PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

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# PIP ELIGD000
Grounding Installation Details

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- ELIGD086 – Buildings – Equipment Grounding Pad Set in Concrete
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1. Introduction

1.1 Purpose

The purpose of this Practice is to provide the typical details for construction of grounding systems in chemical and refining facilities. The bonding and grounding design and installation shall be in accordance with the National Electrical Code.

1.2 Scope

These installation details include power system and equipment grounding, static grounding protection for equipment in classified locations, grounding electrode connections, and step and touch potential grounding.

Not included in the scope of this Practice are computer and control system grounding and cathodic protection.

2. References

Applicable requirements in the latest edition (or the edition indicated) of the following industry codes, standards, and references shall be considered an integral part of this Practice.

2.1 Industry Codes and Standards

- National Fire Prevention Association (NFPA)
  - NFPA 70 - National Electrical Code (NEC)

3. General Information

3.1 Category Index

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<thead>
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<td>ELIGD060 – ELIGD099</td>
<td>Buildings</td>
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<tr>
<td>ELIGD650 – ELIGD699</td>
<td>Miscellaneous</td>
</tr>
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</table>
3.2 User Guidance

The details are intended to convey general concepts of desired grounding installations. In most cases, they are generic with regard to wire sizes. The details may be used “as is”, with specific sizes and part numbers specified elsewhere, or may be copied and customized as appropriate for a specific installation.

When the details are customized for a specific installation the title block can be modified to add project reference information, and the applicable sizes and part numbers can be added to the bill of materials table on each detail. When the details are so modified, PIP requires that the PIP logo and all references to PIP be deleted from the detail. PIP’s intent is to prevent modification of these details through both the software used, when practical, and through exercise of its copyright control of the use of the documents.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

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<td></td>
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<tr>
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<td>A/R</td>
<td>FT</td>
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<td>CONDUIT, PVC, SCHEDULE 80</td>
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</tr>
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</table>
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

1 A/R FT A/R WIRE, COPPER, STRANDED, BARE OR TRIMMED
2 1 EA A/R CONNECTOR, EXOTHERMIC WELD, CABLE-TO-VIRTUAL-STEEL SURFACE
3 A/R FT 1" CONDUIT, PVC, SCHEDULE 80
CONTINUOUS WELD ANGLE TO COLUMN

NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-COCONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
### PROCESS INDUSTRY PRACTICES

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**
**STRUCTURAL COLUMNS**
**NON–FIREPROOFED**
**RISE WITH CRIMPED CONNECTION**

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<td>EA</td>
<td>1/4&quot; - 20</td>
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<tr>
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</tr>
<tr>
<td>8</td>
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<td>EA</td>
<td>1/4&quot; - 20</td>
<td>BOLT, HEX HEAD</td>
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### NOTES:

1. PAINT OR OTHER NON–CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.

2. ALL CONNECTIONS SHALL BE COATED WITH ANTI–OXIDANT COMPOUND.

3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

**PRACTICE REF. ELIGD000**

**DRAWING DATE 11/09**

**ELIGD101**
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
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4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

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PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
STRUCTURAL COLUMNS
NON-FIREPROOFED
RISER WITH EXOTHERMIC WELD CONNECTION

PRACTICE REF. ELIGD000
PAGE 1 OF 1
DRAWING DATE 11/09
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<td>3/8&quot;</td>
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<td>BOLT, HEX HEAD</td>
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<td>10</td>
<td>1</td>
<td>EA</td>
<td>6&quot;</td>
<td>BAR, 1/4&quot; THICK x 2&quot; WIDE WITH 7/16&quot; HOLE, LENGTH AS INDICATED</td>
<td></td>
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NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON–CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI–OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES

FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
STRUCTURAL COLUMNS
FIREPROOFED
RISER WITH BOLTED COMPRESSION CONNECTION
NOTES:
1. BOLTS SHALL BE INSERTED FROM INSIDE THE TRAY.
2. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
3. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
4. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
5. USE MATERIALS NOT SUBJECT TO CORROSION FROM THE ENVIRONMENT OR APPLICATION.
6. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
### Notes:
1. Bolts shall be inserted from inside the tray.
2. All connections shall be made wrench tight.
3. Paint or other non-conductive coating shall be removed at the point of contact, or a fastener that will penetrate the coating shall be used.
4. All connections shall be coated with anti-oxidant compound.
5. Use materials not subject to corrosion from the environment or application.
6. Refer to text portion of ELIGD000 for basic assumptions and application of this detail.

### Table

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### Process Industry Practices

**Fabrication/Installation Details**

**Grounding Detail**

**Cable Tray**

**Bonding of Tray to Tray**

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**Practice Ref. ELIGD000**

**Page 1 of 1**

**Drawing Date 11/09**

**ELIGD206**
NOTES:
1. DIMENSION SHALL BE KEPT TO A MINIMUM, ALLOWING THE BUSHING TO CLEAR THE CABLE TRAY RAIL.
2. ALL CONNECTIONS SHALL BE MADE WRENCH TIGHT.
3. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
4. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
5. USE MATERIALS NOT SUBJECT TO CORROSION FROM THE ENVIRONMENT OR APPLICATION.
6. REFER TO TEXT PORTION OF ELIG000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

ITEM | QTY | UM | SIZE | DESCRIPTION |
--- | --- | --- | --- | --- |
1 | 1 | EA | A/R | BUSHING, INSULATING |
2 | 1 | EA | A/R | CLAMP, CONDUIT, APPROVED GROUNDING |

GROUNDING DETAIL
CABLE TRAY
CONDUIT BONDED TO CABLE TRAY
BY CONDUIT CLAMP
NOTES:
1. BOLTS SHALL BE INSERTED FROM INSIDE THE TRAY.
2. ALL CONNECTIONS SHALL BE MADE WRENCH TIGHT.
3. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
4. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
5. USE MATERIALS NOT SUBJECT TO CORROSION FROM THE ENVIRONMENT OR APPLICATION.
6. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
CABLE TRAY
CONDUIT BONDED TO CABLE TRAY
WITH GROUNDING BUSHING AND CABLE

PRINCIPAL ENGINEER PIP
PRACTICE REF. ELIGD000
PAGE 1 OF 1
DRAWING DATE 11/09
ELIGD219
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<td>EA</td>
<td>3/8”</td>
<td>WASHER, LOCK</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>EA</td>
<td>3/8” - 16 x 3/4”</td>
<td>BOLT, CARRIAGE HEAD, KNURLED SHOULDER</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>EA</td>
<td>3/8” - 16</td>
<td>NUT, HEX</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>EA</td>
<td>1/2”</td>
<td>BUSHING, INSULATING</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>EA</td>
<td>1/2”</td>
<td>CLAMP, GROUNDING</td>
</tr>
</tbody>
</table>

**NOTES:**
1. BOLTS SHALL BE INSERTED FROM INSIDE THE TRAY.
2. ALL CONNECTIONS SHALL BE MADE WRENCH TIGHT.
3. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR AFASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
4. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
5. USE MATERIALS NOT SUBJECT TO CORROSION FROM THE ENVIRONMENT OR APPLICATION.
6. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

**PROCESS INDUSTRY PRACTICES**

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**

**CABLE TRAY**

**CONDUIT BONDED TO CABLE TRAY**

**WITH GROUNDING CLAMP AND CABLE**
NOTES:
1. BOLTS SHALL BE INSERTED FROM INSIDE THE TRAY.
2. ALL CONNECTIONS SHALL BE MADE WRENCH TIGHT.
3. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
4. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
5. USE MATERIALS NOT SUBJECT TO CORROSION FROM THE ENVIRONMENT OR APPLICATION.
6. SLACK SHALL BE PROVIDED IN ITEM 1 TO ALLOW FOR TRAY EXPANSION.
7. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

<table>
<thead>
<tr>
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<th>UM</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>1/a</td>
<td>FT</td>
<td>A/R</td>
<td>WIRE, COPPER, STRANDED</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>EA</td>
<td>A/R</td>
<td>CONNECTOR, COMPRESSION</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>EA</td>
<td>3/8&quot;</td>
<td>WASHER, LOCK</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>EA</td>
<td>3/8&quot; - 16 x 3/4&quot;</td>
<td>BOLT, CARRIAGE HEAD, KNURLED SHOULDER</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>EA</td>
<td>3/8&quot; - 16</td>
<td>NUT, HEX</td>
<td></td>
</tr>
</tbody>
</table>
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
<table>
<thead>
<tr>
<th>ITEM</th>
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<tr>
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<td>FT</td>
<td>A/R</td>
<td>WIRE, COPPER, STRANDED</td>
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</tr>
<tr>
<td>2</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot; - 20</td>
<td>ANCHOR, MASONRY</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot; - 20 x 1&quot;</td>
<td>BOLT, HEX HEAD</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>EA</td>
<td>1&quot;</td>
<td>STRAP, CONDUIT</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>A/R</td>
<td>FT</td>
<td>1&quot;</td>
<td>CONDUIT, PVC, SCHEDULE 80</td>
<td></td>
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</table>

NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON–CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI–OXIDANT COMPOUND.
4. ONLY GROUNDING ELECTRODE CONDUCTOR CONNECTIONS ARE SHOWN. CURRENT CARRYING CONDUCTORS ARE NOT SHOWN.
5. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
SUBSTATIONS AND TRANSFORMERS
LIGHTING TRANSFORMER WITH GROUNDING ELECTRODE CONNECTION AT PANEL

PRACTICE REF. ELIGD000
PAGE 1 OF 1
DRAWING DATE 11/09
ELIGD257
### PROCESS INDUSTRY PRACTICES

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**

**SUBSTATIONS AND TRANSFORMERS**

**LIGHTING TRANSFORMER WITH GROUNDING ELECTRODE CONNECTION AT TRANSFORMER**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>UM</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A/R</td>
<td>FT</td>
<td>A/R</td>
<td>WIRE, COPPER, STRANDED</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot; - 20</td>
<td>ANCHOR, MASONRY</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot; - 20 x 1&quot;</td>
<td>BOLT, HEX HEAD</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>EA</td>
<td>1&quot;</td>
<td>STRAP, CONDUIT</td>
</tr>
<tr>
<td>5</td>
<td>A/R</td>
<td>FT</td>
<td>1&quot;</td>
<td>CONDUIT, PVC, SCHEDULE 80</td>
</tr>
</tbody>
</table>

**NOTES:**

1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. ONLY GROUNDING ELECTRODE CONDUCTOR CONNECTIONS ARE SHOWN. CURRENT CARRYING CONDUCTORS ARE NOT SHOWN.
5. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
5. THIS DETAIL CAN BE APPLIED FOR MULTIPLE GROUND RISER CONNECTIONS TO A SINGLE MEDIUM VOLTAGE MOTOR. ADJUST QUANTITIES AS NECESSARY AND SEE PLAN DRAWINGS FOR RISER LOCATIONS.
ALTERNATE FEATURE

NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED WITH THE MANUFACTURER'S RECOMMENDED TOOL AND DIE.
3. REFER TO THE GROUNDING PLAN FOR WIRE TYPE AND MINIMUM DEPTH.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES

FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
EARTH TERMINALS
GROUND ROD TO CABLE
COMPRESSION CONNECTION
ALTERNATE FEATURE

NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED PER MANUFACTURER’S INSTRUCTIONS.
3. REFER TO THE GROUNDING PLAN FOR WIRE TYPE AND MINIMUM DEPTH.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. DIMENSIONS ARE APPROXIMATE.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. CONNECTIONS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. DIMENSIONS ARE APPROXIMATE.
4. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

ITEM | QTY | UM | SIZE | DESCRIPTION |
-----|-----|----|------|-------------|
1    | 1   | EA | 5/8" x 8' | ROD, GROUND, COPPER CLAD |
     |     |    | 3/4" x 10" | |
     |     |    | 1" x 10'  | |
2    | 2   | EA | 5/8" | CONNECTOR, EXOTHERMIC WELD, GROUND |
     |     |    | 3/4" | ROD TO HORIZONTAL CABLE |
     |     |    | 1"   | |
3    | 3   | FT | 12"  | PIPE, PE, SCHEDULE 80 OR CONCRETE POLYMER ENCLOSURE SUITABLE FOR TRAFFIC AREA |
4    | 1   | EA | –    | COVER, PROTECTIVE |
COMPRESSION CONNECTION

STRANDED COPPER WIRE

NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED WITH MANUFACTURER'S RECOMMENDED TOOL AND DIE.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

ITEM | QTY | UM | SIZE | DESCRIPTION
--- | --- | --- | --- | ---
1 | 1 | EA | A/R | CONNECTOR, COMPRESSION, SPLICE
NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED WITH MANUFACTURER'S RECOMMENDED TOOL AND DIE.
3. REFER TO TEXT PORTION OF ELIGDOO FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>UM</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EA</td>
<td>A/R</td>
<td></td>
<td>CONNECTOR, EXOTHERMIC WELD, HORIZONTAL CABLE TAP TO CABLE RUN</td>
<td></td>
</tr>
</tbody>
</table>

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
EARTH TERMINALS
CABLE-TO-CABLE
EXOTHERMIC WELD TAP CONNECTION
Notes:
1. All connections shall be coated with anti-oxidant compound.
2. Connector shall be installed with manufacturer’s recommended tool and die.
3. Refer to text portion of ELIGD000 for basic assumptions and application of this detail.
NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED PER MANUFACTURER’S INSTRUCTIONS.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>UM</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>EA</td>
<td>A/R</td>
<td>CONNECTOR, GROUND, CABLE-TO-REBAR</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>A/R</td>
<td>FT</td>
<td>WIRE, COPPER, STRANDED</td>
</tr>
</tbody>
</table>

**NOTES:**
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED WITH MANUFACTURER'S RECOMMENDED TOOL AND DIE.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

**PROCESS INDUSTRY PRACTICES**

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**

**EARTH TERMINALS**

**CABLE-TO-REBAR**

**COMPRESSION CONNECTION**
NOTES:
1. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
2. CONNECTOR SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. GROUND BUS SHOWN ON OUTSIDE OF FLANGE. IT MAY BE LOCATED ON INSIDE OF FLANGE.
5. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES

FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
GROUNDED BUS
BAR ATTACHED TO STRUCTURAL STEEL
NOT ISOLATED
<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
<th>UM</th>
<th>SIZE</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>EA</td>
<td>18&quot; LONG 24&quot; LONG</td>
<td>BUS BAR, COPPER, HARD DRAWN, 1/4&quot; x 2&quot;</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>EA</td>
<td>3/8&quot; – 16</td>
<td>ANCHOR, MASONRY, WEDGE STUD</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>EA</td>
<td>3/8&quot; – 16</td>
<td>NUT, HEX</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD451 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

**PROCESS INDUSTRY PRACTICES**

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**

**GROUND BUS**

**WALL MOUNTED GROUND BUS BAR**

**NOT ISOLATED**

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18&quot; BAR</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>B</td>
<td>24&quot; BAR</td>
<td>23</td>
<td>24</td>
</tr>
</tbody>
</table>
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
GROUND BUS
BAR ATTACHED TO STRUCTURAL STEEL ISOLATED
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. PAINT OR OTHER NON-CONDUCTIVE COATING SHALL BE REMOVED AT THE POINT OF CONTACT, OR A FASTENER THAT WILL PENETRATE THE COATING SHALL BE USED.
3. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
4. REFER TO TEXT PORTION OF ELIGDOO0 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
VESSELS, TANKS AND PIPES
PAD MOUNTED VESSELS AND EQUIPMENT
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

<table>
<thead>
<tr>
<th>ITEM</th>
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<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>EA</td>
<td>#2 - 2&quot;</td>
<td>CONNECTOR, GROUND</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>#2 - 2-1/2&quot;</td>
<td>2&quot; POST</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>EA</td>
<td>#2</td>
<td>CONNECTOR, SPLIT BOLT</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A/R</td>
<td>FT</td>
<td>#2</td>
<td>WIRE, COPPER, STRANDED, BARE OR TRIMMED</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>EA</td>
<td>#2</td>
<td>CONNECTOR, GROUND, 1-1/4&quot; PIPE</td>
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PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
FENCES
FENCE POST, FABRIC AND BARBED WIRE GROUNDING

PRACTICE REF. ELIGD000
PAGE 1 OF 1
DRAWING DATE 11/09
ELIGD601
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
FENCES
GATE GROUNDING
NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
FENCES
POST GROUNDING
Notes:
1. Refer to text portion of ELIGD651 for basic assumptions and application of this detail.
PROCESS INDUSTRY PRACTICES

FABRICATION/INSTALLATION DETAILS

GROUNDING DETAIL
MISCELLANEOUS
TANK LOADING STATION

NOTES:
1. ALL CONNECTIONS SHALL BE MADE UP WRENCH TIGHT.
2. ALL CONNECTIONS SHALL BE COATED WITH ANTI-OXIDANT COMPOUND.
3. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.
**NOTES:**
1. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

---

**PROCESS INDUSTRY PRACTICES**

**FABRICATION/INSTALLATION DETAILS**

**GROUNDING DETAIL**

**MISCELLANEOUS**

**LIGHTNING PROTECTION**
<table>
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<tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>EA</td>
<td>1/2&quot; x 24&quot;</td>
<td>COPPER AIR TERMINAL</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>EA</td>
<td>–</td>
<td>ONE BOLT MASONRY BASE</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>EA</td>
<td>1/4&quot;</td>
<td>LOCKWASHER, S.S.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>EA</td>
<td>1/4&quot; - 20 x 1</td>
<td>BOLT, S.S.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>EA</td>
<td>1/4&quot; - 20</td>
<td>HEX NUT, S.S.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>EA</td>
<td>1/4&quot;</td>
<td>FLAT WASHER, S.S.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>FT</td>
<td>2&quot; x 2&quot; x 1/4&quot;</td>
<td>ALUMINUM ANGLE</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>EA</td>
<td>3/8&quot;</td>
<td>U-BOLT W/HEX NUTS, FOR 1-1/2&quot; PIPE, S.S.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot;</td>
<td>BOLT HOLE LOP, COPPER</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>EA</td>
<td>1/4&quot; x 1 1/2&quot;</td>
<td>LAG SCREW, S.S. (AS NEEDED)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>EA</td>
<td>–</td>
<td>CONDUCTOR SPLICER, CROSS</td>
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<tr>
<td>12</td>
<td>A/R</td>
<td>EA</td>
<td>A/R</td>
<td>STAINLESS STEEL OR HOT-DIPPED GALVANIZED BAND</td>
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</tbody>
</table>

NOTES:
1. REFER TO TEXT PORTION OF ELIGD000 FOR BASIC ASSUMPTIONS AND APPLICATION OF THIS DETAIL.

PROCESS INDUSTRY PRACTICES
FABRICATION/INSTALLATION DETAILS
GROUNDING DETAIL
MISCELLANEOUS
COOLING TOWER LIGHTNING PROTECTION

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