LS-32

U.S. Department
of Transportation
**Federal Highway
Administration**

SEP 3 1993

400 Seventh St., S.W.
Washington, D.C. 20590

Refer to: HNG-14

T. M. Fawley, II, P.E.
Engineer
Hapco Division
P.O. Box 547
Abindgon, Virginia 24210

Dear Mr. Fawley:

Thank you for your July 26 letter requesting Federal Highway Administration's (FHWA) acceptance of your company's TP3405 and TP3406 aluminum poles welded into cast aluminum anchor (shoe) base model numbers 73407 and 73340, respectively. Your letter was accompanied by the test report dated July 23, 1993, and video documentation. Pendulum testing was conducted to assess the breakaway performance of the bases with various Hapco aluminum poles. The tests were witnessed by Mr. Jeffrey A. Bloom of Adian Engineering. Requirements for breakaway supports are found in the 1985 American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals. These specifications have been adopted, with minor modifications, by the FHWA.

The bases are cast aluminum, as shown in the enclosed drawings, welded to HAPCO aluminum poles. Typical mode of failure is breaking of the welded connection between the pole and the base, plus some fracturing of the cast base.

The test results are summarized here:

| Test Number | 3405 | 3407 | 3406 |
|---|---|---|---|
| Support Diameter O.D., mm (in)<br>Wall Thickness, mm (in) | 152 (6.0)<br>4.78 (.188) | 152 (6.0)<br>3.18 (0.125) | 206 (8.0)<br>3.96 (0.156) |
| Base Designation<br>Test Article Mass, kg (wt, lbs) | 73407<br>69.1 (152.3) | 73407<br>52.2 (115) | 73340<br>100.3 (221) |
| Bolt Diameter, mm (in)<br>Bolt Circle Diameter, mm (in) | 25.4 (1.0)<br>229 (9.0) | 25.4 (1.0)<br>229 (9.0) | 25.4 (1.0)<br>304 (12.0) |
| Mounting Height, mm (ft)<br>Pendulum Mass, kg (weight, lbs) | 8380 (27.5)<br>818 (1800) | 7010 (23.0)<br>818 (1800) | 10 900 (35.83)<br>818 (1800) |
| Impact Speed, km/h (mph)<br>Velocity Change, m/s (fps) | 32.2 (21.1)<br>2.4 (7.8) | 32.2 (20)<br>1.6 (5.3) | 32.2 (20)<br>2.3 (7.5) |
| Calculated 60-mph (97-km/h)<br>Velocity Change, m/s (fps)<br>Stub Height, mm (in) | <br>1.4 (4.5)<br>92 (3.625) | <br>0.91 (3.0)<br>92 (3.625) | <br>1.6 (5.1)<br>81 (3.1875) |

The results of these tests meet the change in velocity and stub height requirements adopted by AASHTO and the FHWA. Therefore, the following tested aluminum breakaway systems are acceptable for use on National Highway System (NHS) projects, within the range of conditions tested, if proposed by a State:

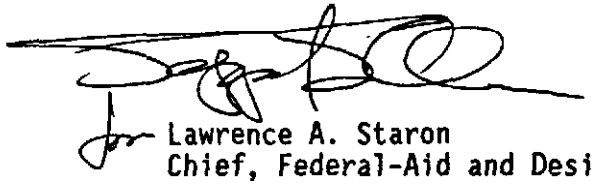
TP3405 (using base 73407) for 152-mm (6-inch) butt diameter aluminum luminaire supports with wall thicknesses from 3.18 mm to 4.78 mm (0.125-inch to 0.188-inch) with luminaire mounting heights up to 8500 mm (27.5 feet).

TP3406 (using base 73340) for 203-mm (8-inch) butt diameter aluminum luminaire supports with wall thickness of 3.96 mm (0.156-inch) with luminaire mounting heights up to 11 000 mm (36 feet).

Our acceptance is limited to the breakaway characteristics of the systems and does not cover their structural features. Presumably, you will supply potential users with sufficient information on structural design and installation requirements to ensure proper performance. We anticipate that the States will require certification from Hapco Division that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that used in the tests, and that they will meet the FHWA change in velocity requirements.

Because Hapco breakaway cast aluminum shoe bases are proprietary, to be used in Federal-aid projects on the NHS: (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with existing highway facilities or that no equally suitable alternate exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411, a copy of which is enclosed.

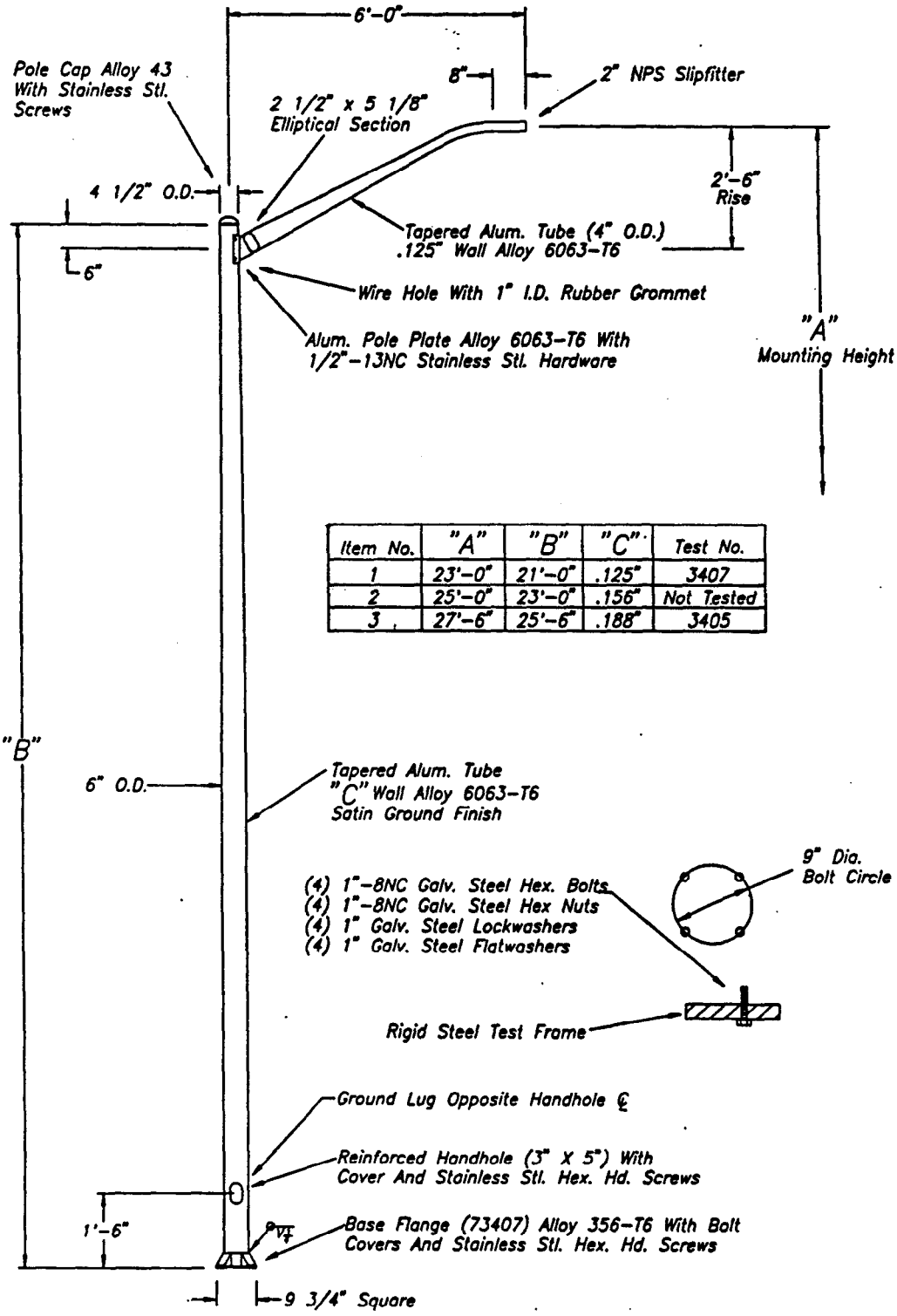
Sincerely yours,



for Lawrence A. Staron
Chief, Federal-Aid and Design Division

2 Enclosures

Figure (2)
Hapco Drawing No. TP3405
Test Luminaire Supports




| Item No. | "A" | "B" | "C" | Test No. |
|---|---|---|---|---|
| 1 | 23'-0" | 21'-0" | .125" | 3407 |
| 2 | 25'-0" | 23'-0" | .156" | Not Tested |
| 3 | 27'-6" | 25'-6" | .188" | 3405 |

TP3405

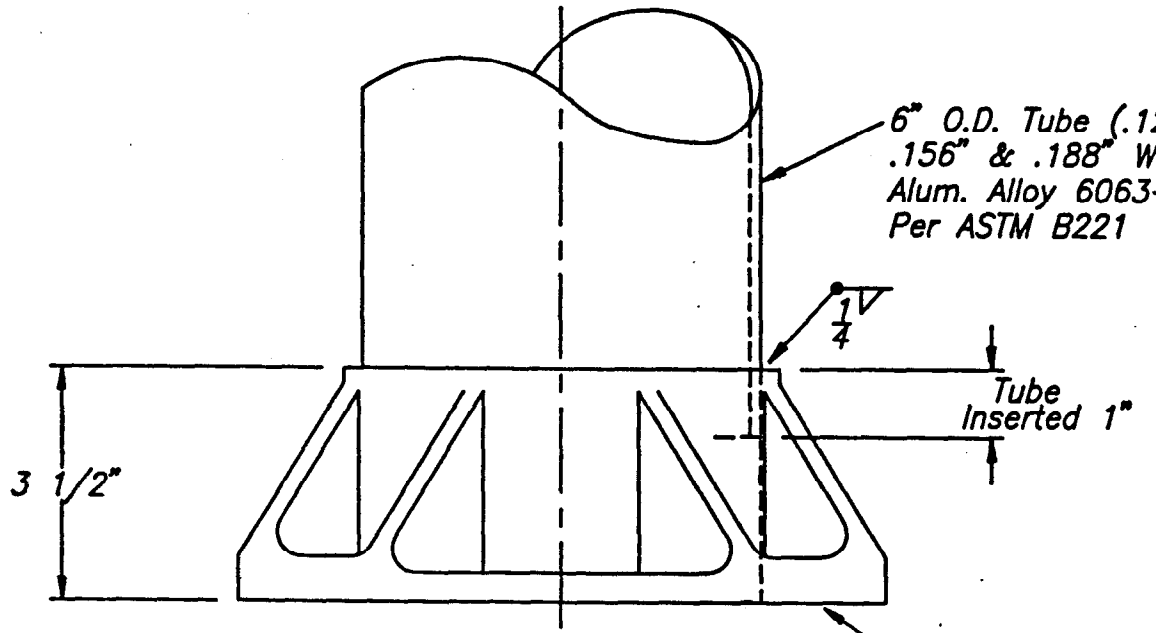
WARNING: Do Not Install Lighting Poles without Luminaires

| NO. | REVISIONS | DATE |
|---|---|---|
| | | |

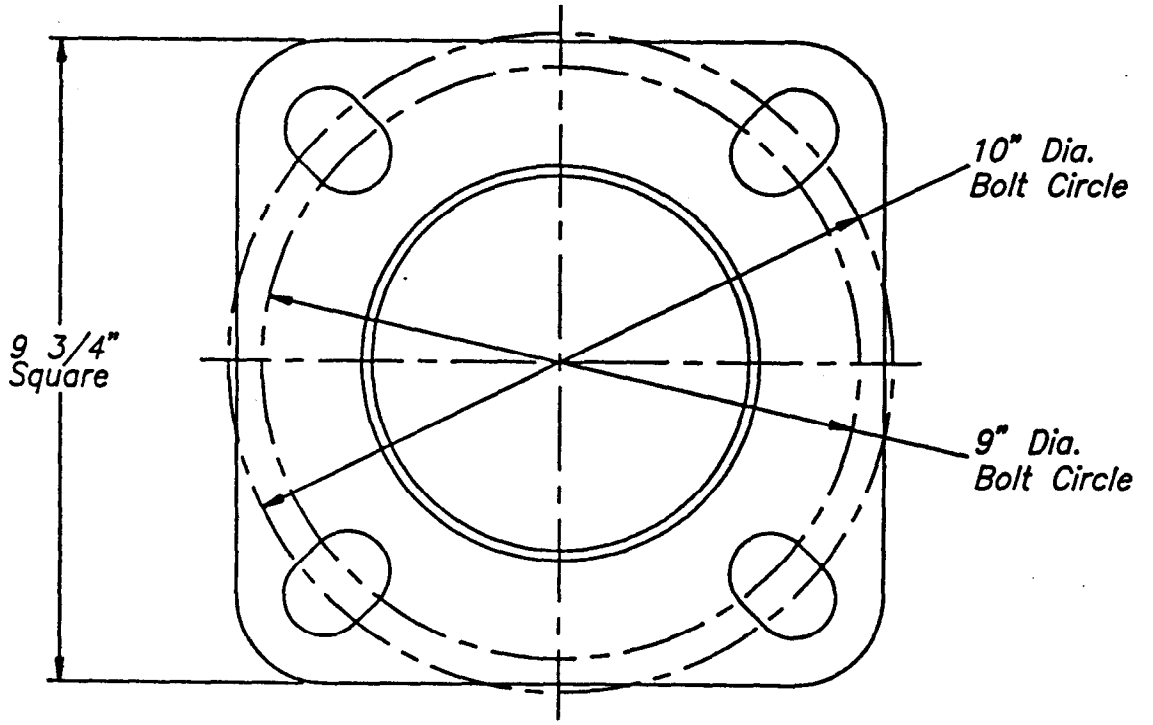
hapco

| | |
|---|---|
| TITLE | TEST POLES |
| CUSTOMER | TEST #3405 & #3407 |
| SCALE | 24.00 |
| DATE | 07/16/93 |
| BY | PRS |
| CHK'D | |
| DWG. NO. | TP3405 |

Figure (3)
Hapco Drawing No. 73407
6" Breakaway Base Assembly




Note: Tube And Base Welded In The -T4 Temper With Alloy 4043 Weld Wire And Artifically Aged (Heat Treated) To The -T6 Temper After Welding.



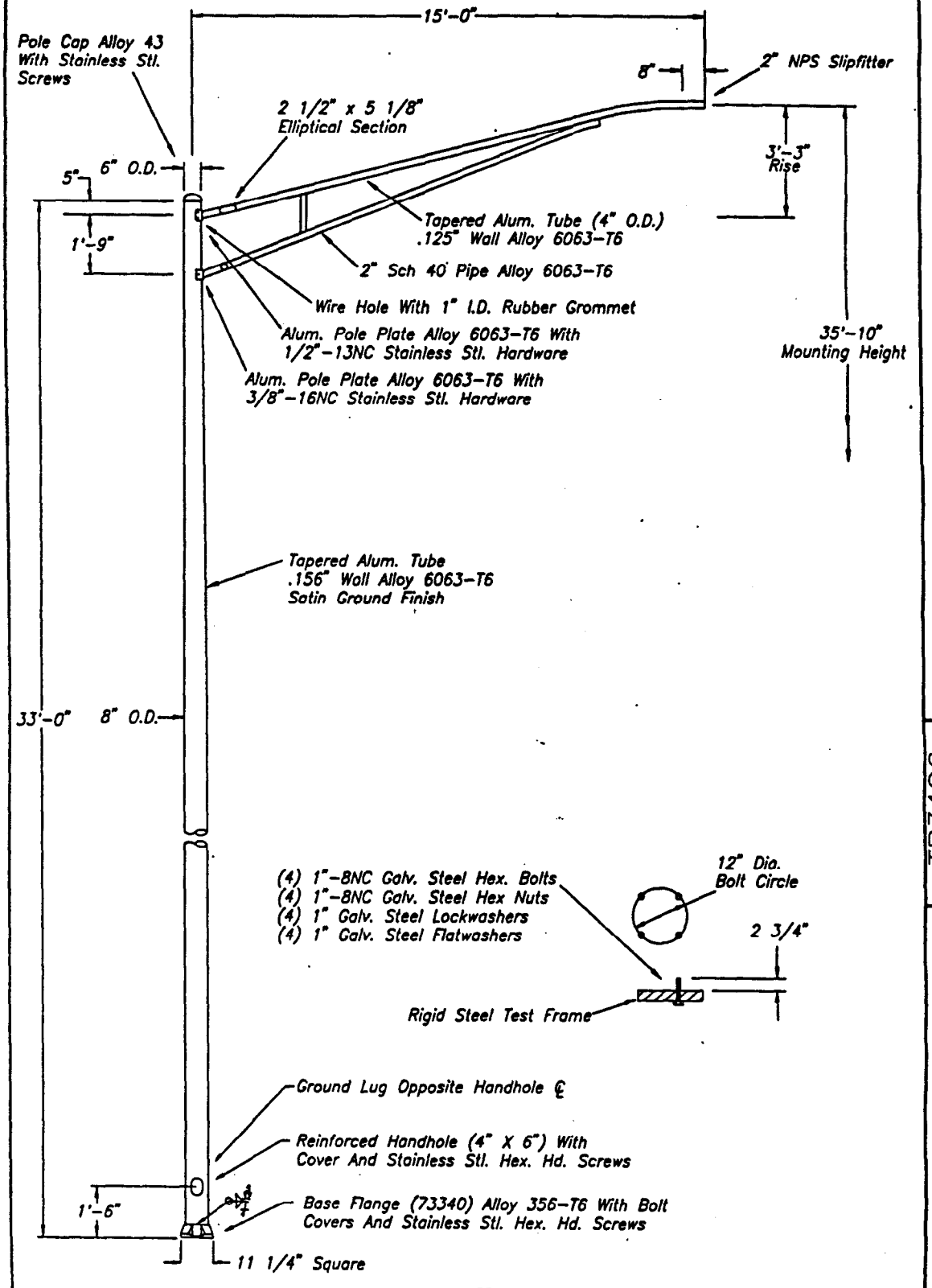

| NO. | REVISIONS | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Hapco COMPANY DIVISION OF KEARNEY-NATIONAL, INC. P. O. BOX 547 ABINGDON, VA. 24210

| | |
|---|---|
| TITLE | 6" BREAKWAY BASE ASS'Y |
| CUSTOMER | |
| SCALE 2.66 | DATE 07/16/93 |
| BY PRS | DWG. NO. A73407 |
| CHK'D | |

Oce Bruning, Inc. 79499 Form 9973

# Hapco Drawing No. TP3406
# Test Luminaire Support




TP3406

| NO. | REVISIONS | DATE |
|---|---|---|
| | | |

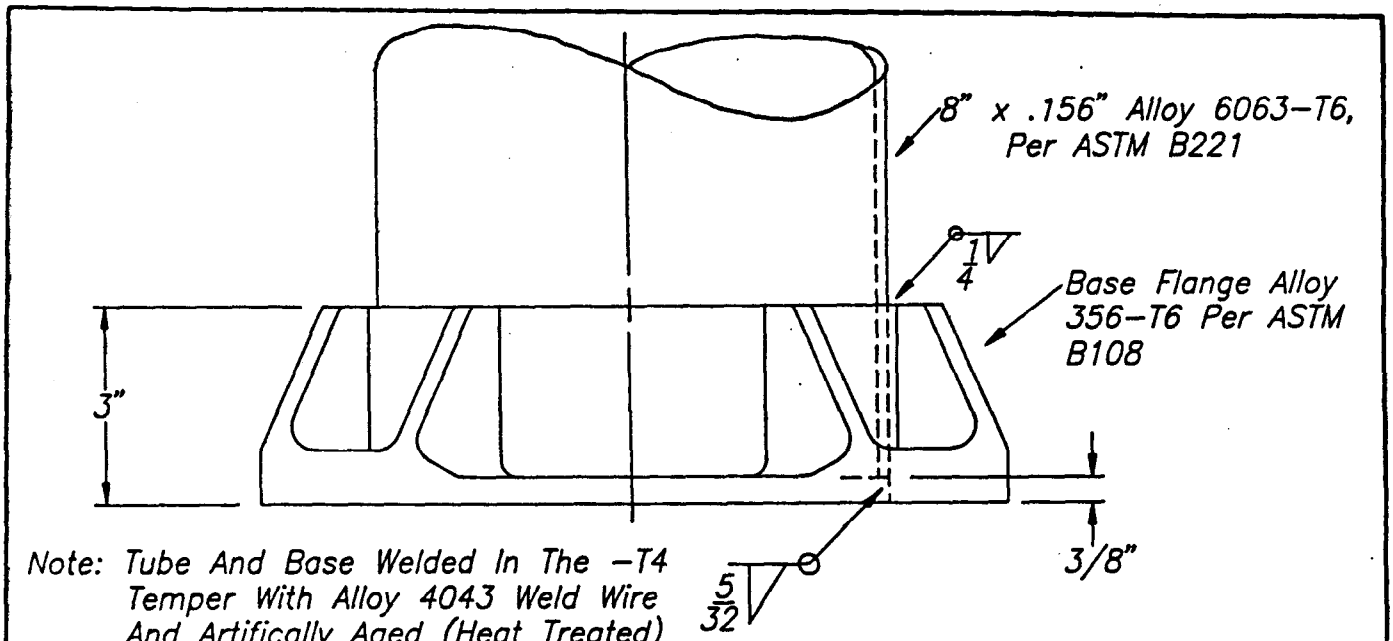
WARNING: Do Not Install Lighting Poles without Luminaires

hapco

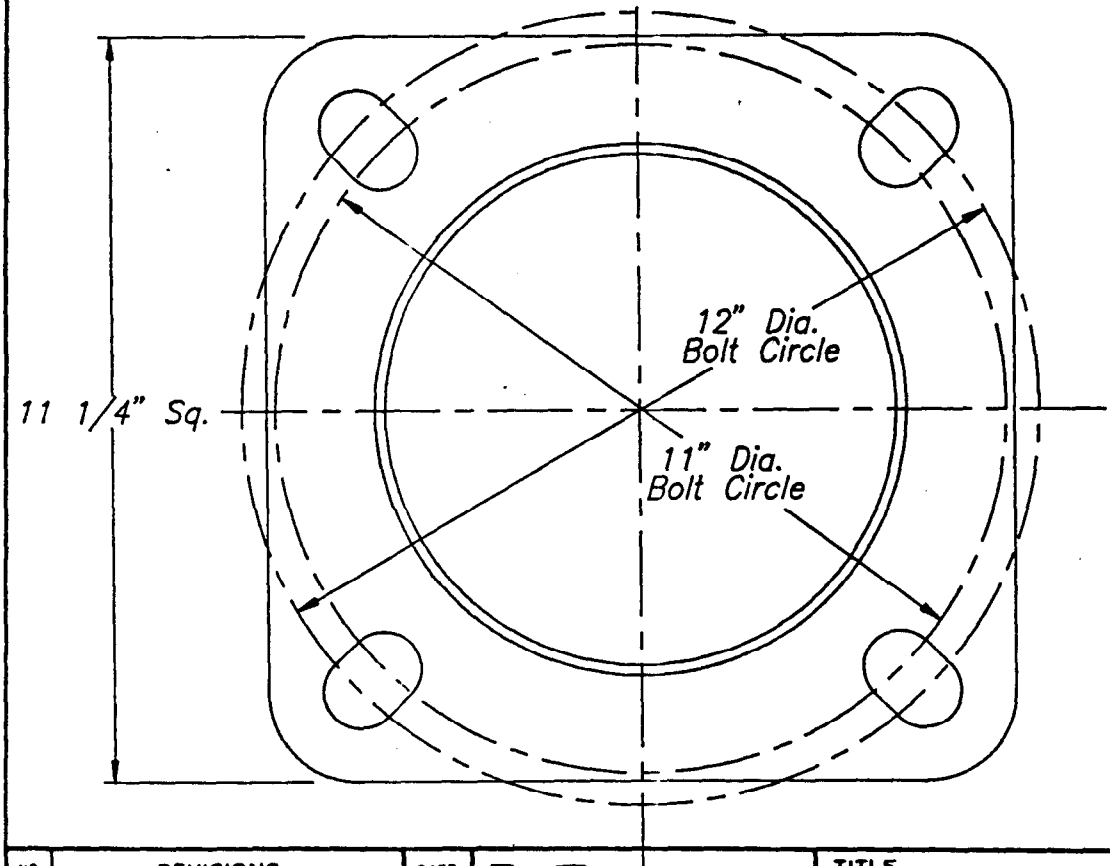
| | |
|---|---|
| TITLE | TEST POLE (TEST # 3406) |
| CUSTOMER | |
| SCALE 32.00 | DATE 07/16/93 |
| BY PRS | DWG. NO. TP3406 |
| CHK'D | |

Hapco Drawing No. 73340

# 8"X.156" Breakaway Base Assembly




Note: Tube And Base Welded In The -T4 Temper With Alloy 4043 Weld Wire And Artifically Aged (Heat Treated) To The -T6 Temper After Welding




| NO. | REVISIONS | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

hapco
COMPANY
DIVISION OF
KEARNEY-NATIONAL, INC.

| | |
|---|---|
| TITLE | 8" X .156" BREAKAWAY BASE ASSEMBLY |
| CUSTOMER | |
| SCALE 2.66 | DATE 06/25/93 |
| BY LW | DWG. NO. A73340 |
| CHK'D TF. | |