



## Structural Engineering Certification

Original Engineering: July 25, 2017

Recertification: April 28, 2021

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### Anchor Bolt Adapter (ABA)

#### Description and Application

The Anchor Bolt Adapter (typically a set of 4 pieces) corrects the anchor bolt alignment problems (ABA.75:4.4 inches max, ABA1:5 inches max). It is used when the existing anchor bolts do not line up with (match) the bolt holes in the light pole base plate. The anchor bolt adapters are threaded onto the existing anchor bolts and can adjust the bolt circle diameter. Then the pole base plate is bolted to the Anchor Bolt Adapter.

#### Analysis and Certification

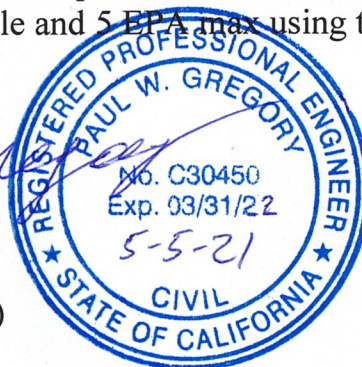
The engineering free-body force diagram of the Anchor Bolt Adapter shows static equilibrium without rotation. The rotation force is translated to anchor bolt pull-out tension. And the tension clamping force (from the anchor bolts) of the concrete pedestal and the pole base plate prevents rotation.

Therefore: The Anchor Bolt Adapter Set (ABA) is certified by this Engineer for:

3/4" Anchor Bolt Adapter (ABA.75): 25' pole, 150 lbs. fixture weight, 100 mph, 11 EPA max using the center hole and 5 EPA max using the outside hole.

1" Anchor Bolt Adapter (ABA1): 40' pole, 550 lbs. fixture weight, 100 mph, 12 EPA max using the center hole and 5 EPA max using the outside hole.

Sincerely,  
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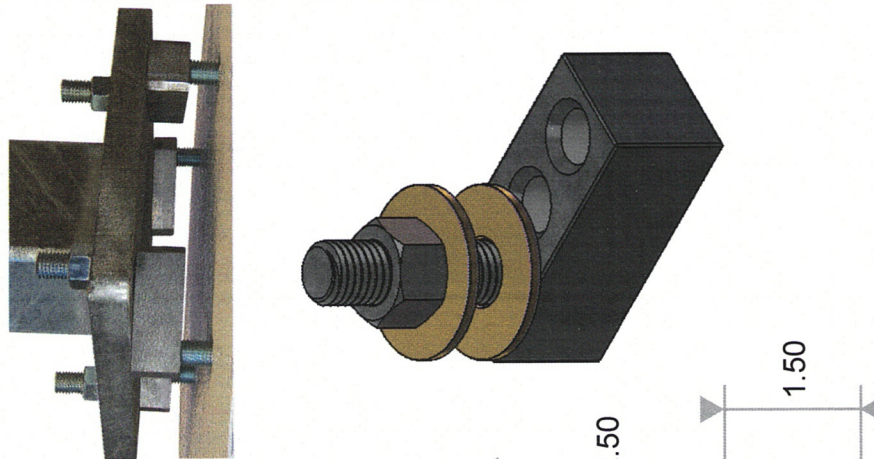
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4507 Delancy Dr.  
Yorba Linda, Ca. 92886



The Anchor Bolt Adapter 3/4" allows an increase or decrease of a bolt circle by up to 4.4", and movement of bolt square by 2.2". For instructions, see Installation Guide.

ABA.75 is sold in sets of 4 blocks.

- (2) 3/4-2.00 Hardened Washer
- 3/4-10 UNC Galvanized Nut
- 3/4-10 UNC Thread
- 3/4-10 UNC Galvanized Stud



With all blocks in this configuration, the bolt circle is decreased by up to 4.4".

With all blocks in this configuration, the bolt circle is decreased by up to 2.2".

With all blocks in this configuration, the bolt circle is increased by up to 2.2".

With all blocks in this configuration, the bolt circle is increased by up to 4.4".

Pole may rotate slightly based on your exact needed adjustment and pole base plate

With all blocks in this configuration, the bolt circle is increased by up to 2.2".

With all blocks in this configuration, the bolt circle is increased by up to 4.4".



ABA.75: 25' MAX POLE, 150 LBS. MAX FIXTURE WEIGHT, 100MPH MAX. EPA 11 USING CENTER HOLE. EPA 5 USING OUTSIDE HOLE.

| Max EPA in 100MPH windzone |                     |
|----------------------------|---------------------|
| 150lbs Fixture Weight      |                     |
| Pole Height                | ABA.75 Outside Hole |
| 15                         | 7                   |
| 20                         | 5                   |
| 25                         | 5                   |

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U.S Patent # 10,450,740

| UNLESS OTHERWISE SPECIFIED:          |                            |
|--------------------------------------|----------------------------|
| DIMENSIONS ARE IN INCHES             | FRAC TIONAL:               |
| ANGULAR: MACH ±                      | BEND ±                     |
| TWO PLACE DECIMAL ± .005             | THREE PLACE DECIMAL ± .005 |
| INTERPRET GEOMETRIC TOLERANCING PER: | MATERIAL                   |
| 1018 STEEL                           | FINISH                     |
| HOT DIP GALVANIZED                   | DO NOT SCALE DRAWING       |

| NAME       | DATE                   | PART#:    | ABA.75                    |
|------------|------------------------|-----------|---------------------------|
| EB         | 08/31/17               | TITLE:    | ANCHOR BOLT ADAPTER, 3/4" |
| DRAWN      | CHECKED                | ENG APPR. | MFG APPR.                 |
| Q.A.       | SIZE DWG. NO. <b>A</b> |           |                           |
| SCALE: 1:2 |                        |           | WEIGHT: 10lbs.            |
| REV 2.4    |                        |           | 8/27/20                   |



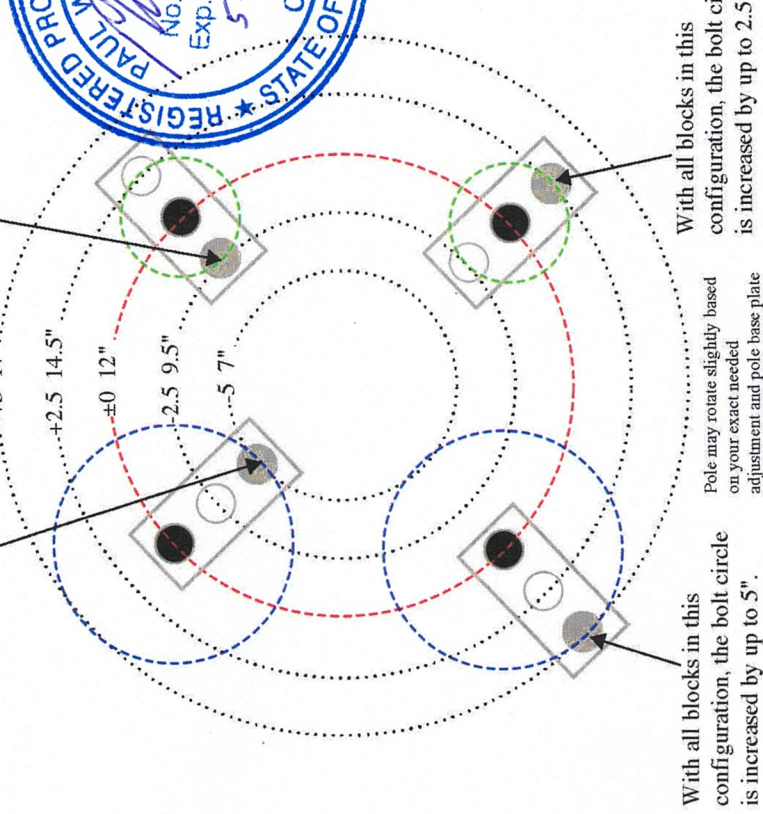


The Anchor Bolt Adapter 1"-.75" allows an increase or decrease of a bolt circle by up to 5", and movement of bolt square by 2.5", and allow a 3/4" base plate to bolt to 1" anchor bolts. For instructions, see Installation Guide.

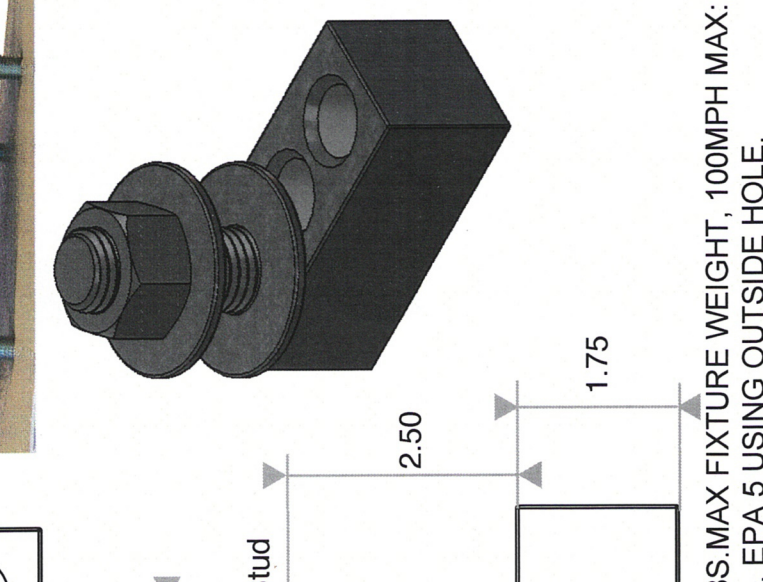
With all blocks in this configuration, the bolt circle is decreased by up to 5".

With all blocks in this configuration, the bolt circle is decreased by up to 2.5".

- (2) 3/4-2.00 Hardened Washer



ABA1-.75 is sold in sets of 4 blocks.



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL: ANGULAR: MACH ± BEND ± TWO PLACE DECIMAL ± .005 THREE PLACE DECIMAL ± .005 INTERPRET GEOMETRIC TOLERANCING PER: MATERIAL 1018 STEEL FINISH HOT DIP GALVANIZED DO NOT SCALE DRAWING

|                 |          |        |                              |
|-----------------|----------|--------|------------------------------|
| NAME            | DATE     | PART#  | ABA1-.75                     |
| EB              | 08/31/17 | TITLE: | ANCHOR BOLT ADAPTER, 1"-.75" |
| DRAWN           |          | SIZE   | DWG. NO. A                   |
| CHECKED         |          | SCALE  | 1:2 WEIGHT: 16lbs.           |
| ENG APPR.       |          | REV    | 2.3                          |
| MFG APPR.       |          |        | 12/3/19                      |
| Q.A.            |          |        |                              |
| MADE IN AMERICA |          |        |                              |

|                            |                     |
|----------------------------|---------------------|
| Max EPA in 100MPH windzone |                     |
| 150lbs Fixture Weight      |                     |
| Pole Height                | ABA.75 Outside Hole |
| 15                         | 17                  |
| 20                         | 13                  |
| 25                         | 11                  |

U.S Patent # 10,450,740



The Anchor Bolt Adapter 1" allows an increase or decrease of a bolt circle by up to 5", and movement of bolt square by 2.5". For instructions, see Installation Guide.

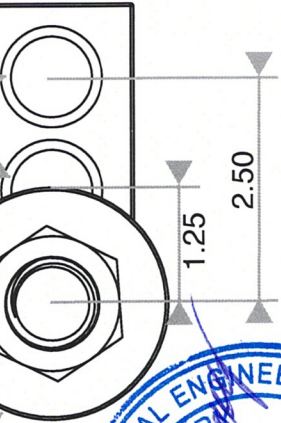
ABA1 is sold in sets of 4 blocks.

(2) 1-2.50 Galvanized Washer

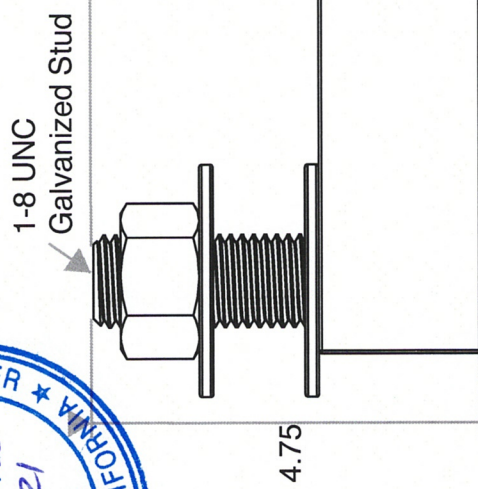
1-8 UNC Galvanized Nut

1-8 UNC Thread

With all blocks in this configuration, the bolt circle is decreased by up to 5".



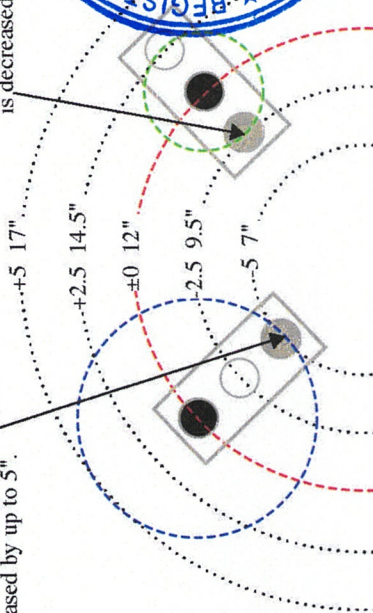
1-8 UNC Galvanized Stud



With all blocks in this configuration, the bolt circle is increased by up to 5". Pole may rotate slightly based on your exact needed adjustment and pole base plate

With all blocks in this configuration, the bolt circle is increased by up to 2.5".

With all blocks in this configuration, the bolt circle is increased by up to 2.5".



Max EPA in 100MPH windzone

| Pole Height | 550lbs Fixture Weight |                   |
|-------------|-----------------------|-------------------|
|             | ABA1 Center Hole      | ABA1 Outside Hole |
| 15          | > 20                  | 12                |
| 20          | > 20                  | 9                 |
| 25          | 20                    | 7                 |
| 30          | 15                    | 6                 |
| 35          | 13                    | 5                 |
| 40          | 12                    | 5                 |



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U.S Patent # 10,450,740

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES  
FRACTIONALS:  
ANGULAR: MACH ± BEND ±  
TWO PLACE DECIMAL ± .005  
THREE PLACE DECIMAL ± .005

DRAWN  
CHECKED  
ENG APPR.  
MFG APPR.  
Q.A.

NAME  
DATE

EB  
08/31/17

PART#: ABA1

TITLE:

ANCHOR BOLT ADAPTER, 1"



SIZE DWG. NO.

A

SCALE: 1:2 WEIGHT: 16lbs.

REV 2.3  
12/3/19





## Overview

Due to the nature, application of this product, it lends itself to the testing method of certification and not the calculation method of determining working stress in a component (Anchor Bolt Adapter ABA.75, ABA1, ABA1-.75).

## Anchor Bolt Adapter Testing Procedure

To test our products, we have a horizontal pole load test stand that allows us to apply force (load measured in lbs.) to the pole at a height of 20'. To test the Anchor Bolt Adapters (ABA), the ABA is installed in the stand between the anchor bolts and the light pole, simulating a light pole using ABA.

### ABA.75 for 3/4" anchor bolts

Test of ABA.75 using center hole

- 1,000lbs of pressure at 20' produced a visible gap between the ABA block and pole. This test was repeated several times with not damage or failure after each subsequence test. This confirmed the parts stayed inside their elastic zone.
  - We consider this the starting of failure at 1,000lbs.

1,000lbs of pressure x 20' = 20,000lbs of torque.

At 25': 20,000 lbs. of torque = 800lbs of pressure = an EPA of 14 at 100MPH

Based on these findings we concretively downgraded the rating to an EPA of 11 at 25' in a 100MPH wind zone.

Test of ABA.75 using outside hole

- 500lbs of pressure at 20' produced a visible gap between the ABA block and pole. This test was repeated several times with not damage or failure after each subsequence test. This confirmed the parts stayed inside their elastic zone.
  - We consider this the starting of failure at 500lbs.
- 980lbs of pressure at 20' produced complete failure of one ABA studs connecting the ABA to the pole base.

500lbs of pressure x 20' = 10,000lbs of torque

At 25': 10,000lbs of torque = 400lbs of pressure = an EPA of 7 at 100MPH

Based on these findings we concretively downgraded the rating to an EPA of 5 at 25' in a 100MPH wind zone.







## **ABA1 for 1" anchor bolts**

Testing of the ABA1 followed the same procedure as listed above for ABA.75. ABA1 destructive testing used an ABA1 prototype with only the center hole.

During on our prototype testing (Equivalent to ABA1 center hole) we overloaded our testing equipment at 2,000lbs of pressure at 20'. With this load, we saw no gap between the ABA block and pole.

2000lbs of pressure x 20' = 40,000lbs of torque

At 40': 40,000lbs of torque = 1,000lbs of pressure = an EPA of 17 at 100MPH

Based on these findings we concretively downgraded the rating to an EPA of 12 at 40' in a 100MPH wind zone.

Based on our ABA.75 testing proving the outside hole had one half the capacity of the center hole; there for we rated the ABA1 outside hole to an EPA of 5 at 40' in a 100MPH wind zone.

## **ABA1-.75 for 1" anchor bolts and a light pole that requires 3/4" anchor bolts.**

The design of the ABA1-.75 uses the same design of the ABA1 with the smaller stud of the ABA.75. For this reason, we concretively rated the ABA1-.75 to the same EPA as the smaller ABA.75

## **Conclusion**

Our conservative ratings ensure Anchor Bolt Adapter parts stay within the part's elastic zone. Anchor Bolt Adapters do not change the original rated load of existing anchor bolts







# Anchor Bolt Adapter Gust Factor and Fixture Weight Explanation

July 7, 2019

To Whom it may concern,

**The Anchor Bolt Adapters are certified by an independent engineer for:**

3/4 inch (ABA.75) and 1 inch-to-3/4 inch conversion (ABA1-.75) Anchor Bolt Adapter: 25' pole, 150 lbs. fixture weight, 100 mph, EPA 11 using the center hole and EPA 5 using the outside hole.

1 inch (ABA1) Anchor Bolt Adapter: 40' pole, 550 lbs. fixture weight, 100 mph, EPA 12 using the center hole and EPA 5 using the outside hole.

The gust factor and fixture weight are included in the original calculations and not clearly stated in the EPA load charts.

**Explanation of Gust Factor:**

The stated Max EPA of our Anchor Bolt Adapters (ABA.75, ABA1, and ABA1-.75) does include the standard 1.3X wind speed gust factor. The Max EPA of the ABA.75, ABA1, and ABA1-.75 is as stated on the spec sheets in a 100MPH wind zone with a 1.3X (130MPH) Gust factor.

**Explanation of Fixture Weight:**

The stated Max Fixture Weight includes any attachments to the light pole, but not the light pole weight. This is to limit the amount of weight moving on the pole, not the total weight that the Anchor Bolt Adapters can support.

