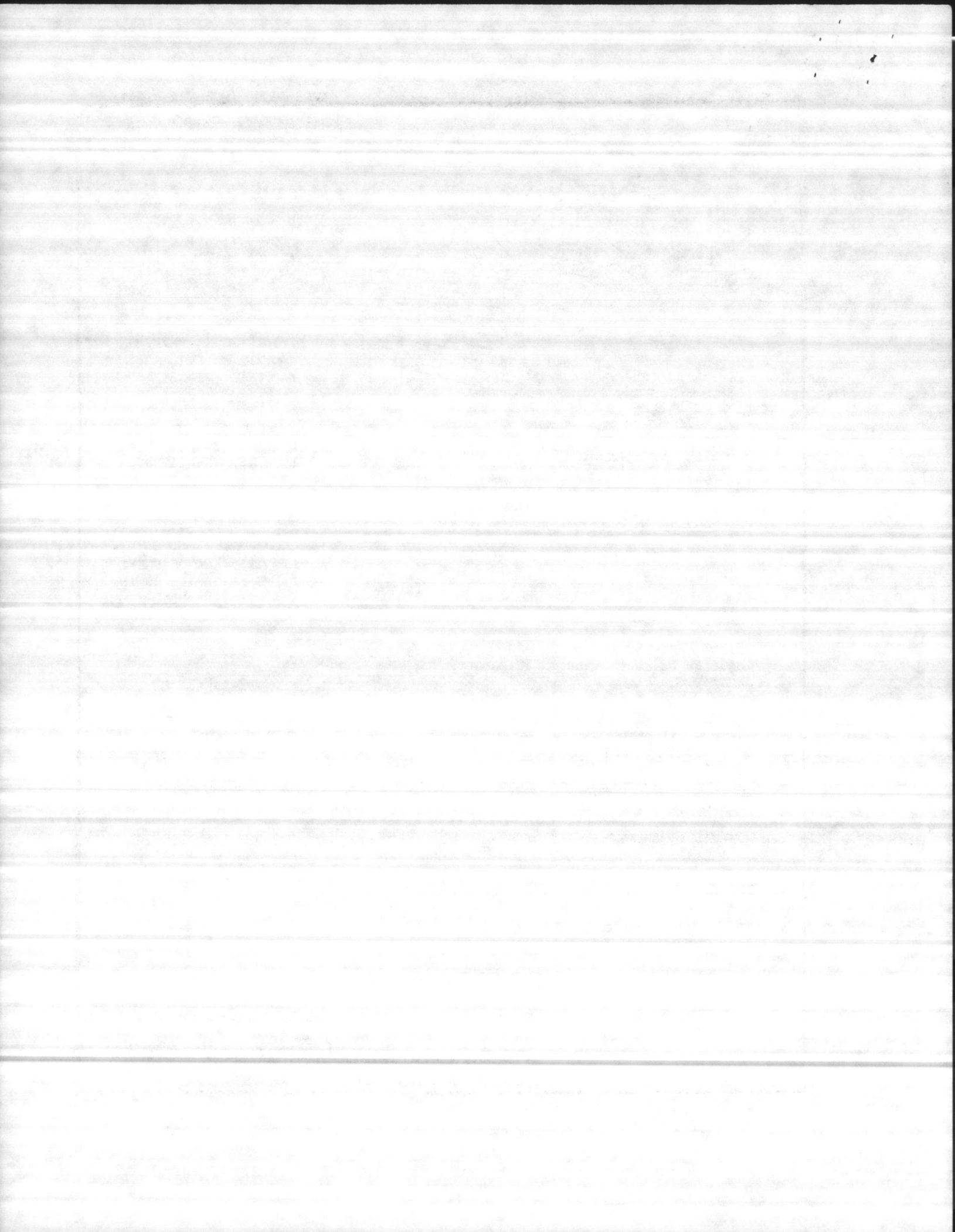
LUMINAIRE REQUIREMENTS

1. 0.054" MINIMUM THICKNESS STEEL OR CAST ALUMINUM HOUSING WITH WHITE ENAMEL FINISH AND SPECULAR ALUMINUM REFLECTOR.
2. 3/16" CAST ALUMINUM FACE PLATE WITH BRUSHED SATIN FINISH AND CLEAR ACRYLIC LAQUER.
3. 5" X 11" X 4" DEEP MAXIMUM DIMENSIONS.
4. NEOPRENE GASKET ASSEMBLY FOR EXTERIOR USE.
5. PROVIDE INCANDESCENT LAMPS AS INDICATED IN FIXTURE SCHEDULE.
6. PORCELAIN SOCKET WITH FULL METAL SCREW SHELL.
7. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

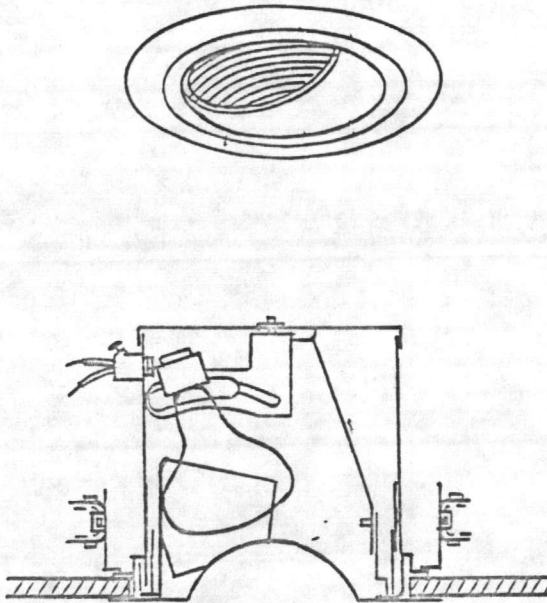
STEP LIGHT

SKETCH No. 16510-40

NL-40







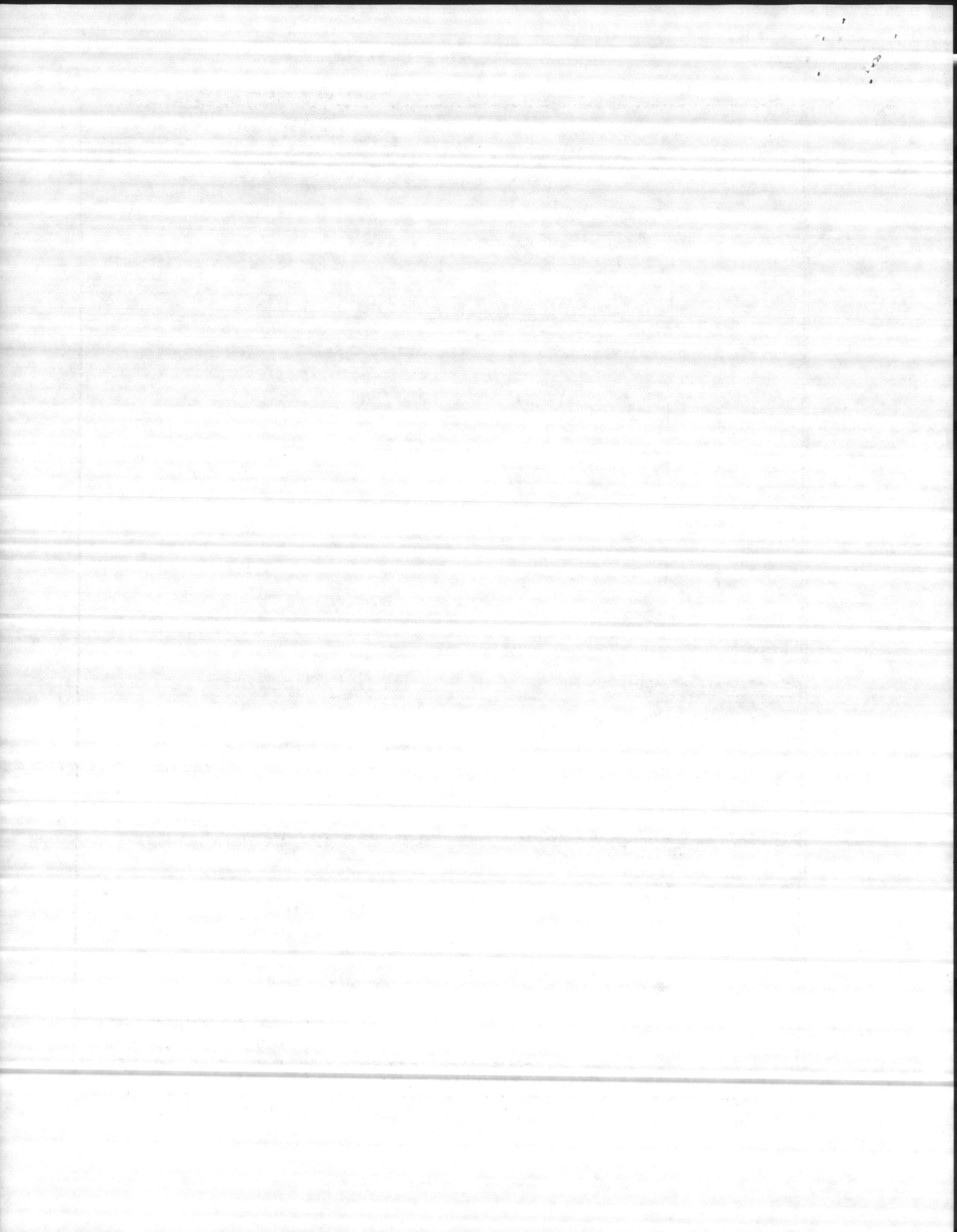
LUMINAIRE REQUIREMENTS

1. 0.032" MINIMUM THICKNESS STEEL HOUSING WITH MATTE BLACK FINISH.
2. PROVIDE LOW-GLOSS WHITE ENAMEL TRIM RING WITH 12" MAXIMUM DIAMETER.
3. SPECULAR ALUMINUM REFLECTOR.
4. 0" - 30" ADJUSTABLE SOCKET ASSEMBLY WITH 358° ROTATION.
5. PROVIDE TRIM SUITABLE FOR RECESS MOUNTING OF LUMINAIRE IN CEILING MATERIAL SPECIFIED.
6. PROVIDE PORCELAIN SOCKET WITH FULL METAL SCREW SHELL SUITABLE FOR 150W PAR OR R LAMP.
7. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

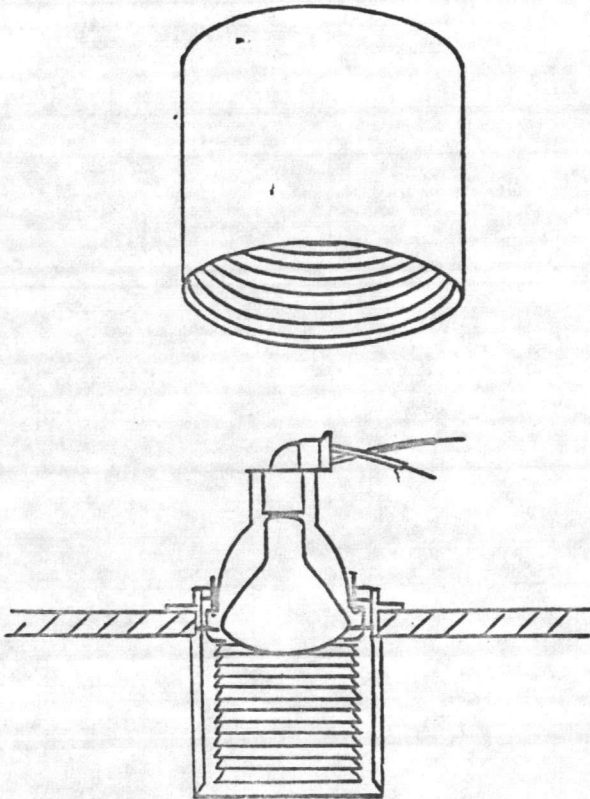
ADJUSTABLE INCANDESCENT  
INTERIOR SPOT LIGHT

SKETCH No. 16510-41

NL-41



SKETCH DATE: MARCH 1983

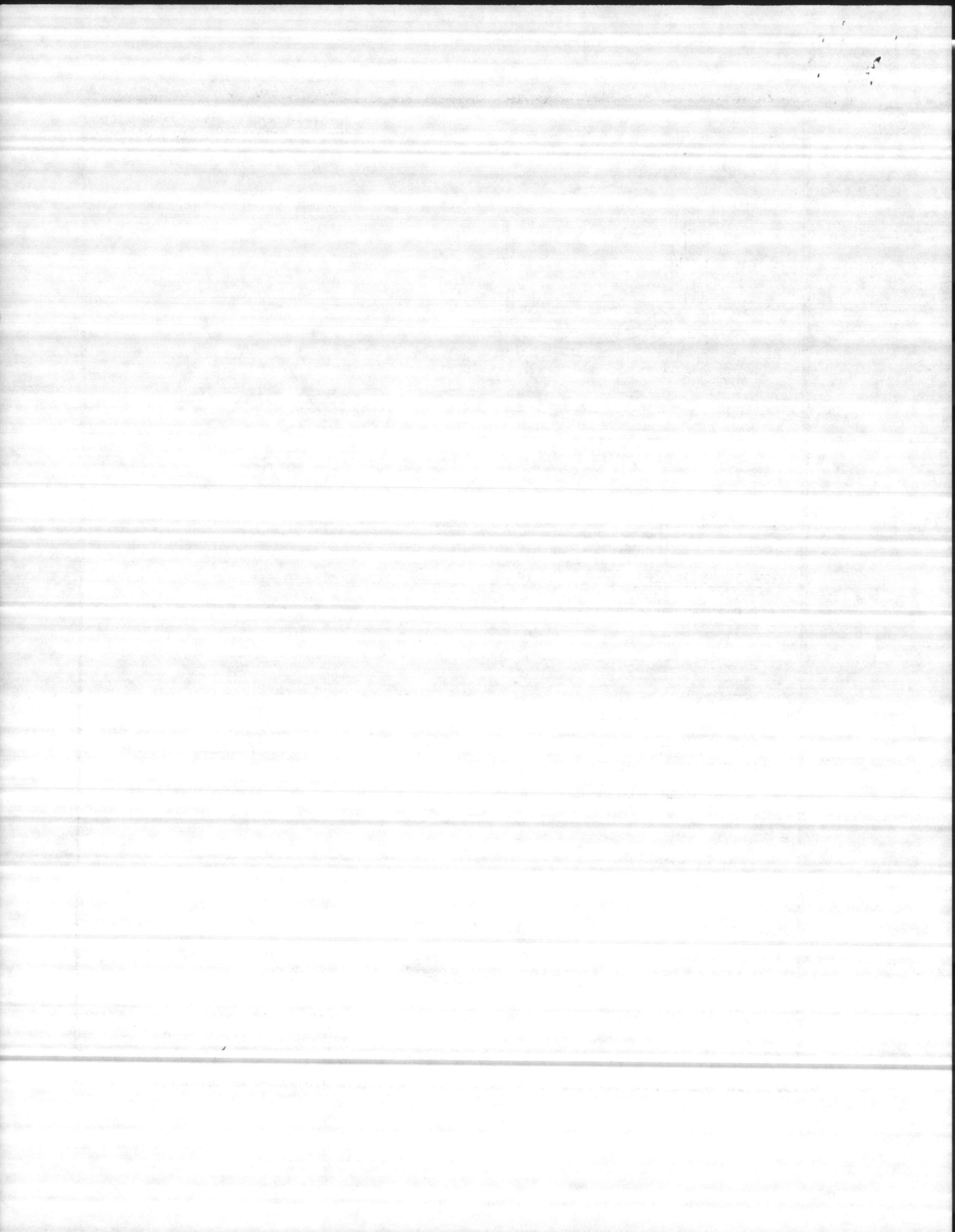
LUMINAIRE REQUIREMENTS

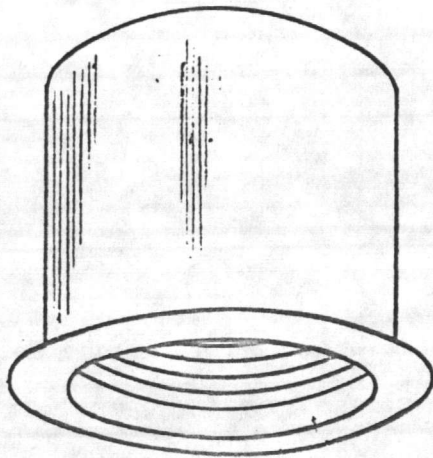
1. 0.032" MINIMUM THICKNESS STEEL OR ALUMINUM HOUSING WITH DIE CAST ALUMINUM PLASTER RING.
2. PROVIDE A 5- TO 7-INCH APERTURE BLACK GROOVED BAFFLE WITH BRUSHED OR SATIN ALUMINUM EXTERIOR FINISH. THE EXPOSED LENGTH OF THE LUMINAIRE SHALL BE 5 TO 7 INCHES.
3. PORCELAIN LAMP SOCKET WITH FULL METAL SCREW SHELL SUITABLE FOR A 150-WATT PAR, OR 75-WATT ER-30 LAMP.
4. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

SEMI - RECESSED BAFFLE DOWNLIGHT  
(INCANDESCENT)

SKETCH No. 16510-42

NL-42





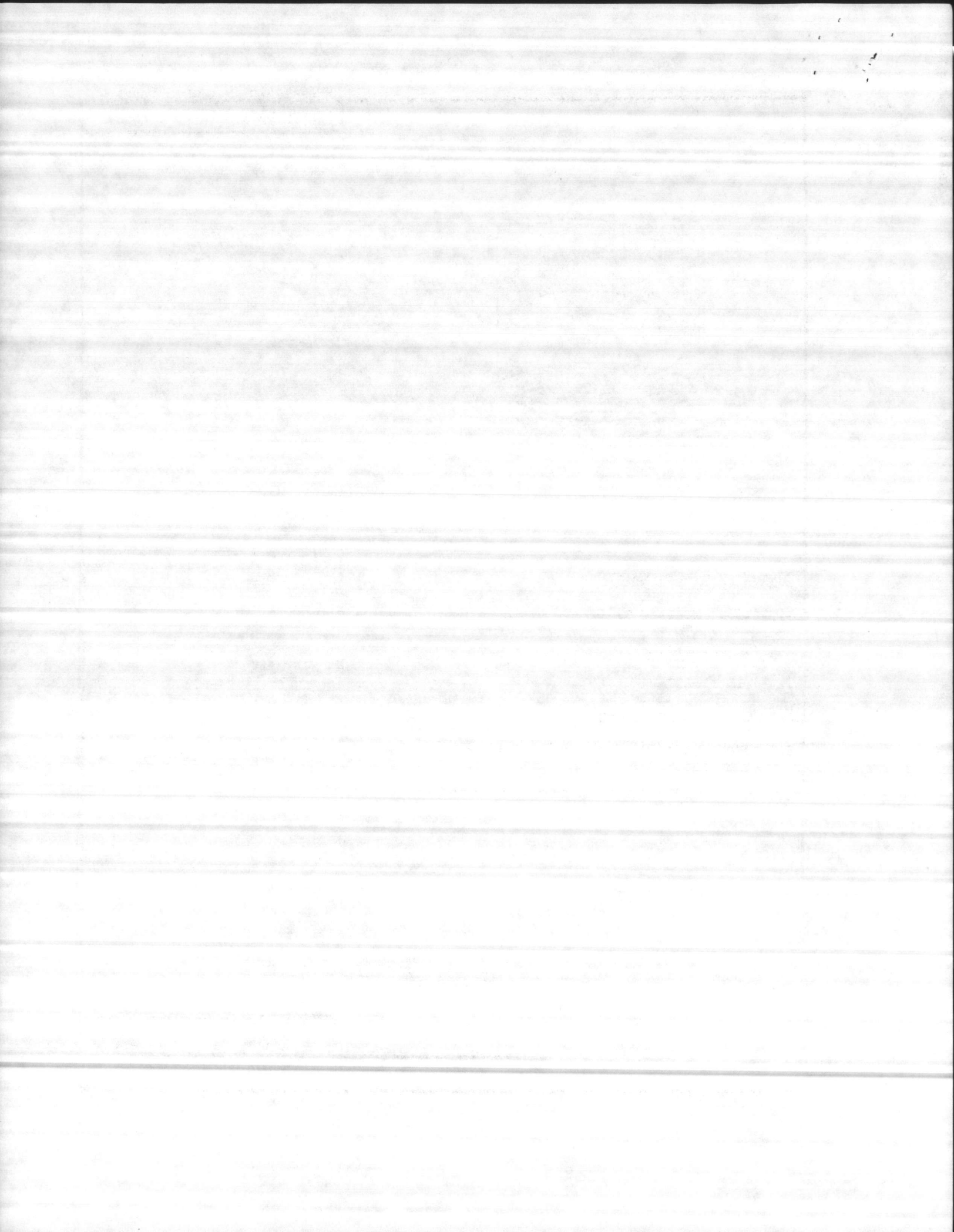
LUMINAIRE REQUIREMENTS

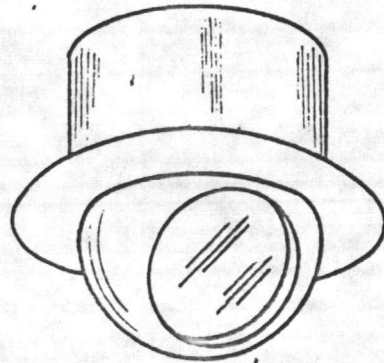
1. 0.032" MINIMUM THICKNESS GALVANIZED STEEL OR ALUMINUM HOUSING WITH ALUMINUM REFLECTOR.
2. PROVIDE MATTE WHITE PAINTED TRIM RING.
3. REGRESSED LENS SHALL BE HEAT-RESISTANT GLASS HELD IN PLACE WITH A CONCEALED TORSION TYPE HINGE.
4. PROVIDE PORCELAIN LAMP SOCKET WITH FULL METAL SCREW SHELL SUITABLE FOR A 150-WATT LAMP.
5. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

RECESSED BAFFLE DOWNLIGHT (INCANDESCENT)

SKETCH No. 16510-43

NL-43





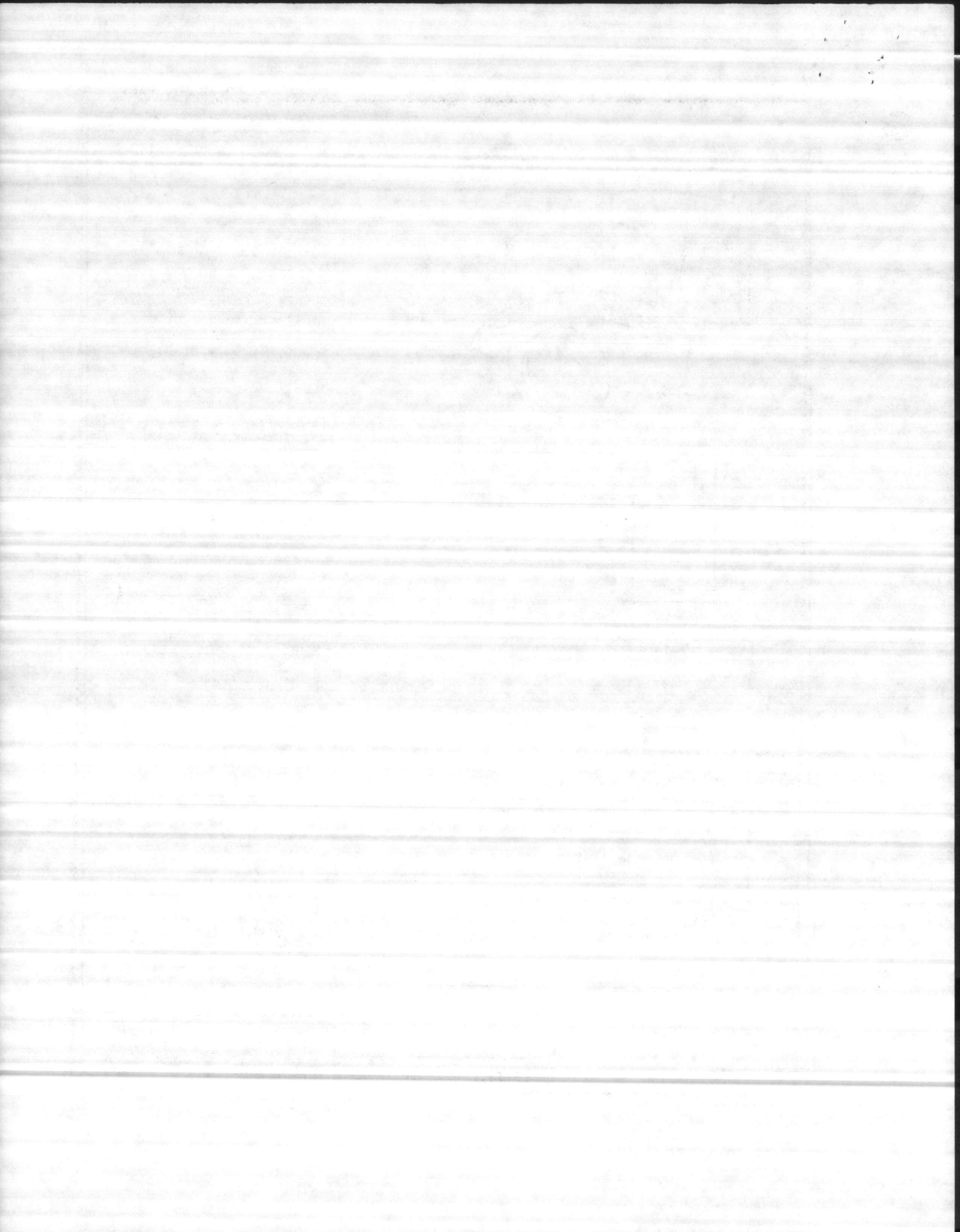
LUMINAIRE REQUIREMENTS

1. 0.032" MINIMUM THICKNESS STEEL HOUSING.
2. ALUMINUM BALL WITH DIE CAST ALUMINUM TRIM RING. PROVIDE MATTE WHITE FINISH.
3. BALL ADJUSTABLE FROM 0" - 45" FROM VERTICAL AND ROTATABLE FOR 359°.
4. PROVIDE MATTE BLACK LOUVER WHEN INDICATED.
5. PORCELAIN SOCKET SUITABLE FOR USE WITH UP TO 75-WATT ER-30 LAMP.
6. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

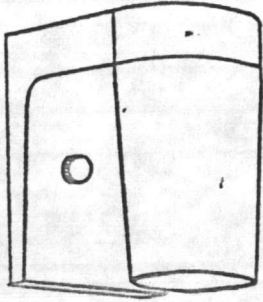
ADJUSTABLE SEMI-RECESSED  
SPOT LIGHT

SKETCH No. 16510-44

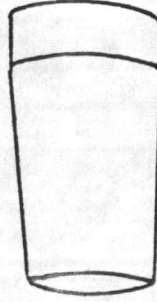
NL-44



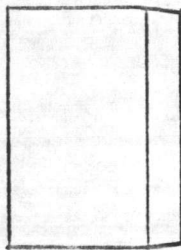




TYPE A



TYPE A1

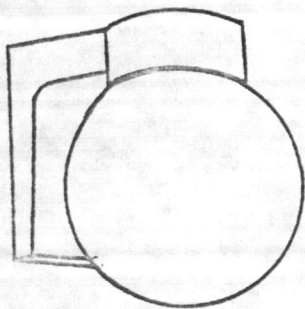


TYPE B

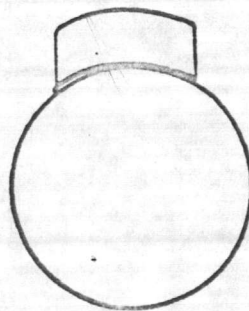
NO EXPOSED METAL

LUMINAIRE REQUIREMENTS

1. CAST ALUMINUM HOUSING SATIN FINISH AND A CLEAR LACQUER COATING. TYPE B MAY HAVE A POLYCARBONATE OR 0.055-INCH MINIMUM THICK STEEL BACKPLATE. PROVIDE PORCELAIN SOCKET WITH FULL METAL SCREW SHELL SUITABLE FOR A 100-WATT INCANDESCENT LAMP.
2. GLOBE SHALL BE WHITE POLYCARBONATE.
3. PROVIDE HEAT-RESISTANT VAPORTIGHT GASKET BETWEEN GLOBE AND HOUSING. PROVIDE NEOPRENE GASKET BETWEEN LUMINAIRE AND WALL OR CEILING.
4. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.



TYPE C

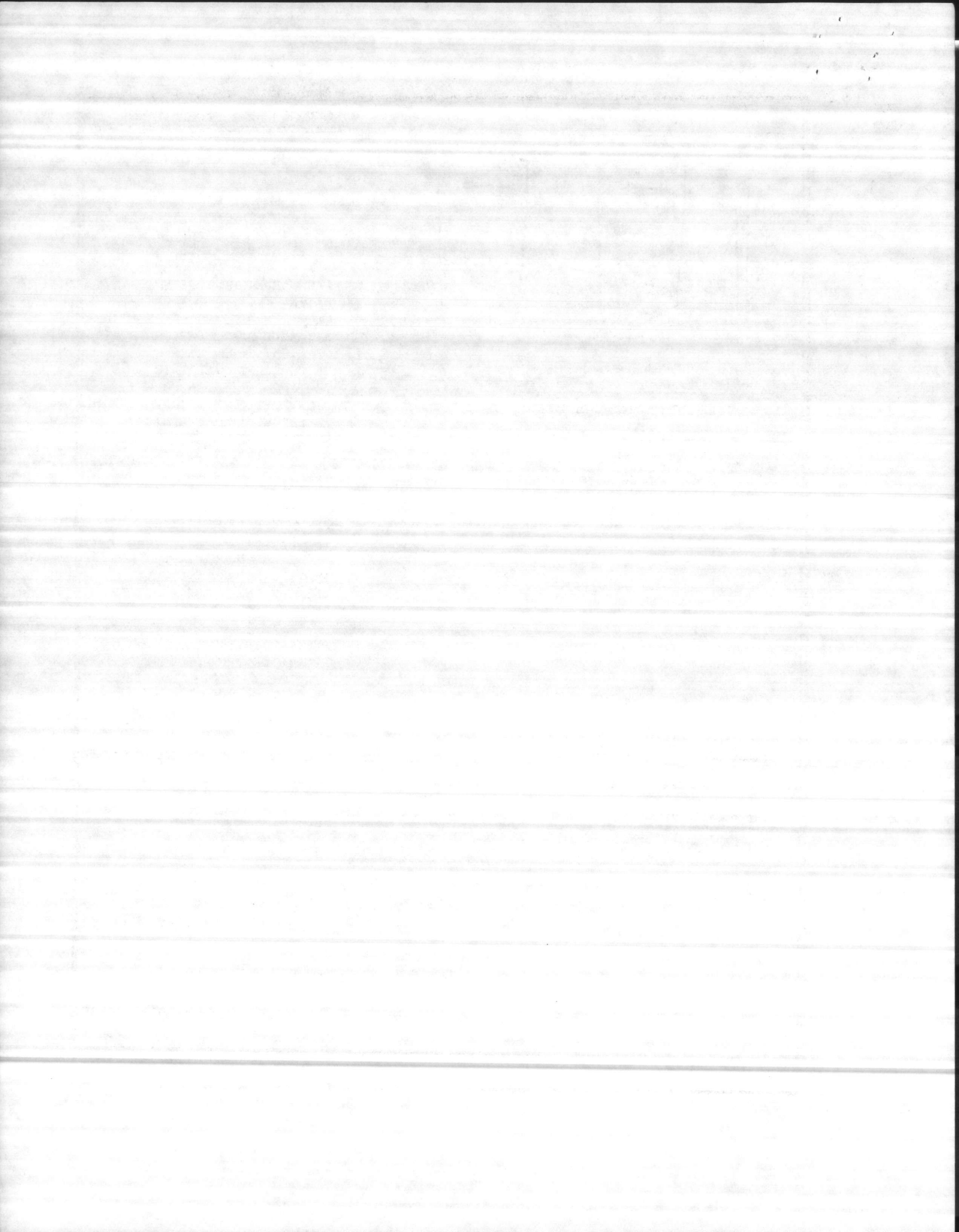


TYPE C1

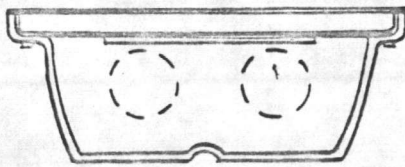
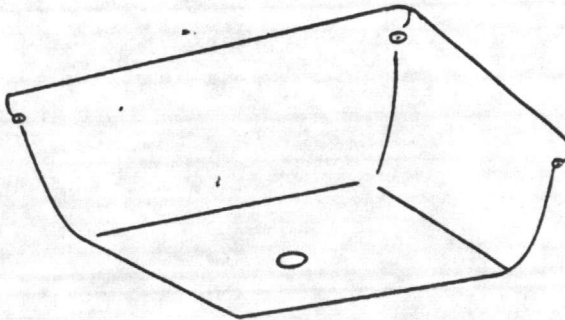
EXTERIOR INCANDESCENT LUMINAIRE

SKETCH No. 16510-45

NL-45



SKETCH DATE: MARCH 1983

LUMINAIRE REQUIREMENTS

1. 0.054-INCH MINIMUM THICK STEEL OR ALUMINUM BACK PLATE.
2. POLYCARBONATE PRISMATIC OR OPAL LENS HELD IN PLACE WITH 4 STAINLESS STEEL SCREWS.
3. FULLY GASKETED AROUND LENS AND BETWEEN LUMINAIRE AND CEILING WITH DOUBLE BAKED NEOPRENE GASKETS.
4. U.L. LISTED FOR DAMP LOCATIONS.
5. MOUNT BACKPLATE TO CEILING WITH 4-1/4"  $\emptyset$  SCREWS OR ANCHORS.
6. PROVIDE WIRING COMPARTMENT SUITABLE FOR USE WITH 60°C WIRE INSULATION.
7. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

TYPE A - UP TO 2-100W A-19 INCANDESCENT LAMPS  
MAX. DIMENSIONS 12"X12"X6" D

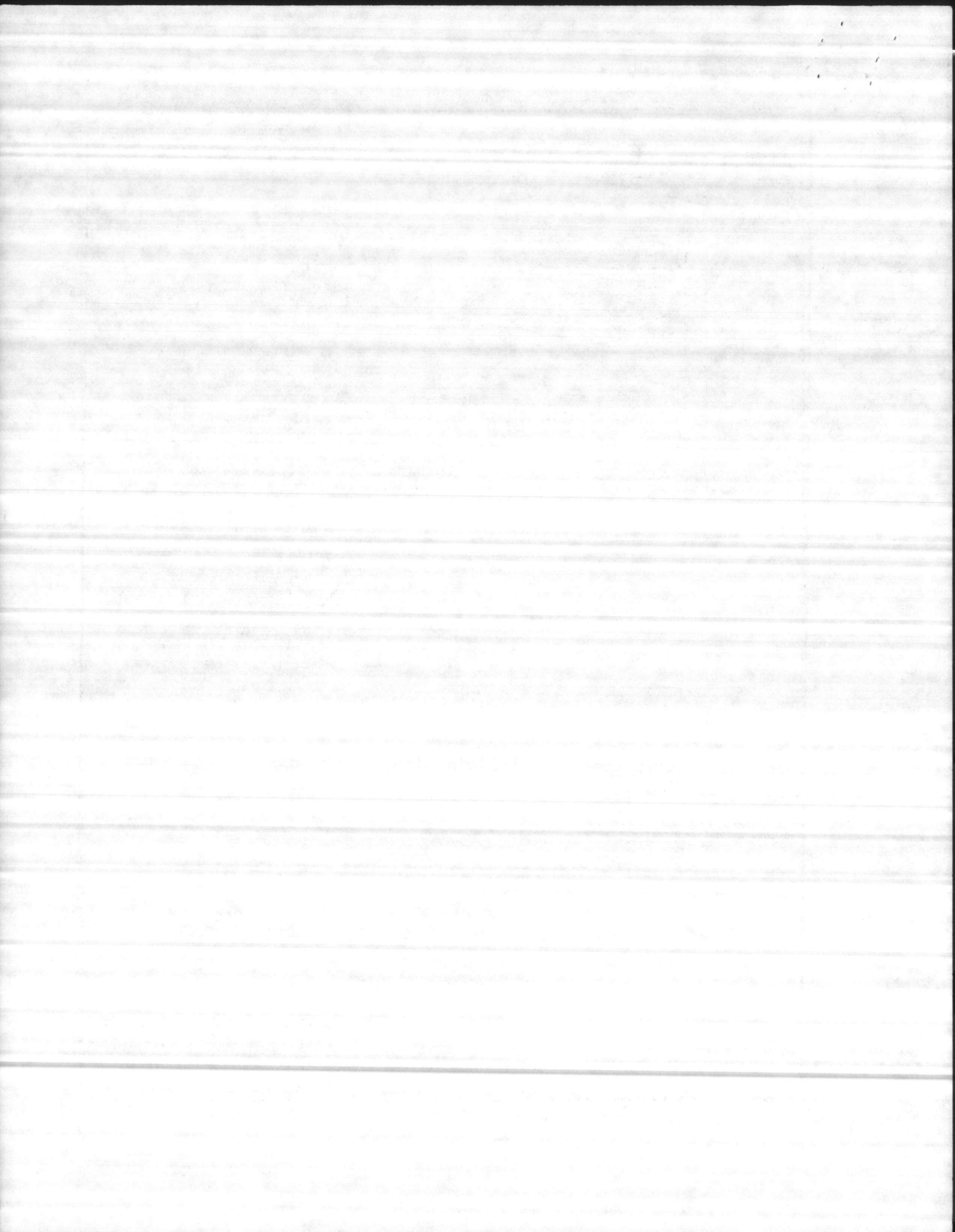
TYPE B - 35W, 50W OR 70W HIGH PRESSURE SODIUM LAMP AS INDICATED  
MAX. DIMENSIONS 12-1/2"X12-1/2"X8-1/2" D

TYPE C - 20 OR 22W FLUORESCENT CIRCLINE  
MAX. DIMENSIONS = 12"X12"X6" D

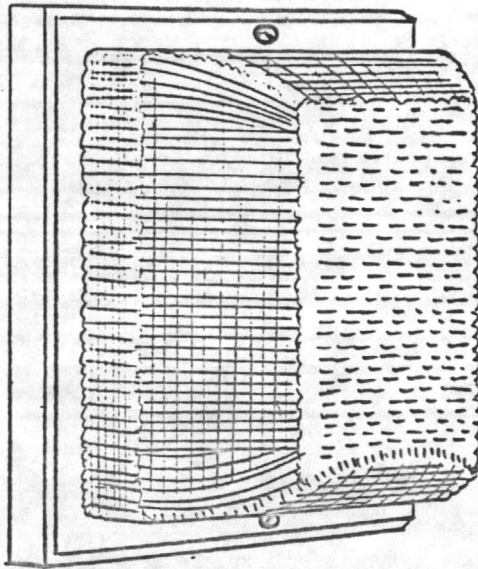
CEILING-MOUNTED  
VANDAL-RESISTANT LUMINAIRE

SKETCH No. 16510-46

NL-46



SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. 0.054-INCH MINIMUM THICK STEEL TEMPERED ALUMINUM OR POLYCARBONATE BACK PLATE.
2. POLYCARBONATE PRISMATIC DIFFUSER HELD IN PLACE WITH STAINLESS STEEL SCREWS.
3. FULLY GASKETED AROUND LENS AND BETWEEN WALL AND LUMINAIRE WITH DOUBLE BAKED NEOPRENE GASKETS.
4. U.L. LISTED FOR WET LOCATIONS.
5. MOUNT BACKPLATE TO WALL WITH 4-1/4" Ø SCREWS OR ANCHORS.
6. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

TYPE A - UP TO 100W INCANDESCENT  
MAXIMUM DIMENSIONS 6"WX9"HX5"D

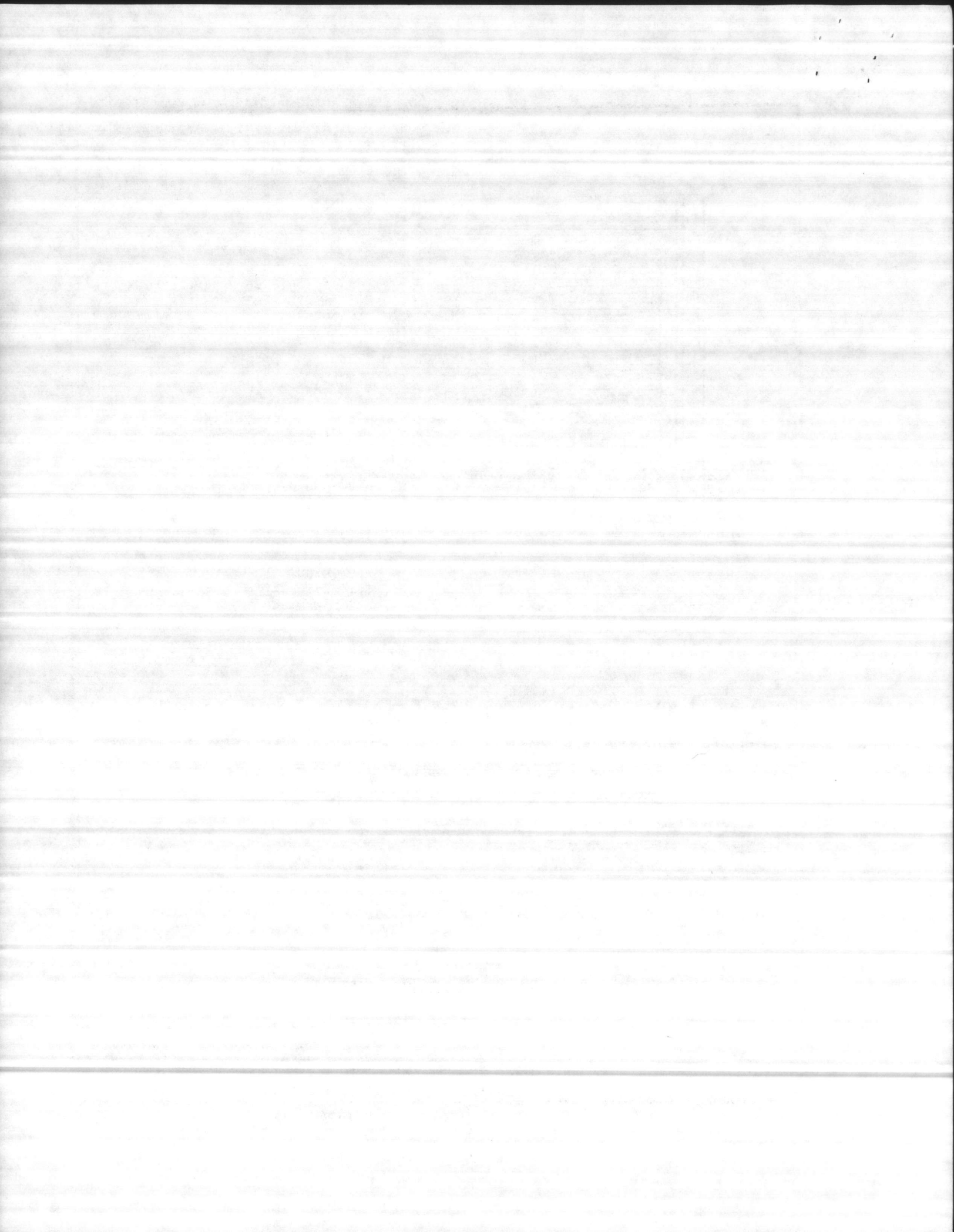
TYPE B - 7, 8, 9, 12, 13W FLUORESCENT LAMP  
(MFG. STD. FLUOR. LAMP FOR FIXTURE)  
MAXIMUM DIMENSIONS 6"WX9"HX5"D  
WITHOUT BALLAST

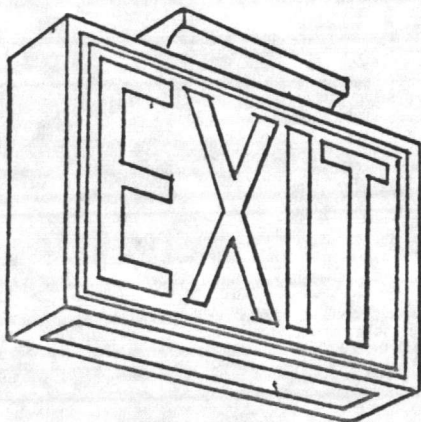
TYPE C - 35W, 50W OR 70W HIGH PRESSURE  
SODIUM LAMP AS INDICATED  
MAXIMUM DIMENSIONS 6-1/2"WX9-1/2"HX7-1/2"D

WALL-MOUNTED  
VANDAL-RESISTANT LUMINAIRE

SKETCH No. 16510-47

NL-47





LUMINAIRE REQUIREMENTS

1. LETTERS SHALL BE 6" TALL WITH 3/4" STROKES FORMED BY A STENCIL FACE.
2. PROVIDE RED FIBERGLASS PANEL BEHIND STENCIL FACE.
3. PROVIDE 2 LONG LIFE INCANDESCENT LAMPS.
4. PROVIDE DOWN LIGHT PANEL IN FIXTURE.
5. PROVIDE ILLUMINATED ARROWS AS INDICATED.
6. PROVIDE SINGLE OR DOUBLE FACE AS INDICATED.
7. PROVIDE CEILING, END WALL, BACK WALL OR PENDANT MOUNTING AS INDICATED.
8. UNITS MOUNTED EXPOSED TO THE ENVIRONMENT SHALL HAVE A DAMP OR WET U.L. LABEL AS APPROPRIATE AND SHALL NOT BE CONSTRUCTED OF STEEL.
9. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.
10. PROVIDE INTERNATIONAL SYMBOL OF ACCESS ON SIGN WHEN INDICATED.

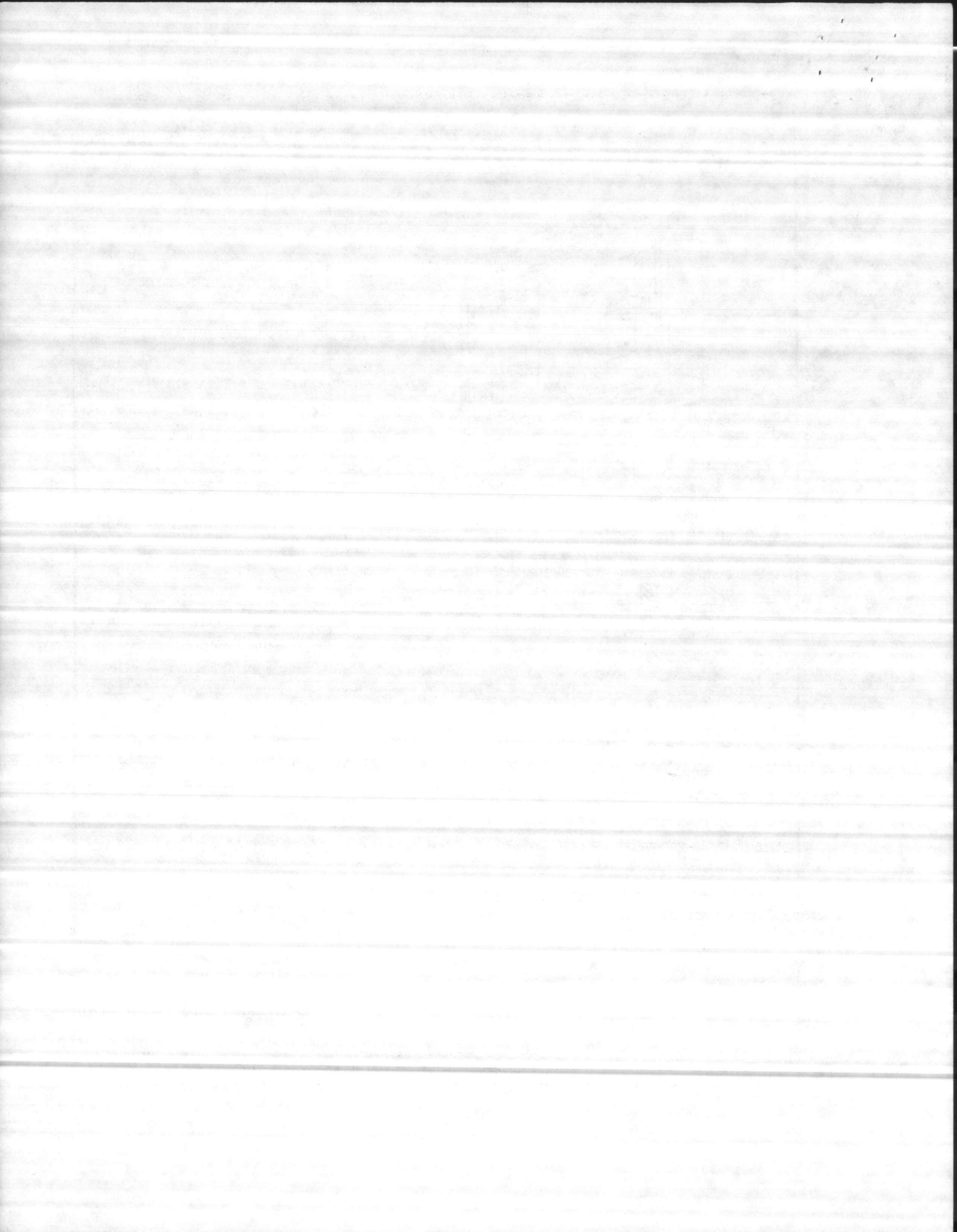
TYPE A - ALUMINUM OR PAINTED STEEL HOUSING AND STENCIL FACE. (SEE NOTE 8.)

TYPE B- PLASTIC HOUSING ENCLOSED IN POLYCARBONATE WITH STENCIL ON INSIDE OF POLYCARBONATE HOUSING. (SEE NOTE 8.)

EXIT SIGN

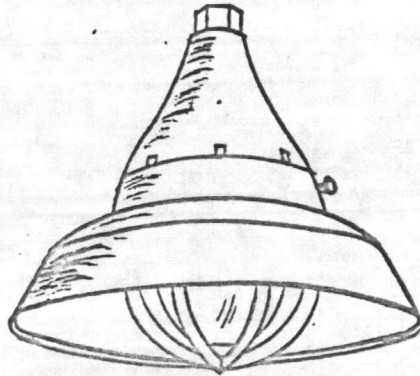
SKETCH No. 16510-48

NL-48





SKETCH DATE: MARCH 1983



LUMINAIRE REQUIREMENTS

1. LUMINAIRE SHALL MEET U.L. 844 OR FACTORY MUTUAL (FM) STANDARD FOR HAZARDOUS LOCATIONS.
2. HOUSING SHALL BE COPPER FREE CAST ALUMINUM WITH LAQUER OR EPOXY FINISH.
3. ALL JOINTS SHALL BE OF THE THREADED TYPE.
4. HEAT AND IMPACT RESISTANT PRESTRESSED GLASS GLOBE.
5. PROVIDE WHITE PORCELAIN ENAMEL STEEL, FIBERGLASS REINFORCED POLYESTER OR GLASS COATED DOME REFLECTOR.
6. PROVIDE GLOBE GUARD WHEN INDICATED.
7. PROVIDE LAMPS AS INDICATED.
8. MOUNTING AS INDICATED.
9. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

TYPE A 60-200 WATT INCANDESCENT LUMINAIRE RATED FOR CLASS 1 DIVISION 1 GROUP D ATMOSPHERE.

TYPE B 60-200 WATT INCANDESCENT LUMINAIRE RATED FOR CLASS 1 DIVISION 1 GROUP D ATMOSPHERE.

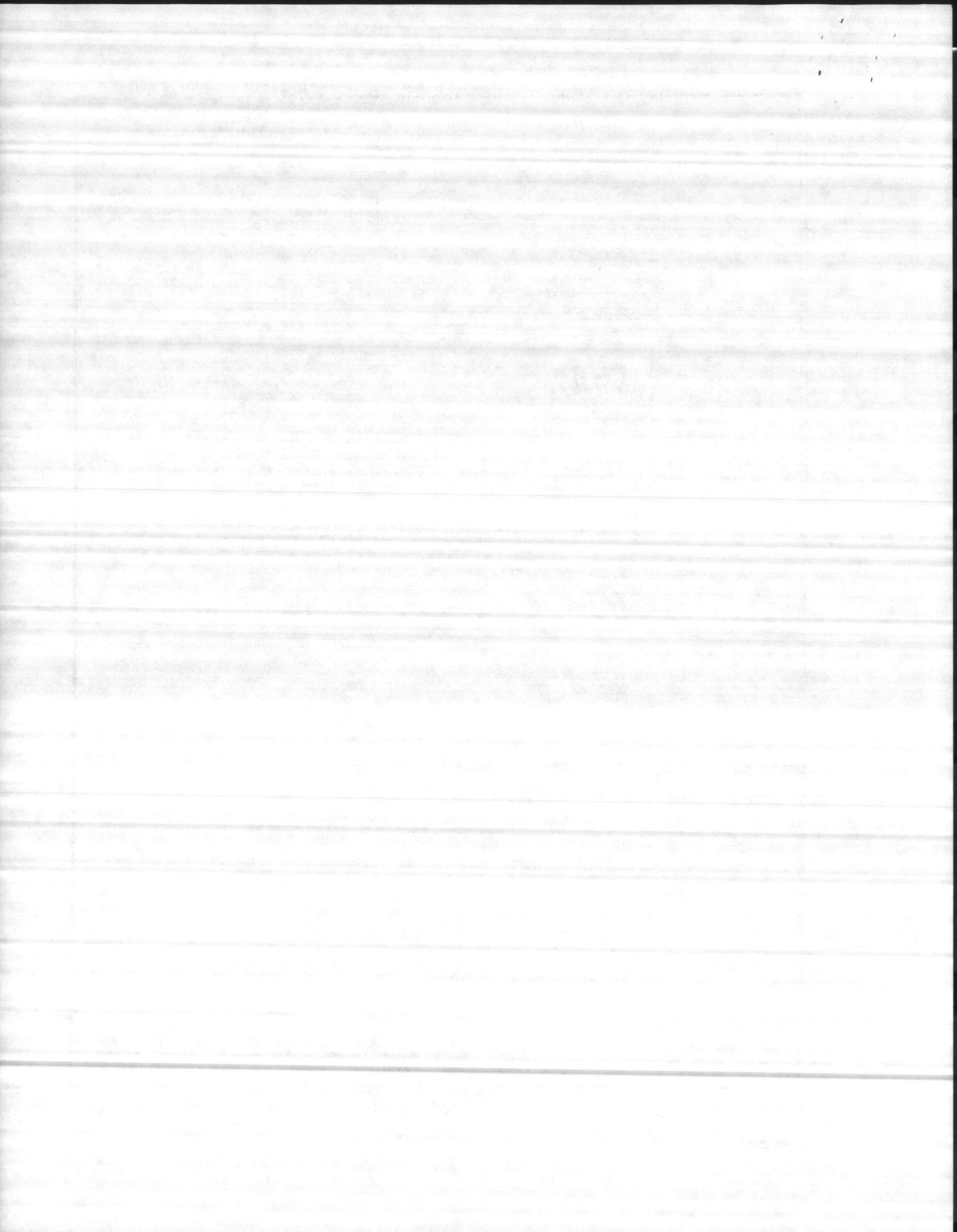
TYPE C 70-250 WATT HPS OR 175-400 WATT MET. HALIDE LUMINAIRE RATED FOR CLASS 1 DIVISION 1 GROUP D ATMOSPHERE.

TYPE D 70-250 WATT HPS OR 175-400 WATT MET. HALIDE LUMINAIRE RATED FOR CLASS 1 DIVISION 2 GROUP D ATMOSPHERE.

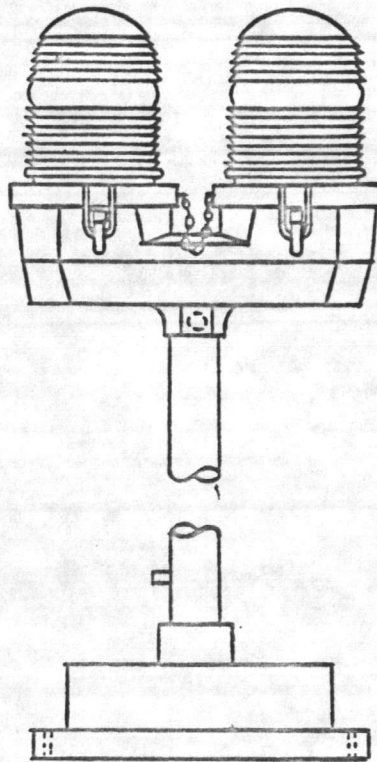
EXPLOSION-PROOF LUMINAIRE

SKETCH No. 16510-49

NL-49



SKETCH DATE: MARCH 1983



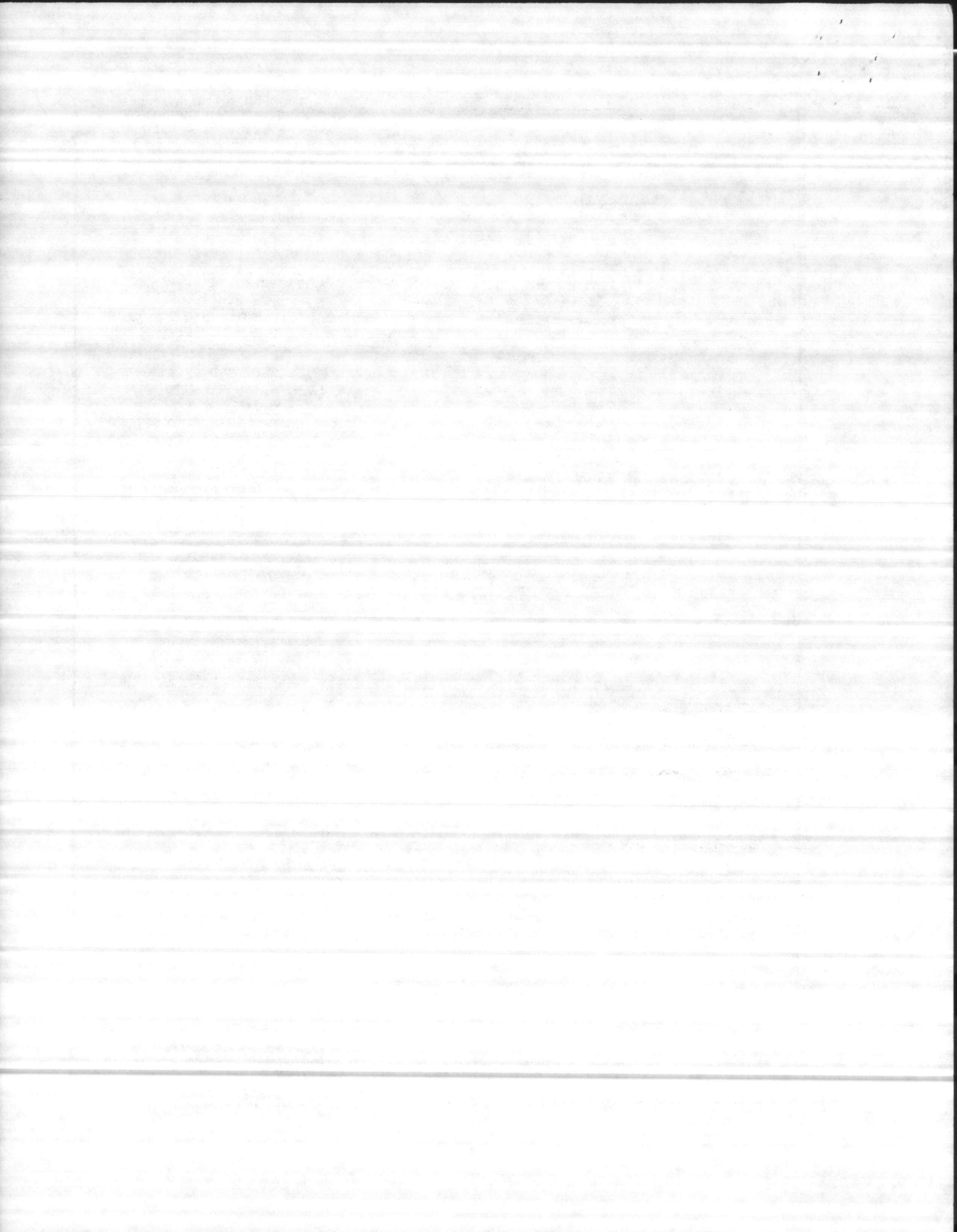
LUMINAIRE REQUIREMENTS

1. LUMINAIRE SHALL MEET FEDERAL AVIATION ADMINISTRATION SPECIFICATIONS FOR OBSTRUCTION LIGHTING (L-810).
2. CAST ALUMINUM HOUSING.
3. ONE PIECE 360° RED, HEAT RESISTANT GLASS FRESNEL GLOBE. PROVIDE TOGGLE TYPE LATCHES AND CLAMPING TO SECURE GLOBES. PROVIDE SAFETY CHAINS ON GLOBES.
4. MOUNT PHOTO ELECTRIC CONTROL TO CONTROL LAMPS.
5. MOUNT LUMINAIRE ON 1" RIGID STEEL CONDUIT. PROVIDE JUNCTION BOX AND MOUNTING PLATE AT BASE UNLESS INDICATED OTHERWISE.
6. LAMPS SHALL BE RATED 100 WATT 130 VOLT, MULTIPLE, MEDIUM BASE. TWO LAMPS ARE REQUIRED.
7. PROVIDE INTERNAL PROVISIONS FOR GROUNDING.

OBSTRUCTION LIGHT

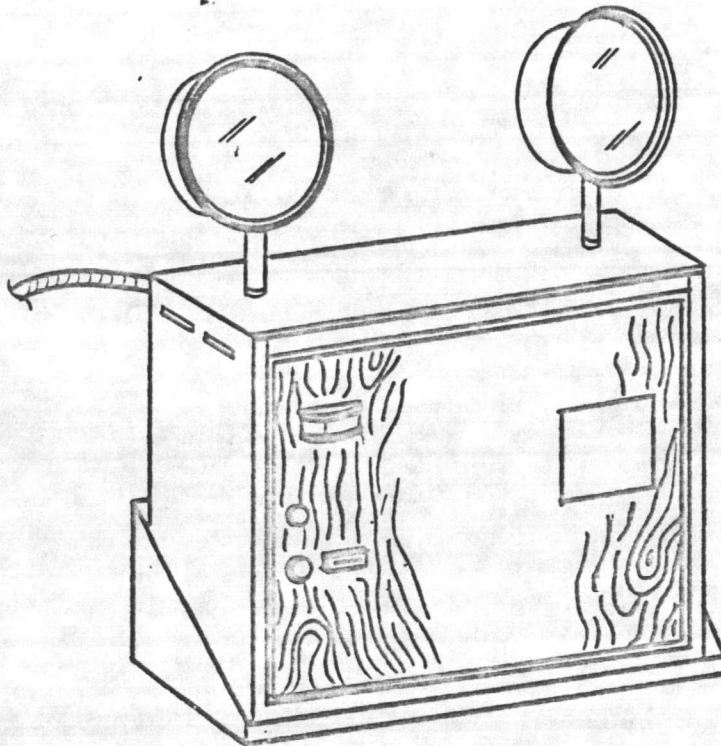
SKETCH No. 16510-50

NL-50



SKETCH DATE: MARCH 1983.

LUMINAIRE REQUIREMENTS

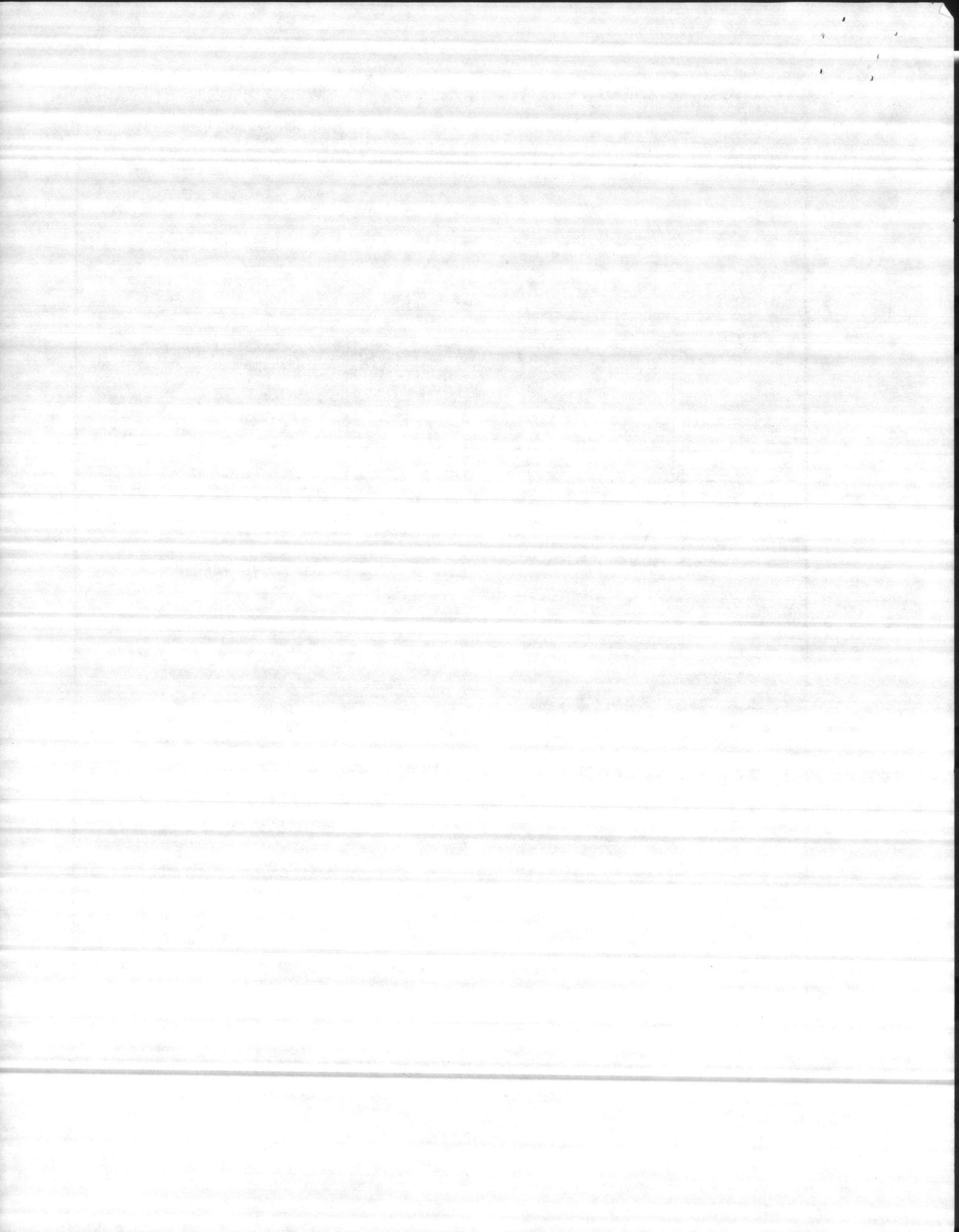


1. SEALED BATTERY, SPECIFICALLY DESIGNED FOR EMERGENCY LIGHTING, SOLID STATE FULLY AUTOMATIC - THREE RATE CHARGER FOR NICKEL CADMIUM BATTERY AND TWO RATE HIGH/LOW CHARGER FOR LEAD CALCIUM OR LEAD ACID SEALED BATTERIES.
2. MINIMUM 0.032" THICK STEEL HOUSING WITH BAKED ENAMEL PAINTED FINISH (BROWN OR BEIGE), OR NONMETALLIC PLASTIC HOUSING WITH DECORATIVE WOOD GRAIN FRONT PANEL ON EITHER HOUSING.
3. TEST SWITCH
4. "AC ON" PILOT LIGHT.
5. AUTOMATIC OVERLOAD PROTECTION - FUSE OR CIRCUIT BREAKER.
6. HEADS SHALL BE FULLY ADJUSTABLE VERTICALLY AND HORIZONTALLY.
7. SEALED BEAM HALOGEN LAMPS MINIMUM 8 WATT OR WATTAGE AS INDICATED IN SCHEDULE.
8. INPUT VOLTAGE AS INDICATED IN SCHEDULE.
9. VOLTMETER.
10. 3/C #16, SO CORD SET - (HARD WIRE TO CIRCUIT)
11. PROVIDE MINIMUM 0/032"-THICK STEEL WALL MOUNTING SHELF, OR MOUNTING BRACKETS OR HOLES IN HOUSING FOR MOUNTING UNIT ON WALL.
12. LOW VOLTAGE, DEEP DISCHARGE DISCONNECT.

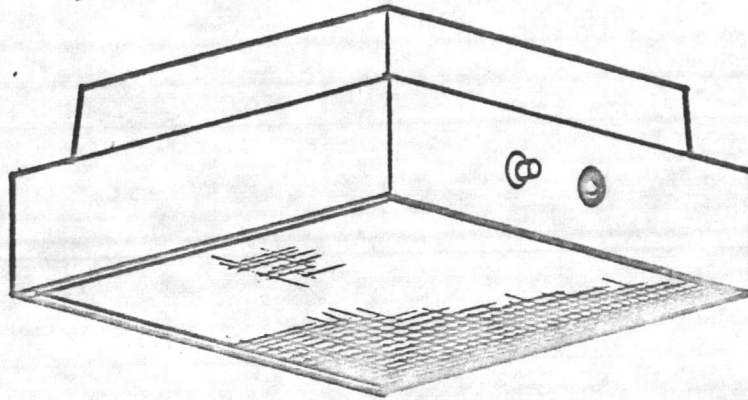
EMERGENCY LIGHTING UNIT

SKETCH No. 16510-51

NL-51



SKETCH DATE: MARCH 1983

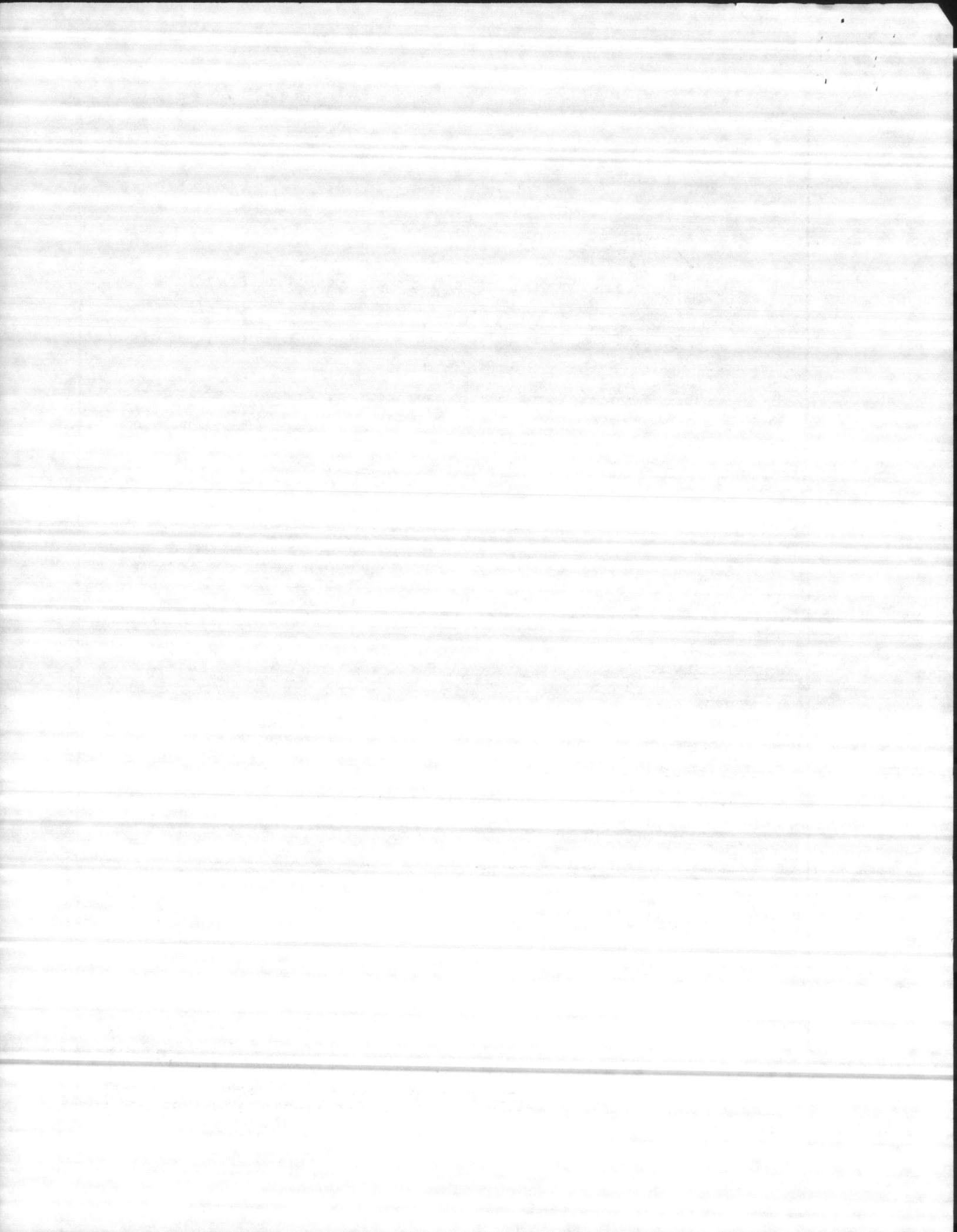
LUMINAIRE REQUIREMENTS.

1. HOUSING - STEEL PAINTED SATIN BLACK HOUSING AND MATTE WHITE FRAME OR IMPACT AND FIRE RESISTANT POLYCARBONATE OR THERMOPLASTIC.
2. LENS SHALL BE PRISMATIC ACRYLIC APPROXIMATELY 9" X 9". REFLECTOR SHALL BE SPECULAR ALZAK.
3. BATTERY SHALL BE MAINTENANCE FREE, 6 VOLT NICKEL CADMIUM WITH FULL 5-YEAR WARRANTY.
4. UNIT SHALL HAVE SOLID STATE AUTOMATIC TWO RATE CHARGER, CAPABLE OF FULLY RECHARGING IN 12 HOURS.
5. SWITCHING AND CONTROLS - AUTO TRANSFER SWITCH, TEST SWITCH, SHORT CIRCUIT PROTECTION AND LOW VOLTAGE, DEEP DISCHARGE DISCONNECT, HIGH CHARGE INDICATING LIGHT.
6. LAMPS - MINIMUM - TWO 8-WATT TUNGSTEN HALOGEN LAMPS.
7. SUITABLE FOR WALL OR CEILING MOUNTING.

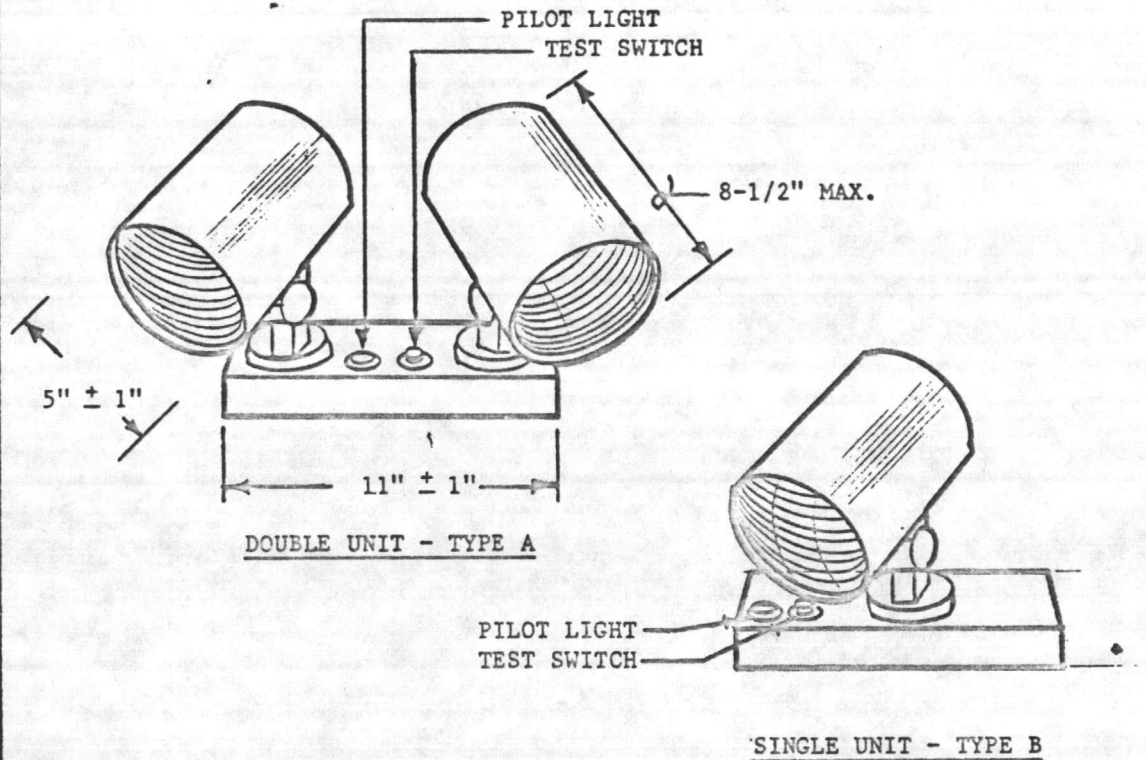
LENS TYPE EMERGENCY LIGHTING UNIT

SKETCH No. 16510-52

NL-52







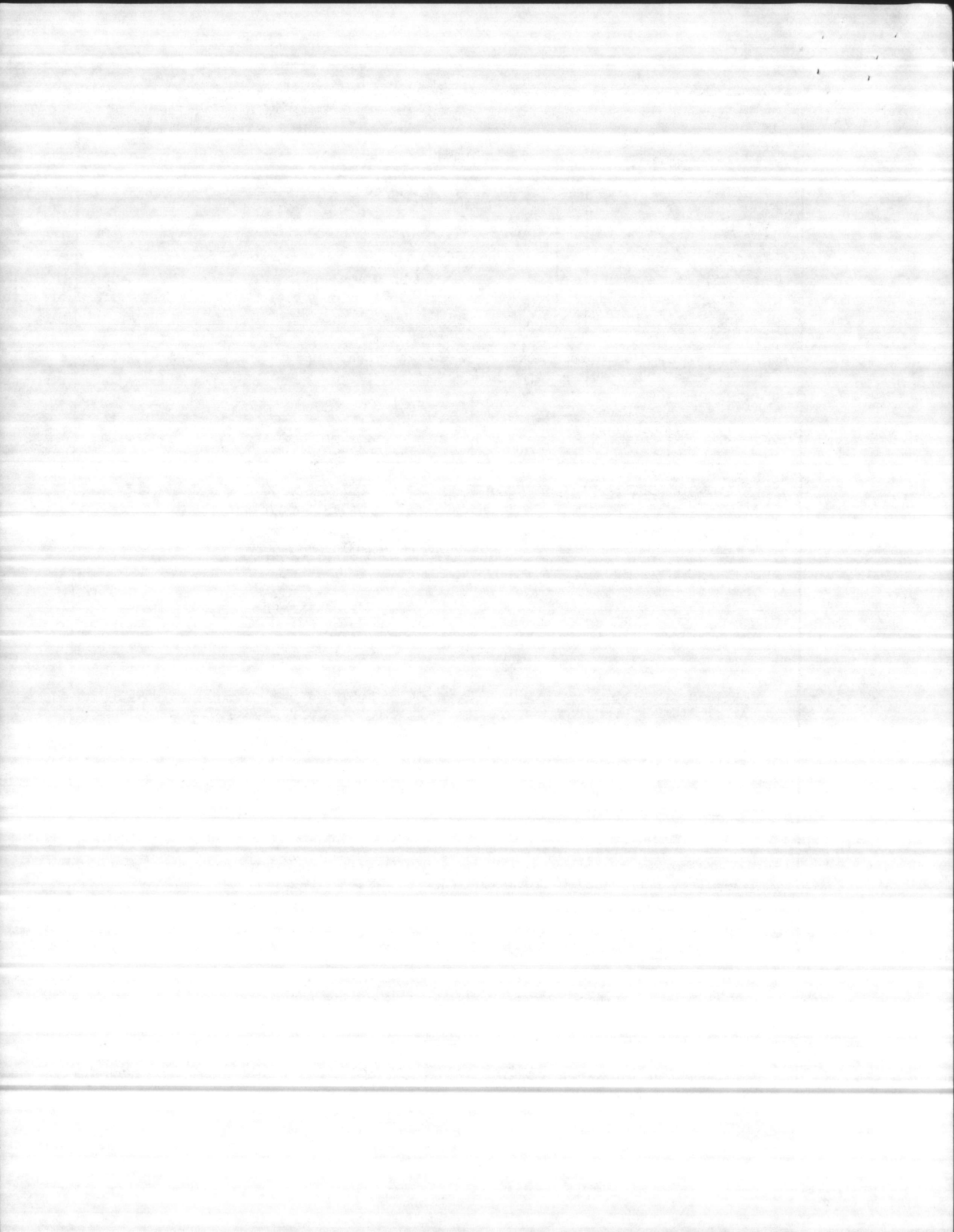
LUMINAIRE REQUIREMENTS

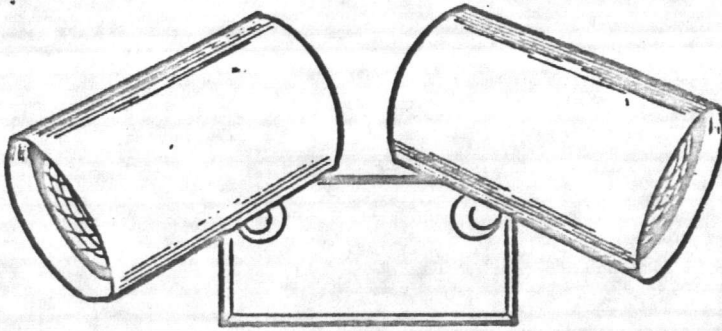
1. ALUMINUM FINISHED CHANNEL MOUNTING BASE WITH TEST SWITCH AND PILOT OR HIGH RATE INDICATING LIGHT.
2. CYLINDERS FOR LIGHTS AND BATTERY AND CHARGER SHALL BE PAINTED MATTE WHITE AND SHALL BE FULLY ADJUSTABLE.
3. BATTERY SHALL BE MAINTENANCE FREE NICKEL CADMIUM WITH FULL 5-YEAR WARRANTY.
4. UNIT SHALL HAVE AUTOMATIC TWO RATE CHARGER.
5. SWITCHING AND CONTROLS - COMPLETELY SOLID STATE WITH AUTO TRANSFER AND LOW VOLTAGE CUTOFF, TEST SWITCH AND HIGH RATE INDICATING LIGHT.
6. 9-WATT TUNGSTEN HALOGEN LAMP.

CYLINDER TYPE EMERGENCY LIGHTING UNIT

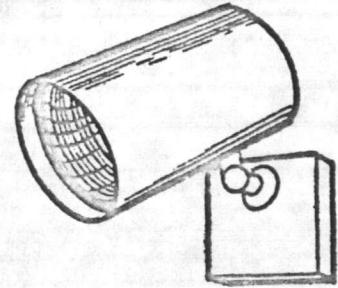
SKETCH No. 16510-53

NL-53

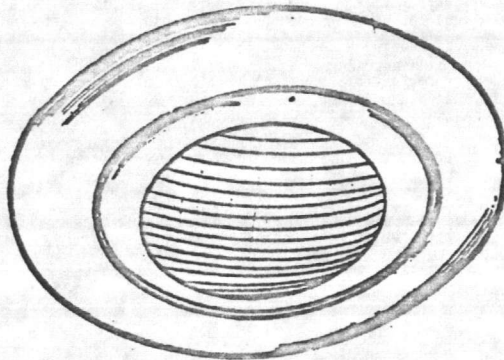




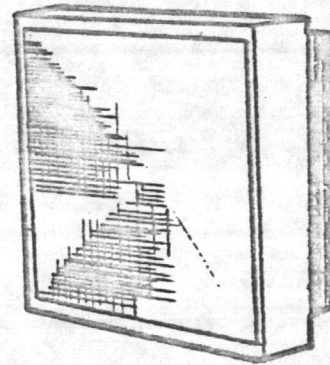
TYPE - A



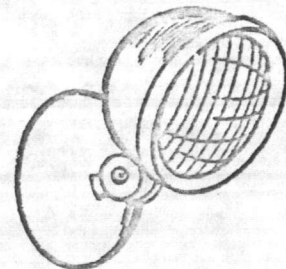
TYPE - B



TYPE - C



TYPE - D



TYPE - E

REMOTE EMERGENCY LIGHTING UNITS

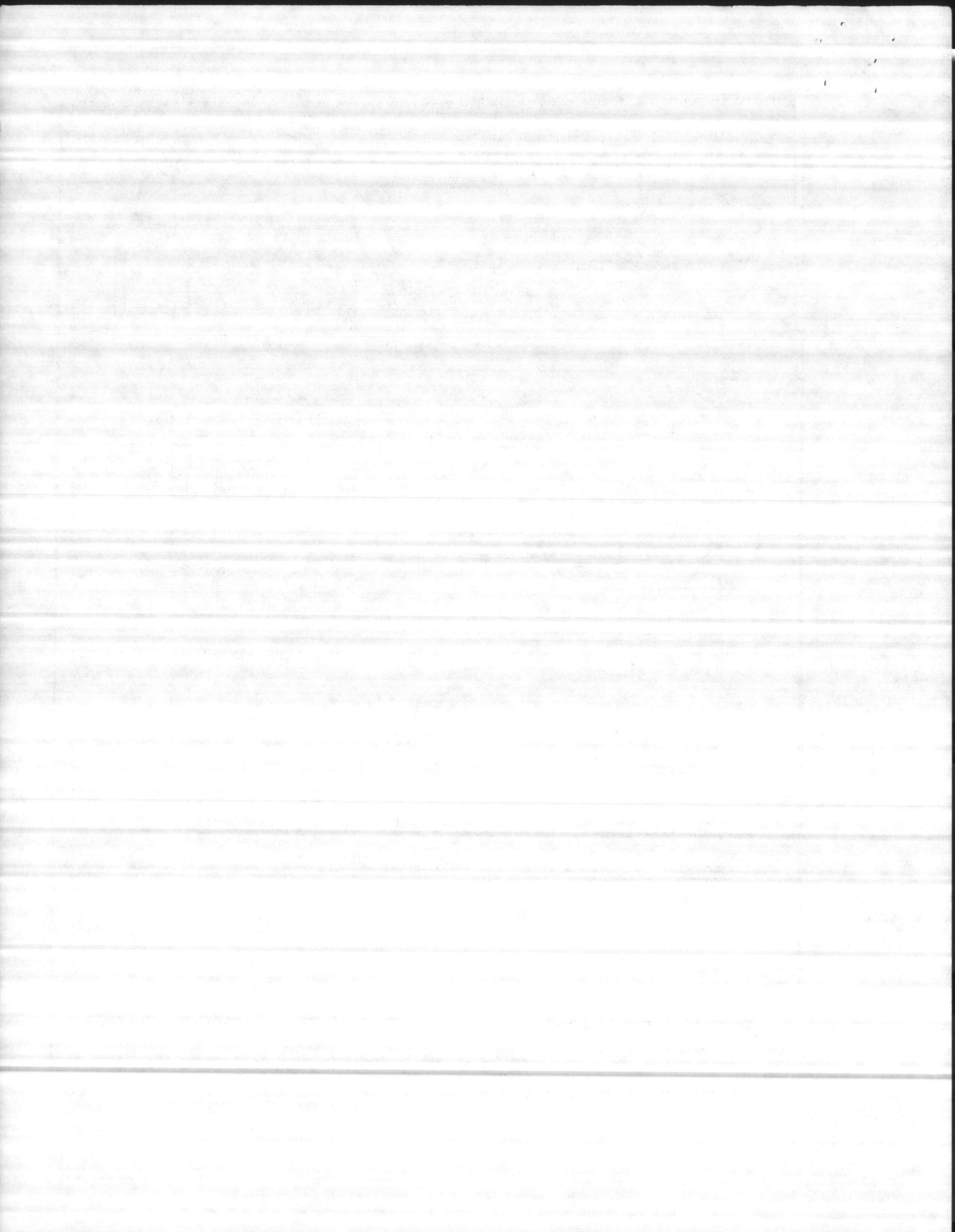
NOTES:

1. LAMPS AND FINISHES SHALL BE COMPATIBLE WITH PRIMARY UNIT WITH WHICH USED.

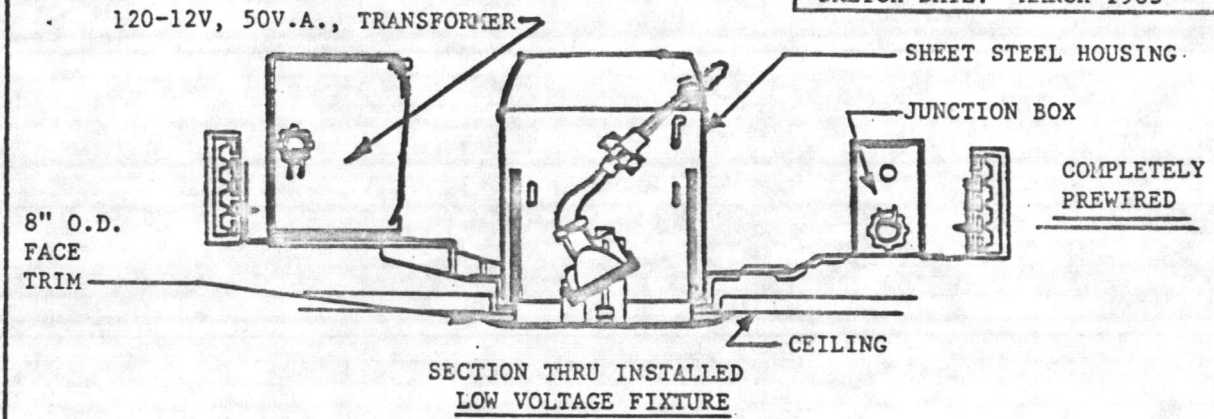
REMOTE FIXTURES FOR USE WITH BATTERY UNIT

SKETCH No. 16510-54

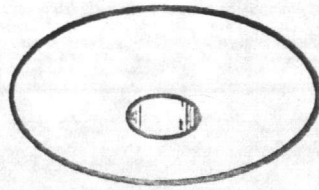
NL-54



SKETCH DATE: MARCH 1983

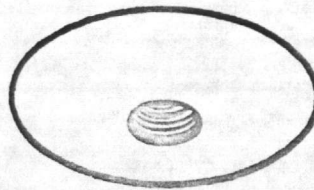


COMPLETELY  
PREWIRED



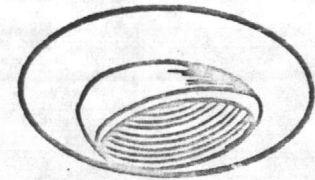
1-3/4" PINHOLE  
WITH CLEAR CONE

TYPE - A



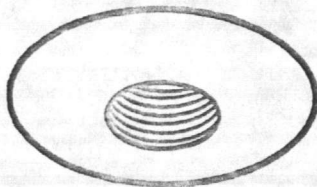
BLACK GROOVED  
BAFFLE WITH 3-1/4"  
APERTURE

TYPE - B



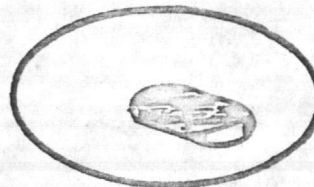
ADJUSTABLE EYEBALL  
WITH GROOVED BLACK  
BAFFLE, 25° TILT AND  
358° ROTATION

TYPE - C



1-3/4" PINHOLE  
DOWN LIGHT WITH  
GROOVED BLACK  
BAFFLE

TYPE - D



RECESSED ADJUSTABLE  
WITH 40° TILT AND 358°  
ROTATION

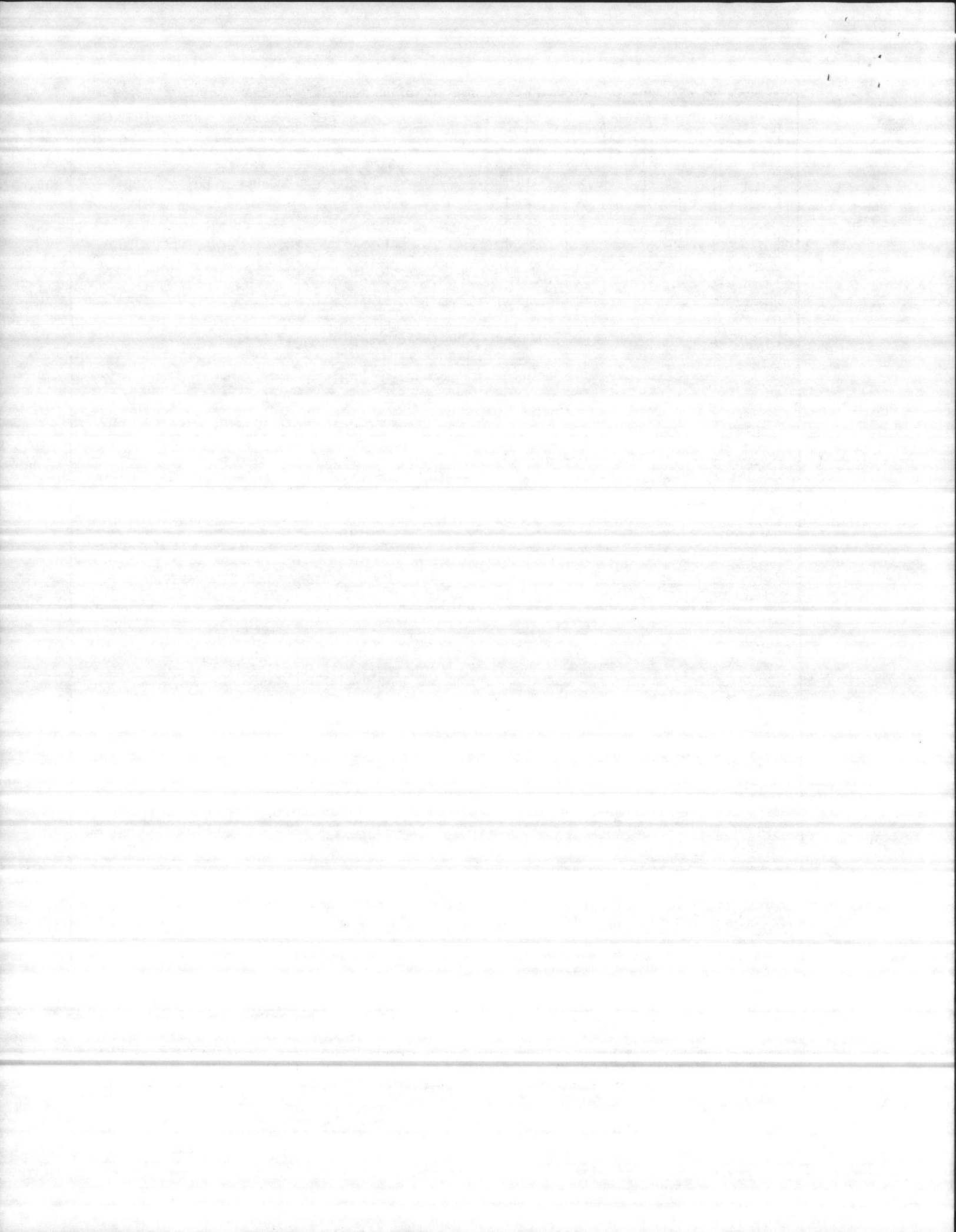
TYPE - E

NOTE: FACE TRIM; MATTE WHITE OR MATTE BLACK






LOW VOLTAGE RECESSED INCANDESCENT

SKETCH No. 16510-55

NL-55



# LIGHTING FIXTURE SCHEDULE

FIXTURE SYMBOL	STYLE & TYPE - SEE SPECS FOR NAVFAC SKETCH NO. OR SEE DETAIL ON PLANS _____	NUMBER AND TYPE OF LAMPS	VOLT	MOUNTING	REMARKS
	NL-1, TYPE A	2 - F40 T-12 LW	120	SURFACE	ENERGY SAVING LAMPS
	NL-3, TYPE C	2 - 40W T-12 R.S.	120	RECESSED	OFFICE TYPE
	NL-1, TYPE B	4 - F40 T-12 LW	120	SURFACE	ENERGY SAVING LAMPS
	NL-4, TYPE A	2 - 20W T-12 R.S.	120	WALL 6' A.F.F.	---
	SEE SHEET E-5	2 - 40W T-12 R.S.	120	SUSPENDED W/1/2"C 12' A.F.F.	LOW TEMP. BALLAST

SKETCH No. 16510-99

NL-99

SAMPLE - LIGHTING FIXTURE SCHEDULE  
SHOW ON LIGHTING PLAN

SKETCH DATE: MARCH 1983

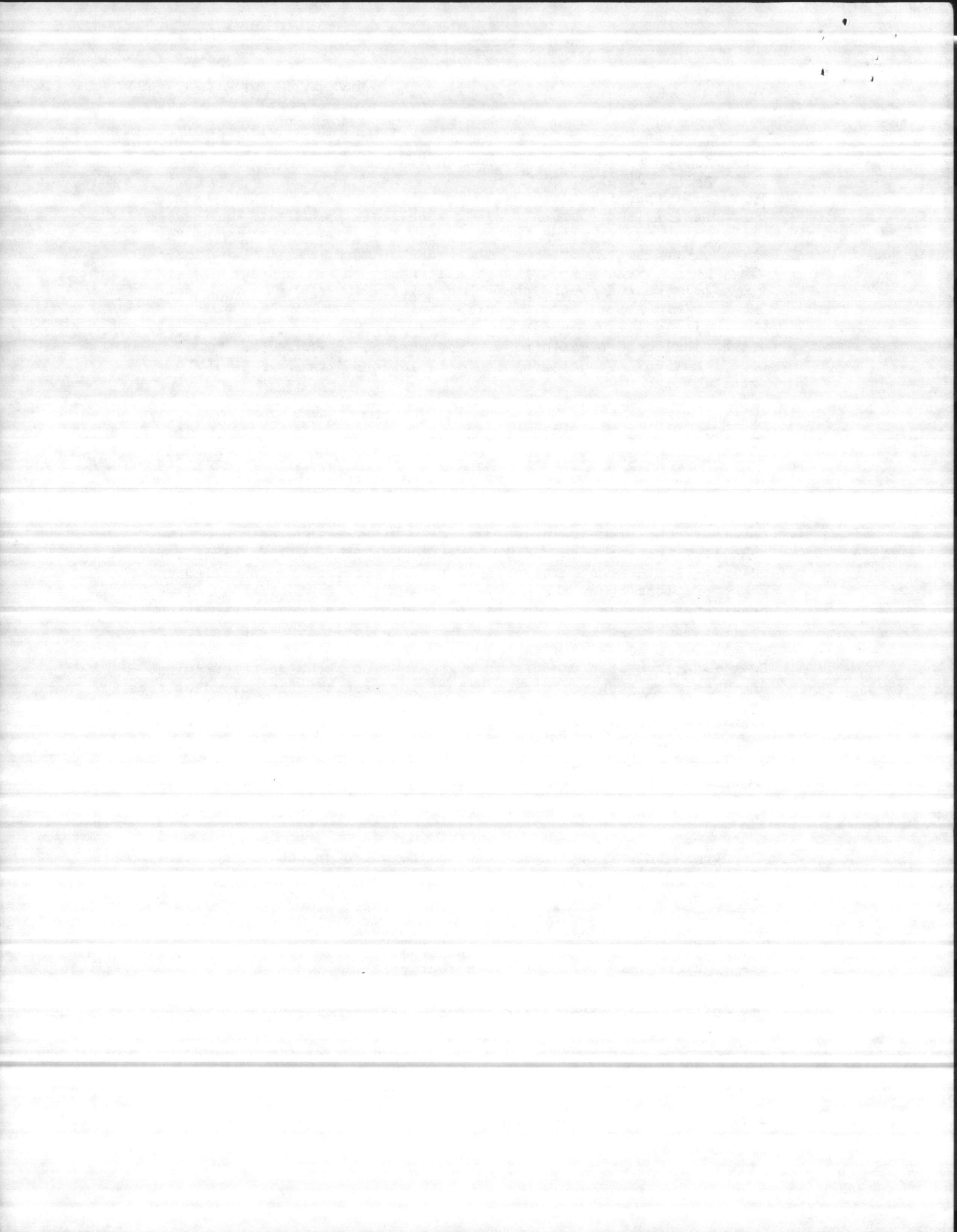
NECS-16510 (November 1983)





## GENERAL NOTES

1. This guide specification shall not be referenced but is to be used as a manuscript in preparing project specifications. Edit and modify this guide specification to meet project requirements. Where "as shown", "as indicated", "as detailed", or words of similar import are used, include all appropriate requirements in the project specification and on the project drawings.
2. The capital letters in the right hand margins indicate that there is a technical note pertaining to that portion of the guide specification. Do not include these letters in the project specification.
3. Where numbers, symbols, words, phrases, clauses, or sentences in this specification are enclosed in brackets [], a choice or modification must be made; delete inapplicable portion. Delete publications not referenced in the project specification. Where blank spaces occur, insert appropriate data. Delete inapplicable paragraphs.
4. CAUTION: Coordination of this section with other sections of the specification and with the drawings is mandatory. If materials or equipment are to be furnished under this section and installed under other sections or on the drawings, state that fact clearly for each occurrence. Review the entire specification to ensure that language is included to provide complete and operable systems and equipment.
5. Specifications should not repeat information shown on the drawings. Drawings only should indicate dimensions of construction, quantities, location, and capacity of equipment. Specifications should supplement the drawings by specifying the quality of materials and workmanship, method of installation, equipment functions, and testing required for the project.
6. Do not include Table of Contents, General Notes, and Technical Notes in this section in any submittal.
7. The following information should be indicated on the project drawings or specified in the project specifications:
  - a. Type, style, mounting, and lamp arrangement
  - b. Location of fixtures
  - c. Wattage, voltage, and frequency rating required
  - d. Type of reflector, diffuser required
  - e. Glass/plastic lens
  - f. Accessories required, such as photocell, time switches, and auxiliary lamps



- g. Mounting height above floor or grade to bottom of fixture
  - h. Reflecting or nonreflecting surface finish
  - i. Shielding required
  - j. Referenced sketch
8. Suggestions for improvement of this specification will be welcomed; fill in and mail the attached DD Form 1426. Send original of DD Form 1426 to the preparing activity, with a copy to:

COMMANDER  
Naval Facilities Engineering Command  
Code 04M2D  
200 Stovall Street  
Alexandria, VA 22332

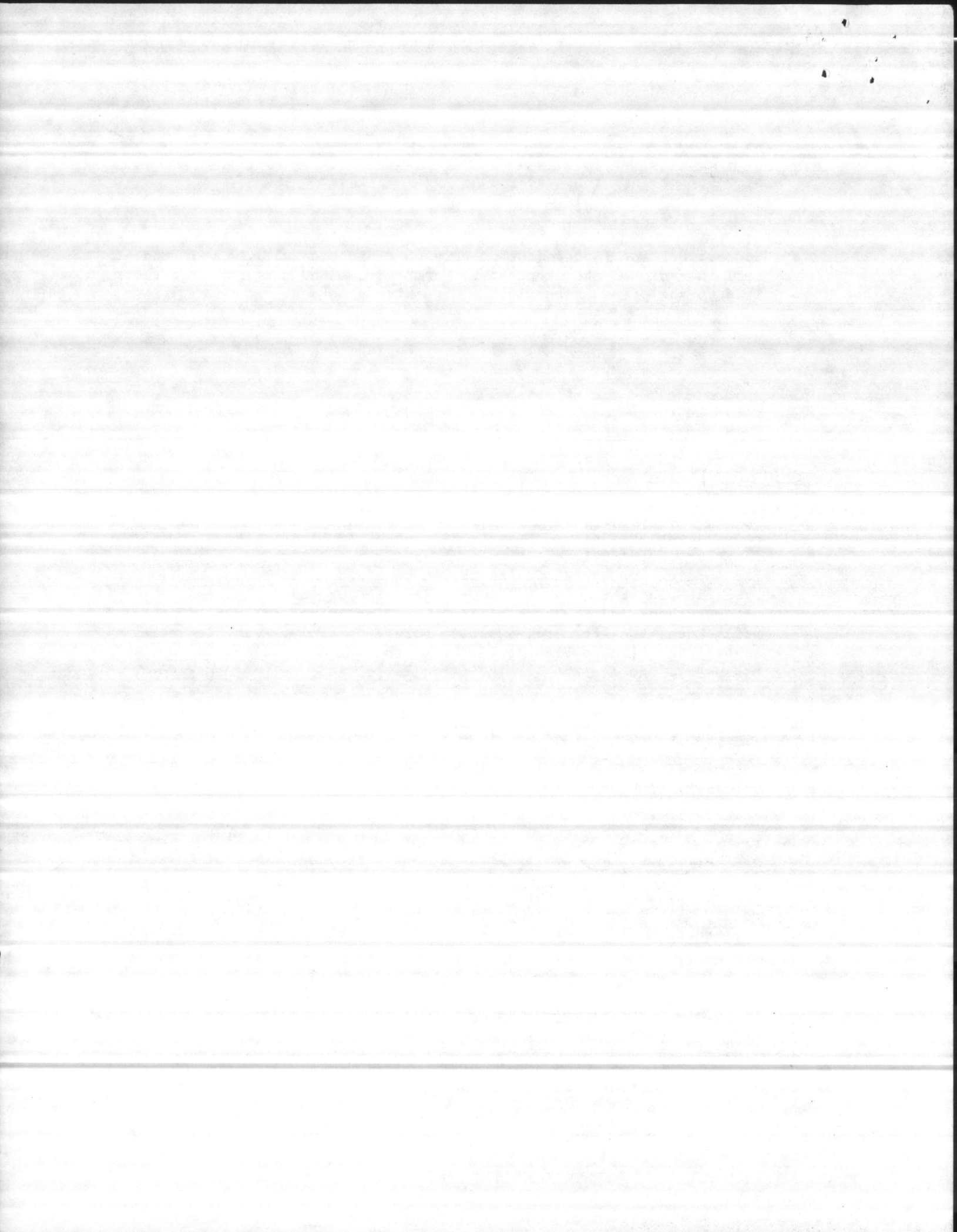
#### TECHNICAL NOTES

- A. This guide specification covers requirements for incandescent, fluorescent, and high-intensity discharge lighting fixtures for interior installations. Requirements for materials and procedures for special or unusual design should be added as necessary to fit specific projects. The extent and location of the work to be accomplished, and the type of lamps, cables, wire, conduit, fixtures, reflectors, transformers, junction boxes, controls, switches, relays, regulators, circuit breakers, panels, and all other wiring, equipment, and accessories indicated, specified, or necessary for a complete installation shall be indicated on the project drawings.
- B. Specification, section, and page numbers shall be centered at the bottom of each page of this section.

EXAMPLE:

05-76-1776  
16510-1

- C. Paragraph 1.1: The latest issue of these publications must be used if they meet the requirements of the project under design. If the latest issue of the referenced publication does not meet project requirements, resolve the problem in the most efficient way; reference the listed publication issue, incorporate data in project specification or do whatever is appropriate. Immediately complete DD Form 1426 in duplicate to the EFD specifications branch.
- D. Paragraph 1.3: Delete items not applicable to the specific project and insert additional details required to describe the specific project.



- E. Paragraph 1.3: Include lighting fixture schedule on drawings and indicate all pertinent information, i.e., mounting, lamps, ballasts, voltage, etc. See sample schedule on Sketch No. 16510-99. Lighting fixture, ballast, and lamp design and technology have advanced rapidly in recent years; ensure that the fixture is currently available before specifying.
- F. Paragraph 1.4.3: Certified test reports generally involve additional cost. If not essential to the specific application, they should be deleted. When computerized candlepower data are required, specify the number of angles, planes, and light distribution.
- G. Paragraph 2.1: ~~The provisions in UL 1570 for fixtures used in damp and wet locations are not effective until April 1, 1984. Fixtures used as air handling registers must meet the requirements of NFPA 70 and NFPA 90A.~~
- H. Paragraphs 2.1.1, 2.2.1, and 2.3.1: Lamp types are keyed to the ANSI C78 series of lamp standards. For example: Type S50 according to ANSI C78.1351.
- I. Paragraph 2.1.2: This specification does not presently include requirements for electronic ballasts. Preliminary data concerning energy savings by electronic ballasts are encouraging. Their inclusion in this specification will be based on length of life compared to standard ballasts, ability to endure temperatures in ballast compartment, ability to withstand voltage fluctuations and switching surges, and general availability from proven sources.
- J. Paragraph 2.1.2.1: Low temperature ballasts should be specified where ambient temperatures may normally drop below 50 degrees F.
- K. Paragraph 2.1.2.2: Energy saving ballasts are generally not available for low temperature applications (below 50 degrees F). Additionally, the combination of energy saving ballasts and energy saving lamps are not recommended below 60 degrees F.
- L. Deleted.
- M. Paragraph 2.2.2: Coordinating HPS lamp and ballast characteristics is important for proper operation, maximum light output, and optimum lamp life. Lamp current crest factor and maximum peak voltage across lamp terminals are particularly important characteristics. High power-factor, regulating type ballasts should be used in all available sizes. Ballasts for HPS lamps must maintain the lamp wattage variations within the limits of the ANSI trapezoid for the specific lamp throughout their designed input voltage limits. A



ballast characteristic curve should preferably be such that the lamp wattage attains a maximum at or below the maximum lamp voltage line and then decreases substantially as the lamp voltage increases beyond this point. A relatively flat ballast characteristic curve located near the line of rated lamp wattage is also preferable to one that rises or falls relatively steeply. This is a requirement of ANSI C82.4.

- N. Paragraph 2.2.3: Use this paragraph only where ballast hum may be audible above ambient sound levels and may exceed the recommended noise criterion rating for a particular room or area. Of the HID ballast types available, encapsulated ballasts are generally quieter than other types. Remote ballasts can be specified for areas with extremely low ambient sound levels or where high ambient temperatures may shorten lamp and ballast life if they are mounted in the same enclosure.
- O. Deleted.
- P. Paragraph 2.3.2: Do not specify central dimming systems with this specification. The use of fluorescent dimmer systems is discouraged because of electromagnetic interference, flickering at low lighting levels, and inherently noisy operation. Also, dimmer ballasts must be compatible with the dimmer chosen and are not CBM certified by ETL. The use of multiple switching is encouraged in lieu of dimming fluorescent lamps. HID dimming systems can have similar problems. If these dimming systems are used, take caution in designing and specifying the system and system components.
- Q. Paragraph 2.11: Use self-powered exit signs only where long runs of wire and conduit make installation of standard signs impractical and where special circumstances apply. Luminous exit signs contain radiation emitting sources which must be returned to the manufacturer for disposal. Use economic analysis to determine best type of exit signs for a particular project.
- R. Paragraph 2.12: Lamp wattage must be specified to provide the required illumination per NFPA. In lieu of an installation involving many individual emergency lighting units, consider central system with zone control. Circuit shall be hard wired to normal power system. A variety of battery types exists. Each has differing life expectancies and maintenance requirements. Choose the battery type which best suits the application.
- S. Paragraph 2.13: Specify instant restrike devices or auxiliary quartz system for luminaires where the extinguishing of HID lamps caused by momentary power interruptions is unacceptable for safety or security reasons.

