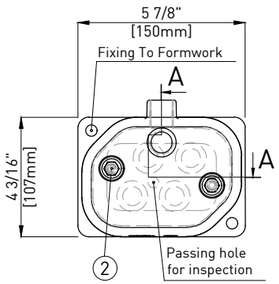
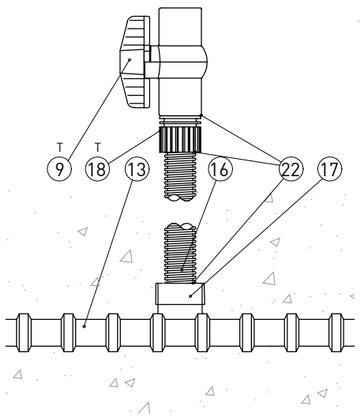
CAUTION

Assembly of anchorage and installation of tendons shall only be performed by qualified post-tensioning specialist personnel.

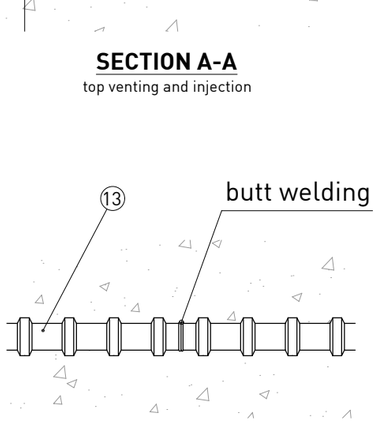
This installation procedure is generic: follow the specific procedure for each project and the FDoT specifications.



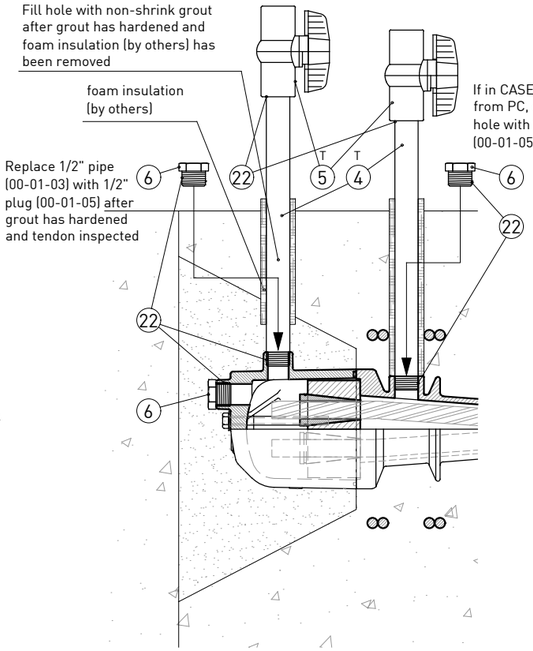

**END VIEW**




w/ welded grout port




butt welded

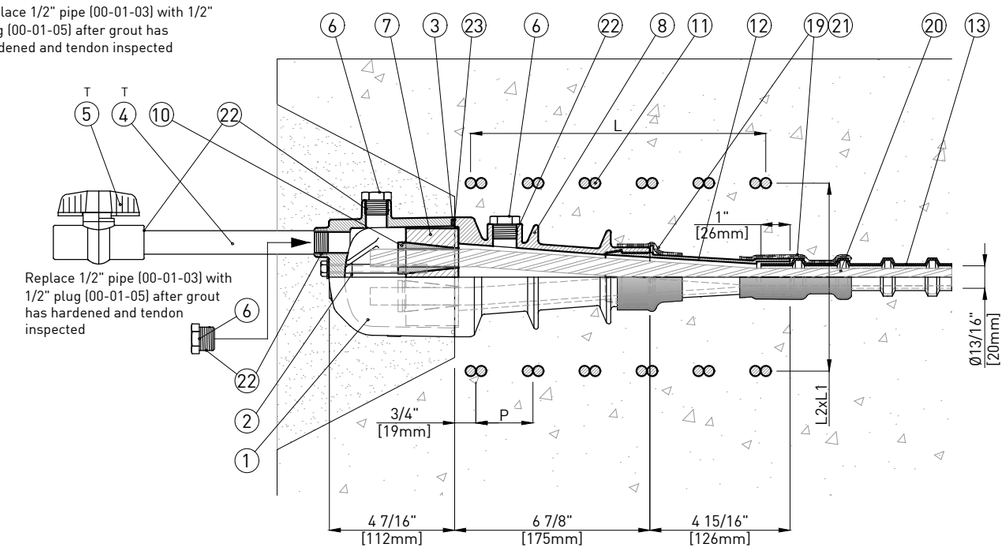


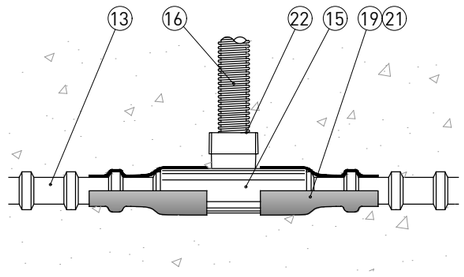

**SECTION A-A**

top venting and injection

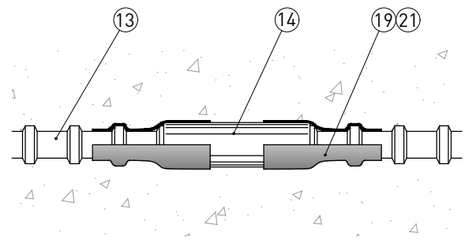
**SECTION A-A**

front venting and injection




w/ coupler and grout port




w/ coupler

INSTALLATION

1. Preassemble anchor (AN) and plastic trumpet (PT), and seal the joint by heat shrink sleeve (or, if not possible, with heat shrink wrap).
2. Bolt the assembled AN to the pocket former using the two threaded holes located on the front surface of AN. AN shall be placed perpendicular to the tendon's axis and with the grout hole that points up.
3. The position of the stirrups (SR) shall be secured to the AN or to adjacent rebar by tack-welding or proper fixing. The SR shall be positioned such that it won't interfere with 1/2" NPT pipe attachment (if using AN grout hole). Align axis of SR with AN.
4. Install the duct as shown on shop drawings, insert it into PT and seal it with duct by heat shrink sleeve (or, if not possible, with heat shrink wrap) in order to prevent concrete from penetrating.
5. Carry out the pressure test.

Concreting can now proceed.

6. After completion of concrete placement, remove the pocket former and prove that duct is clear of any obstructions or damage and that all grout vents are free and secured.
7. Install strands by pushing or pulling individually or as a bundle into duct. Allow sufficient extra length at the active anchorage for stressing. The strand threading can be completed before or after the concrete is poured.
8. Check the wedge plate (WP) for rust and dirt, clean wedge holes with wire brush if necessary. Lightly grease or oil wedge holes.
9. Check wedges for rust. Discard rusty wedges and use only clean ones.
10. Install wedge plate, slip the wedges over the strands and securely place them into wedge holes.
11. Do not apply post-tensioning forces until the concrete mean compressive strength $f'_{ci}$ is not less than the values shown on the stirrups table. These values refer to cylindrical strength.

Stressing can now proceed.

(!) Appropriate clearance must be kept behind the hydraulic jack while stressing.

12. Stressing operation shall be executed according to the engineer form and requires the simultaneous reading of pressure and elongation. Check the conformity of the final elongations measurement with prescribed values.
13. Install the protection cap (PC) with O-ring sealing on AN and WP using two bolts (some silicone grease shall be used to facilitate the compression of the O-ring).
14. Thread ½" NPT pipe for grout onto the PC or the ½" NPT pipe for grout onto AN. Use a ½" plug to secure the holes on PC or on AN not used, except one hole on PC to allow the vent. (Some thread seal tape shall be used to improve the tightness of the threadings)
15. Carry out the pressure test.

Grouting can now proceed.

16. Grout shall be injected through the filler inlet until it escapes from the filler outlet. Special measures shall be applied for long tendons, for tendon paths with distinct high points or inclined tendons to avoid voids.
17. All vents and grouting inlets/outlets have to be sealed with plugs soon after grouting.
18. Fill holes with non-shrink grout after post grouting operation and inspection are completed.

BILL OF MATERIALS

| ITEM | PART # | DESCRIPTION | MATERIAL |
|---|---|---|---|
| 1 | I-4-01-00 | Protection Cap | Nylon S-PA0401 - according to ASTM D5989 |
| 2 | I-4-01-01 | Protection Cap Bolts | Stainless Steel GR316L - according to ASTM F593 |
| 3 | I-4-01-02 | Protection Cap O-Ring | NBR - according to FDoT Tab.2.2.1.7-1 Sec.960 |
| 4 | 00-01-03 | NPT Pipe Nipples 1/2" | SCH80 PVC or SCH40 steel |
| 5 | 00-01-04 | NPT Ball Valve 1/2" | PVC 150 psi rated |
| 6 | 00-01-05 | NPT Plug 1/2" | High Density Polyethylene - according to ASTM D3350 |
| 7 | I-4-02-00 | Wedge Plate | Steel AISI C1045 Normalized |
| 8 | I-4-03-00 | Anchor | Ductil Iron ASTM A536 GR80-55-06 + Galvanization according to ASTM A123 |
| 9 | 00-03-02 | NPT Ball Valve 3/4" | PVC 150 psi rated |
| 10 | 00-04-00 | Wedges | Steel AISI 12L14 - according to ASTM A108 + Heat treatment |
| 11 | I-4-05-00 | Stirrups | Steel GR60, #3 - according to ASTM A615 |
| 12 | I-4-06-00 | Trumpet | High Density Polyethylene - according to ASTM D3350 |
| 13 | I-4-07-00 | Duct 0.83x2.83" | Polypropylene - according to ASTM D4101 |
| 14 | I-4-07-01 | Duct Coupler 0.83x2.83" | Polypropylene - according to ASTM D4101 |
| 15 | I-4-07-02 | Duct Coupler w/ Vent 0.83x2.83" | Polypropylene - according to ASTM D4101 |
| 16 | 00-07-03 | Hose 21mm | Polyethylene - according to ASTM D3350 |
| 17 | 00-07-04-P | Vent Port 21mm PP | Polypropylene - according to ASTM D4101 |
| 18 | 00-07-05 | Adaptor 21mm-3/4" | Polypropylene - according to ASTM D4101 |
| 19 | I-4-07-06 | Heat Shrink Sleeve | Coated Polyolefin Backing - according to FDoT Tab.2.2.1.8-1 Sec.960 |
| 20 | 00-08-00 | Strand 0.6" | Steel GR270 - according to ASTM A416 |
| 21 | 00-09-00 | Heat Shrink Wrap | Coated Polyolefin Backing - according to FDoT Tab.2.2.1.8-1 Sec.960 |

**INTERMEDIATE COUPLING DETAILS**

see installation procedures

NOTE:

- Components marked with "T" on the drawing are temporary;
- Port and hose assembly may be oriented in any required direction to create a vent or a drain.

MISCELLANEOUS MATERIALS

| ITEM | DESCRIPTION |
|---|---|
| 22 | Commercially available thread seal tape |
| 23 | Commercially available and compatible silicone grease |

STURRUPS

| CONCRETE CLASS | 3500 PSI [24MPA] | 6500 PSI [45MPA] |
|---|---|---|
| LENGTH (L) | 8-3/4" [223mm] | 10-13/16" [274mm] |
| MIN WIDTH (L1) | 6-11/16" [170mm] | 4-5/8" [117mm] |
| MAX WIDTH (L2) | 9-1/4" [235mm] | 6-5/8" [168mm] |
| PITCH (P) | 2" [51mm] | |
| BAR DIAMETER | #3 - 3/8" [9.5mm] | |
| N. OF STIRRUPS | 10 | 12 |

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 05/08/18 | First issue | L.C. | T.C. |

Material : -

Treatment : -

TENSA AMERICA GRUPPO DE ECCHER

Title :

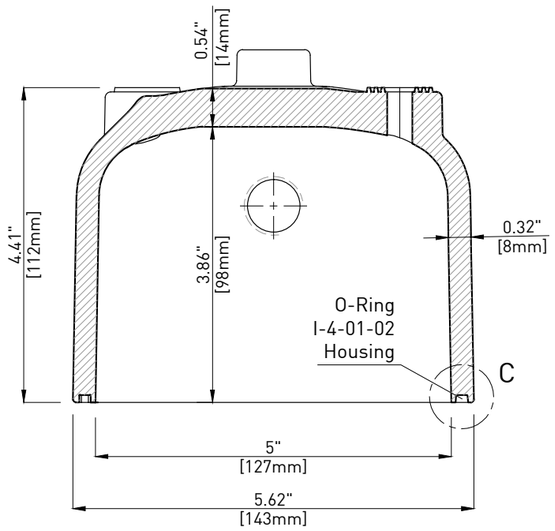
**INTERNAL PT SYSTEM ASSEMBLY for 4APTS15 (4-0.6")**

TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

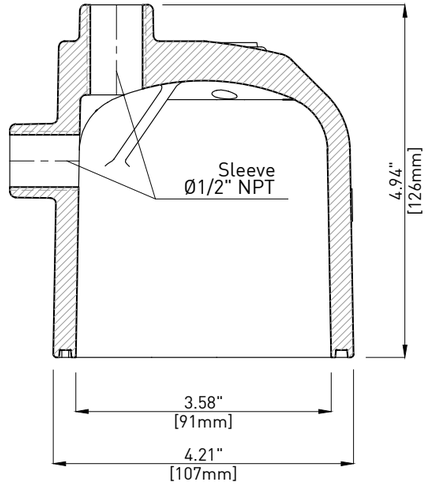
Drawn : L.CIVATI | Checked : T.CICCONE

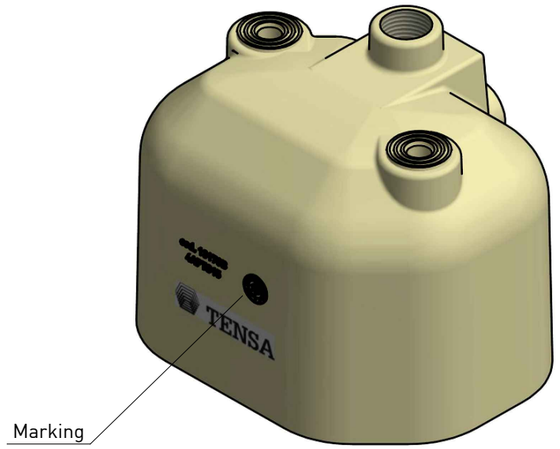
Date : 05/08/2018 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-00-00** | Code : -

## SECTION A-A

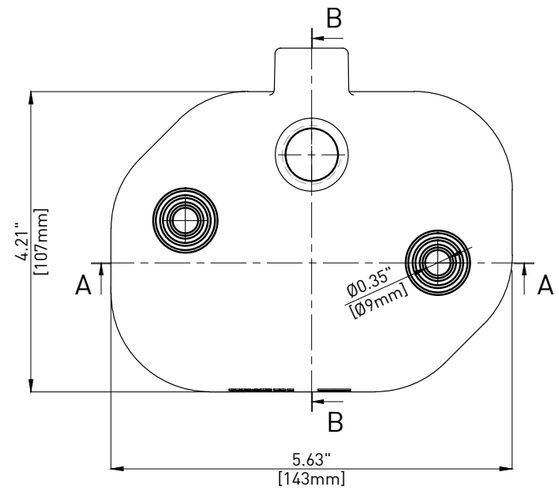



## SECTION B-B

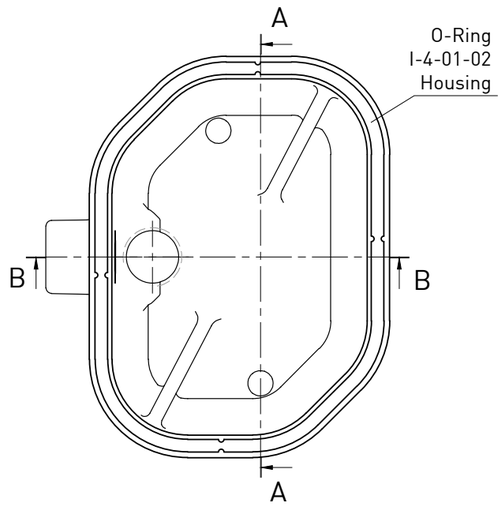


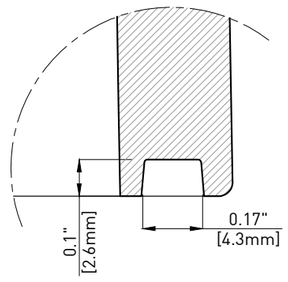




## TOP VIEW



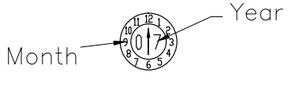

## BOTTOM VIEW



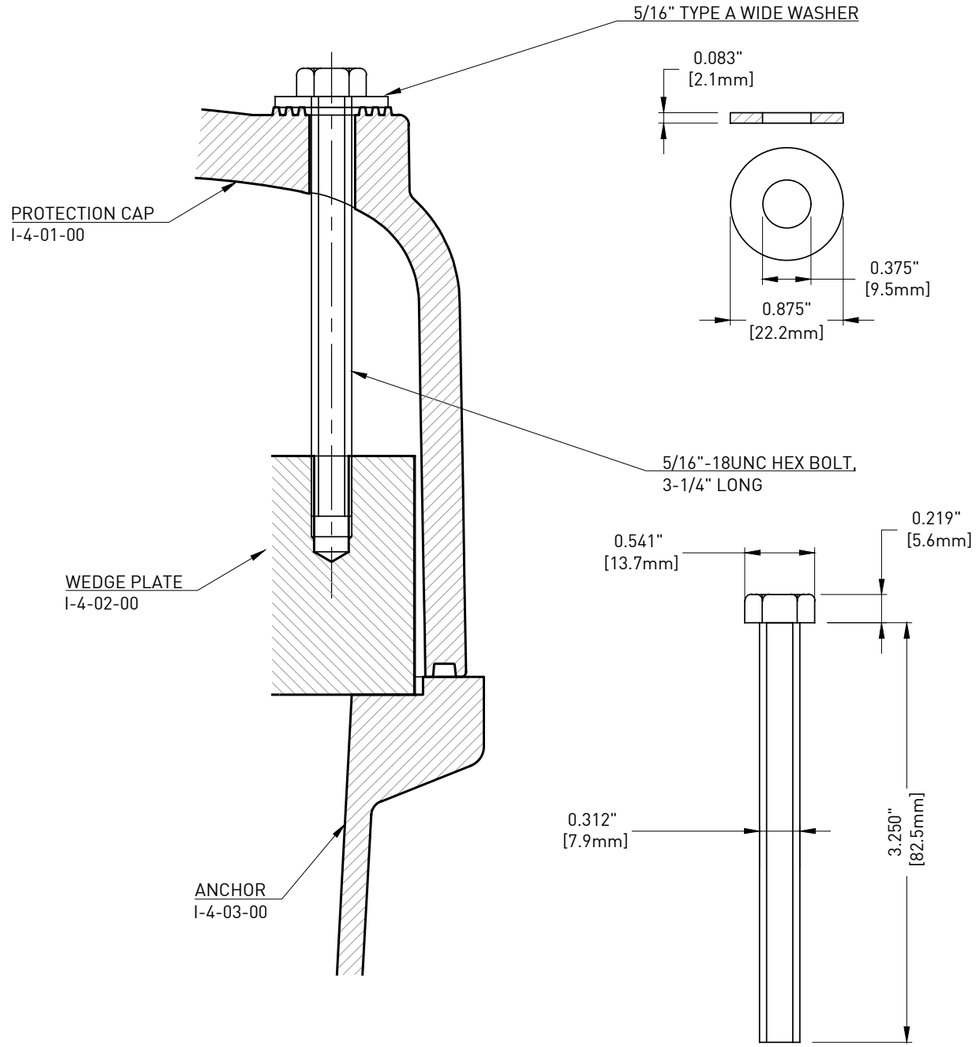

## DETAIL C

## Marking — Type




| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 11/03/16 | First issue | L.C. | T.C. |

| | | |
|---|---|---|
| Material :<br>Nylon S-PA0401 - according to ASTM D5989 | | Treatment :<br>- |
| TENSA GRUPPO DE ECCHER \| AMERICA | | Title :<br>**PROTECTION CAP for 4APTS15** |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI / Checked : T.CICCONE |
| Date : 11/03/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-01-00** / Code : - |










| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 05/03/18 | First issue | L.C. | T.C. |

| | |
|---|---|
| Material :<br>Stainless Steel GR316L - according to ASTM F593 | Treatment :<br>- |

TENSA GRUPPO DE ECCHER | AMERICA

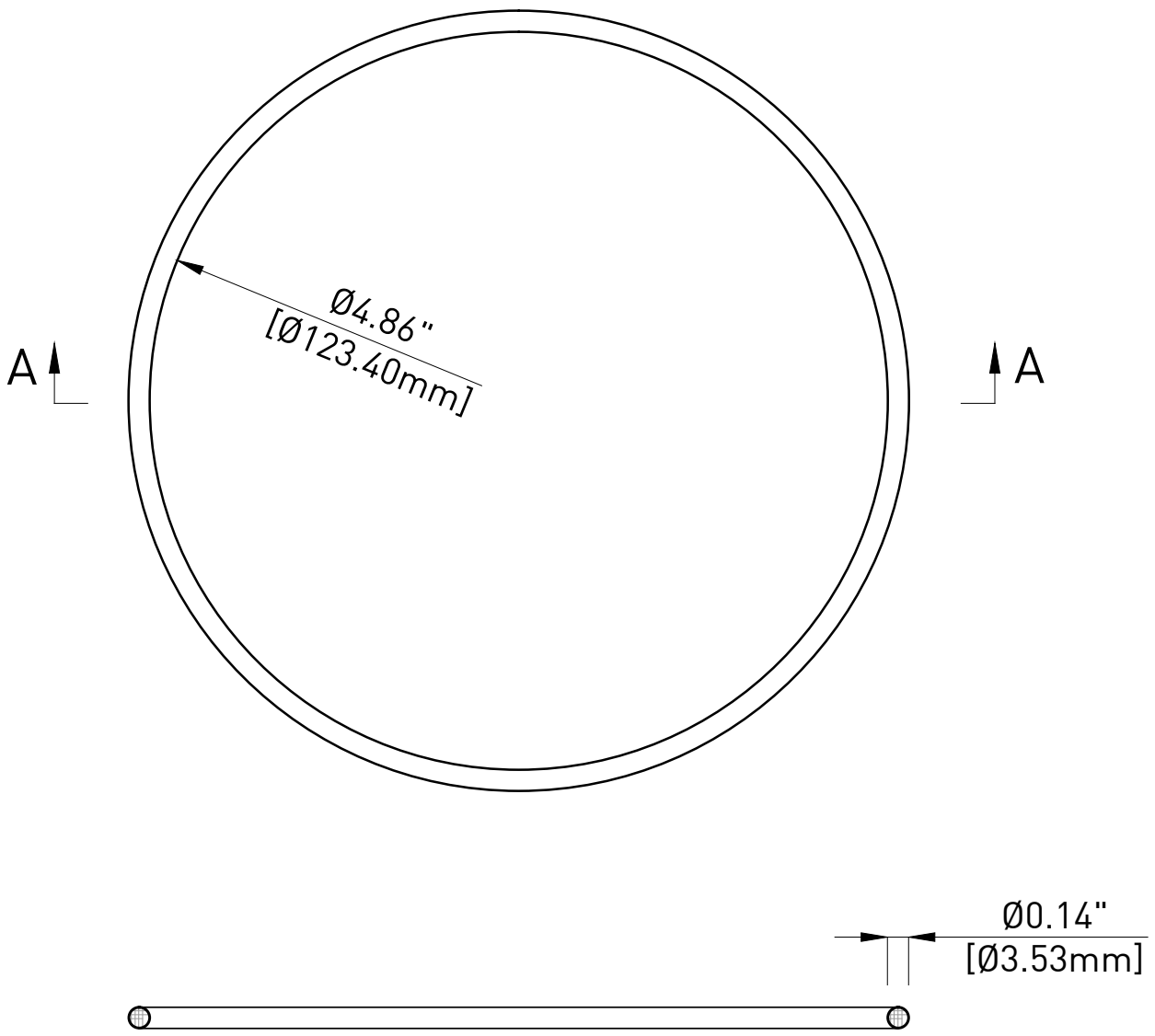
Title :

**PROTECTION CAP BOLTS**

**for 4APTS15**

TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

| | | | |
|---|---|---|---|
| | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 05/03/2018 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-01-01** | Code : - |




SECTION A-A

NOTE:

- This drawing is not intended for manufacturing purposes.

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |

| Material : | Treatment : |
|---|---|
| NBR - according to FDoT Tab. 2.2.1.7-1 Sec.960 | - |

TENSA GRUPPO DE ECCHER | AMERICA

Title :

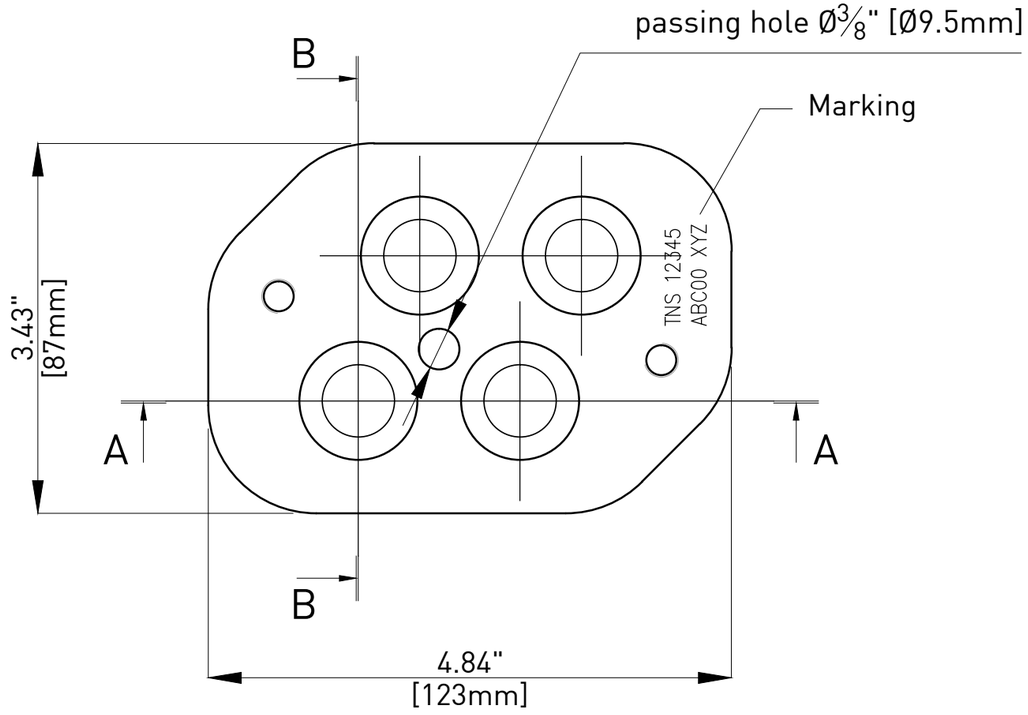
**Centro Guarnizioni TIGER s.r.l**

**PROTECTION CAP O-RING**

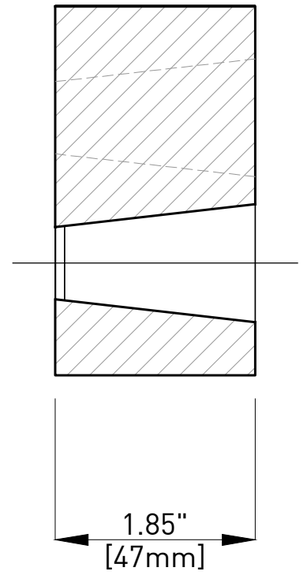
**for 4APTS15 PT SYSTEM**

TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

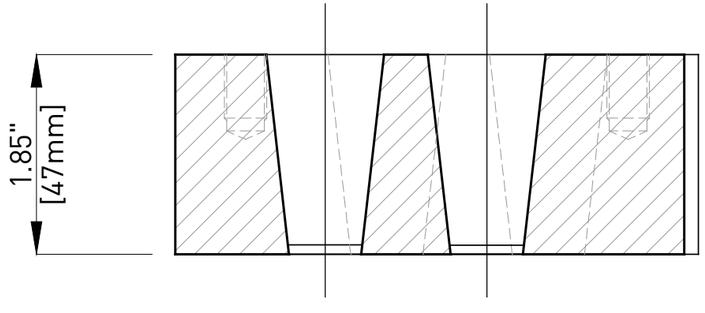
| | | | |
|---|---|---|---|
| | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-01-02** | Code : OR 04487 |




## SECTION B-B



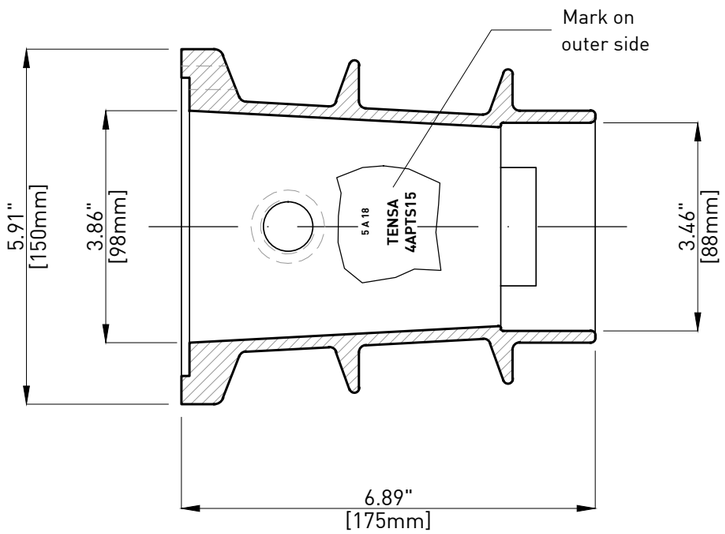

## SECTION A-A



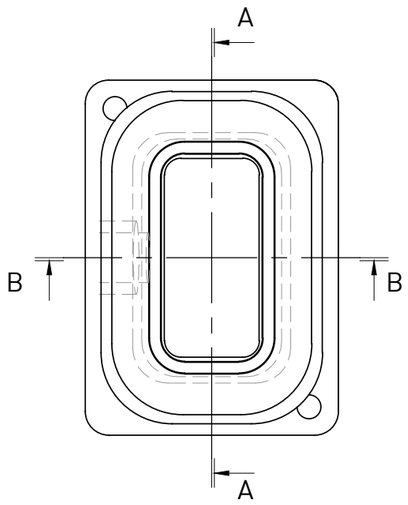

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |

| | | | |
|---|---|---|---|
| Material :<br>Steel AISI C1045 Normalized | | Treatment :<br>- | |
| TENSA GRUPPO DE ECCHER \| AMERICA | | Title :<br>**WEDGE PLATE**<br>**for 4APTS15 (4-0.6")** | |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-02-00** | Code : - |

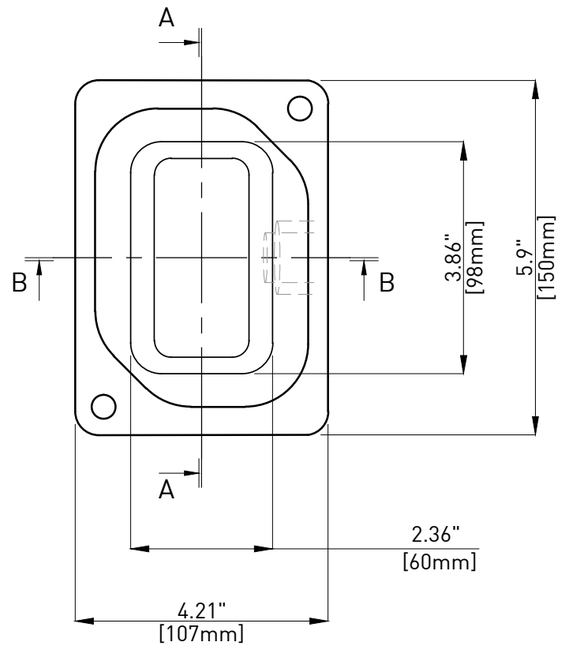
## SECTION A-A



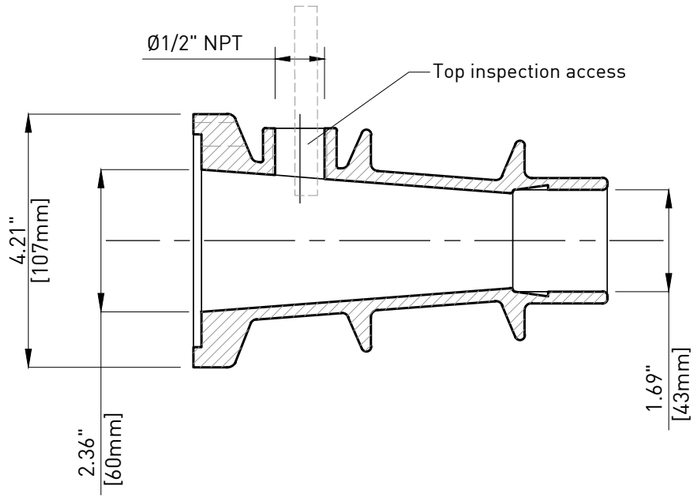

## RIGHT VIEW




## LEFT VIEW



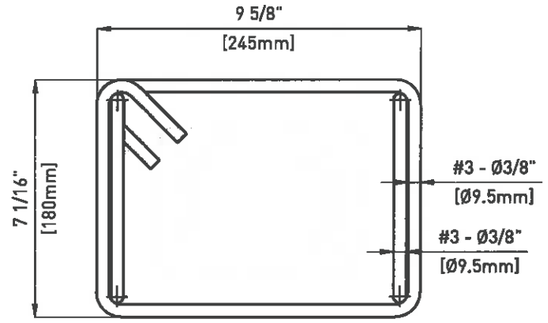

## SECTION B-B

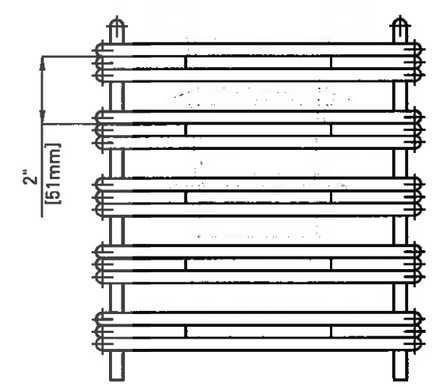



| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |

| | | | |
|---|---|---|---|
| Material :<br>Ductil Iron ASTM A536 GR80-55-06 | | Treatment :<br>Galvanization according to ASTM A123 | |
| TENSA AMERICA GRUPPO DE ECCHER | | Title :<br>**ANCHOR 4APTS15 (37-0.6")** | |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-03-00** | Code : - |

STANDARD REINFORCEMENT
FOR CONCRETE CLASS $f'_{ci}$ = 3500psi (24MPa) *

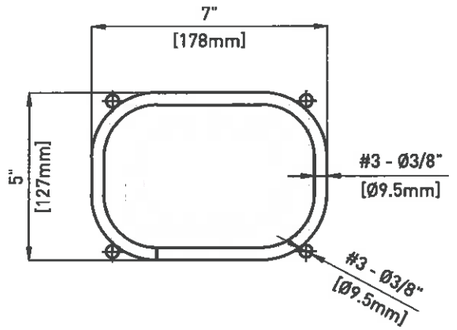


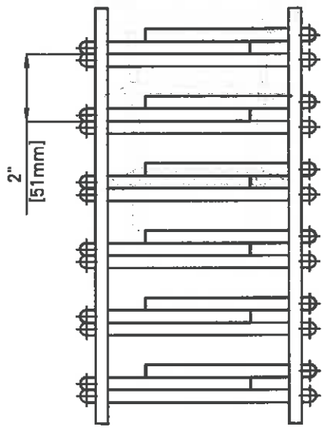




NO. OF STIRRUPS:
10

NO. OF STIRRUP
HOLDERS:
2

STANDARD REINFORCEMENT
FOR CONCRETE CLASS $f'_{ci}$ = 6500psi (45MPa) *




NO. OF STIRRUPS:
12

NO. OF STIRRUP
HOLDERS:
4

R. CRAIG FINLEY, JR.
LICENSE
NO. 34234
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

I have independently reviewed the calculations and testing reports, along with the documentation and certified that TENSA system spiral rebar detail meets the requirements as outlined in paragraph 3.3 PTI Anchorage Zone Design.

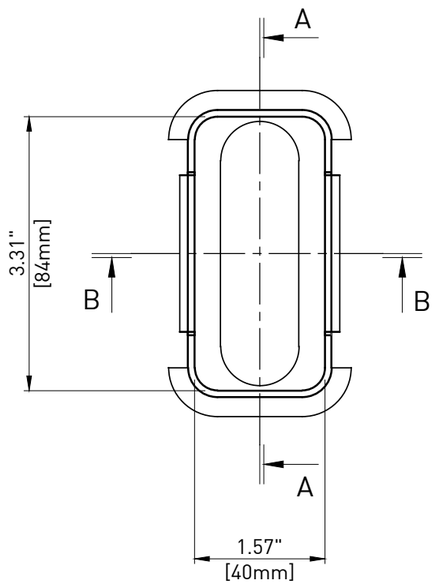
(*) Do not apply post-tensioning forces until the concrete mean compressive strength $f'_{ci}$ is not less than the values shown in the present drawing.

NOTE: The local zone reinforcement is to be shown on the shop drawings.

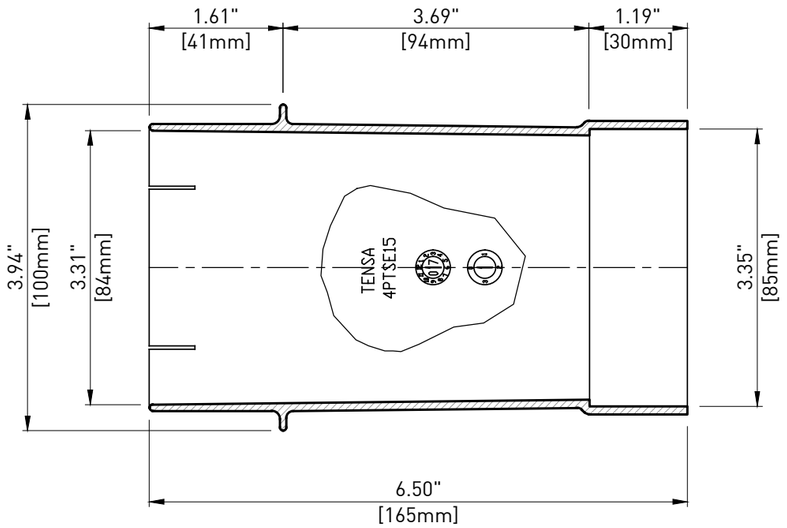
| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/17 | First issue | L.C. | T.C. |

| | | | |
|---|---|---|---|
| Material : Steel Rebar GR60, #3 - according to ASTM A615 | | Treatment : - | |
| TENSA GRUPPO DE ECCHER \| AMERICA | | Title : **STIRRUPS REINFORCEMENT for 4APTS15** | |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 12/20/2017 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-04-05-00** | Code : - |

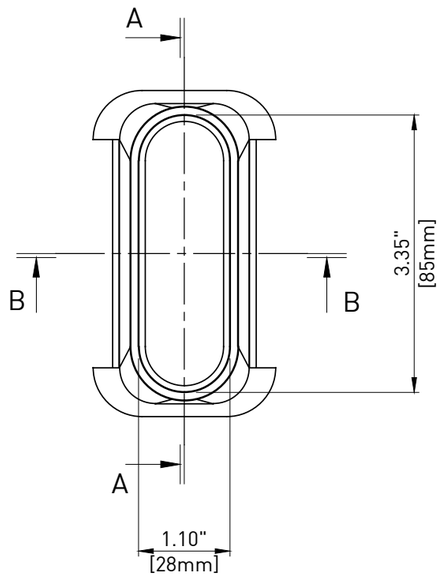
## LEFT VIEW



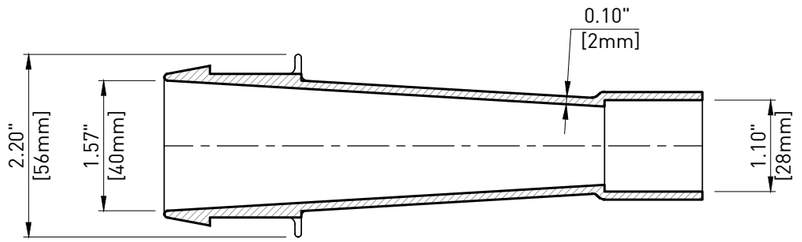

## SECTION A-A



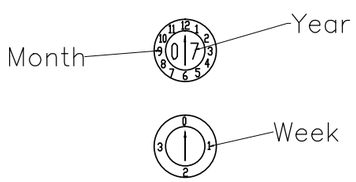

## RIGHT VIEW




## SECTION B-B




## Marking — Type




| Material : | Treatment : |
|---|---|
| High Density Polyethylene - according to ASTM D3350 | - |

TENSA AMERICA
GRUPPO DE ECCHER

Title :

**TRUMPET for 4APTS15**

**Standard fit for I-4-07-00 DUCT**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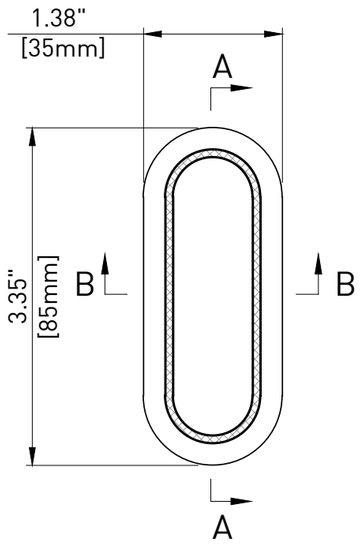
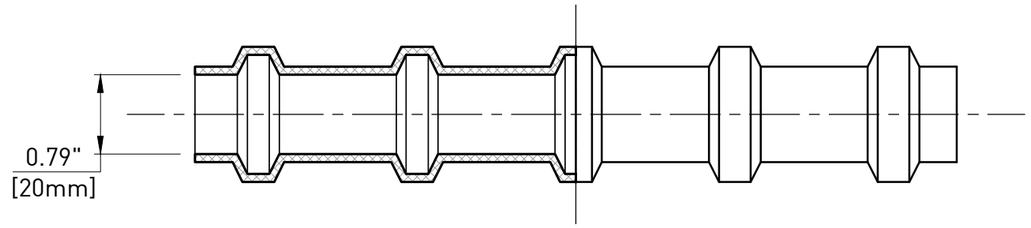
| Drawn : L.CIVATI | Checked : T.CICCONE |
|---|---|

| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-06-00** | Code : - |
|---|---|---|---|

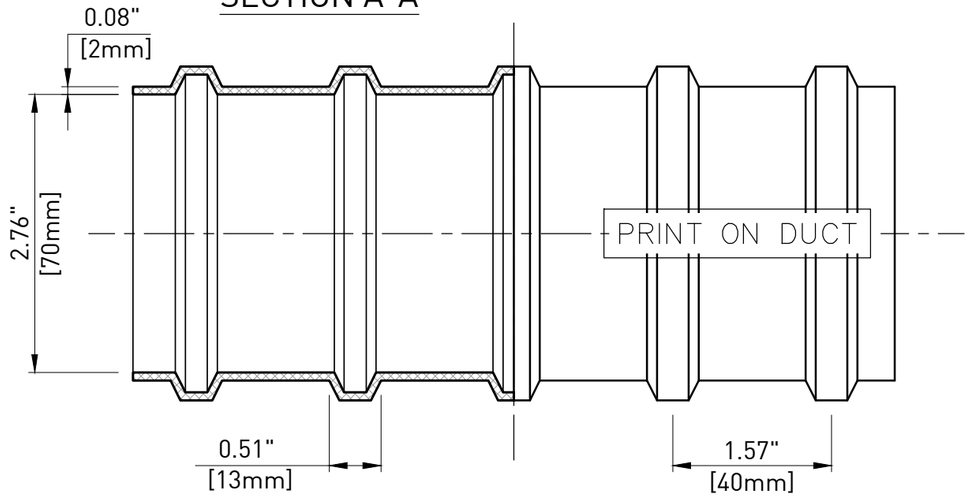
| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |




SECTION B-B




SECTION A-A




| Minimum radii of curvature determined as per FIB Bulletin 75, Annex A8 | |
|---|---|
| Minimum radius [ft (m)] | 11.38 (3.47) |

PRINT ON DUCT:
"GTI GENERAL TECHNOLOGIES, INC. STAFFORD, TEXAS ___ U.S. & FOREIGN PATENTS P.N. 220100 72x21mm"

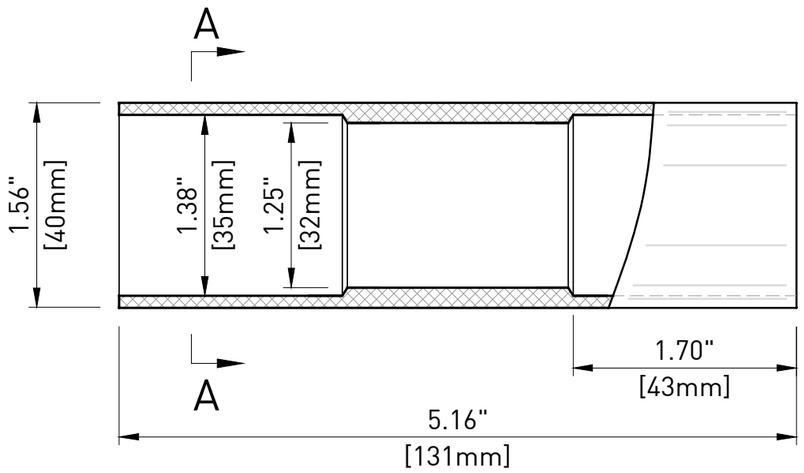
NOTE:

- All dimensions are measured;
- This drawing is not intended for manufacturing purposes;
- Duct is delivered in straight sections or in coils;
- Duct meets FDoT requirements in terms of Minimum Wall Thickness (Table 2.2.1.1-1 Section 960).

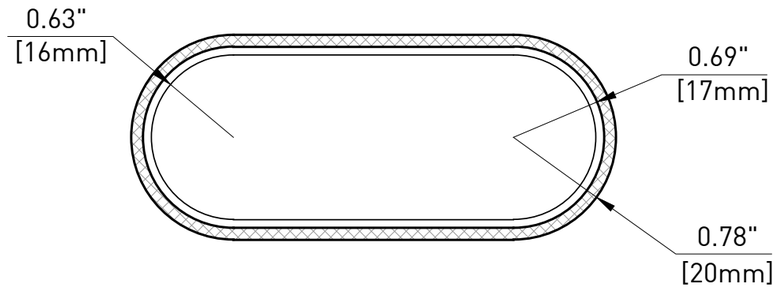
| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 05/03/18 | First issue | L.C. | T.C. |

| | | | |
|---|---|---|---|
| Material :<br>Polypropylene - according to ASTM D4101 | | Treatment :<br>- | |
| TENSA AMERICA<br>GRUPPO DE ECCHER | | Title :<br>**GTI DUCT 2.83x0.83" (72x21mm) for Internal Bonded System Standard fit for 4APTS15** | |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 05/03/2018 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-07-00** | Code : 220100 |

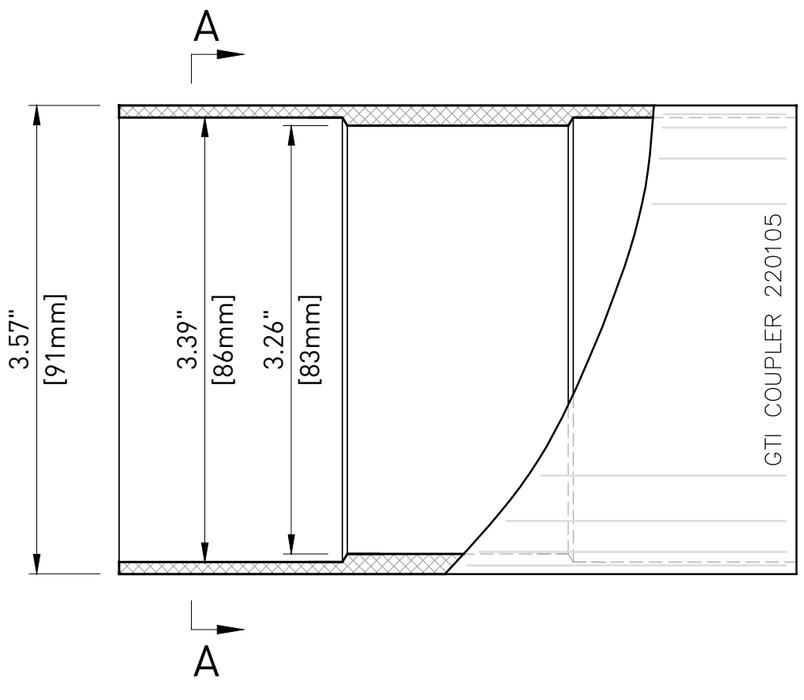
## TOP SECTION/ELEVATION




## SECTION A-A




## SIDE SECTION/ELEVATION




NOTE:

- This drawing is not intended for manufacturing purposes;
- Coupler meets or exceeds FDoT requirements (Section 960-2.2.1.5 and 2.4.4);
- Standard fit for 2.83x0.83" [72x21mm] corrugated plastic flat duct.

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |

| Material : | Treatment : |
|---|---|
| Polypropylene - according to ASTM D4101 | - |

TENSA GRUPPO DE ECCHER | AMERICA

Title :

**GTI SLIP-ON COUPLER**
**for INTERNAL PT SYSTEM**
**Standard fit for 4APTS15**

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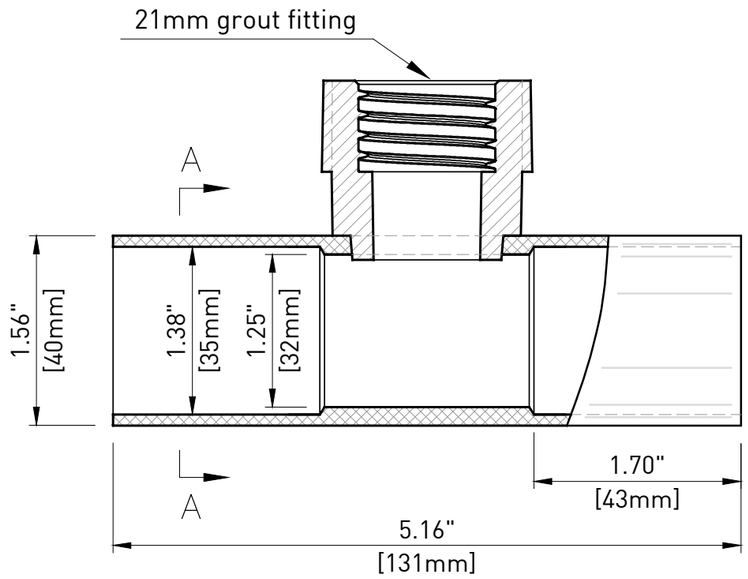
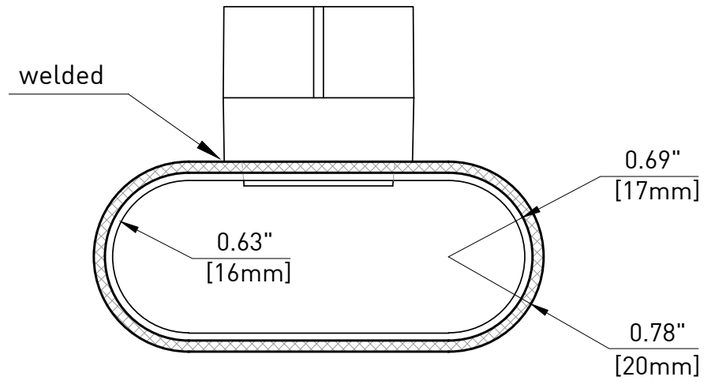
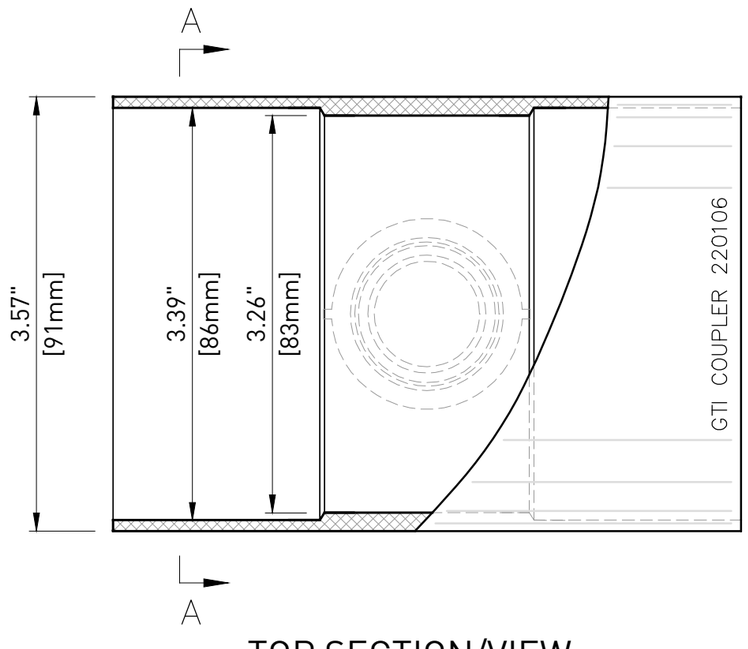
| | | | |
|---|---|---|---|
| Drawn : L.CIVATI | Checked : T.CICCONE | | |
| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-07-01** | Code : 220105 |




SIDE SECTION/ELEVATION




SECTION A-A




TOP SECTION/VIEW

NOTE:

- This drawing is not intended for manufacturing purposes;
- Coupler meets or exceeds FDoT requirements (Section 960-2.2.1.5 and 2.4.4);
- Standard fit for 2.83x0.83" [72x21mm] corrugated plastic flat duct.

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 12/20/16 | First issue | L.C. | T.C. |

| Material : | Treatment : |
|---|---|
| Polypropylene - according to ASTM D4101 | - |

TENSA GRUPPO DE ECCHER | AMERICA

Title : **GTI SLIP-ON COUPLER W/ 21mm PORT for INTERNAL PT SYSTEM Standard fit for 4APTS15**

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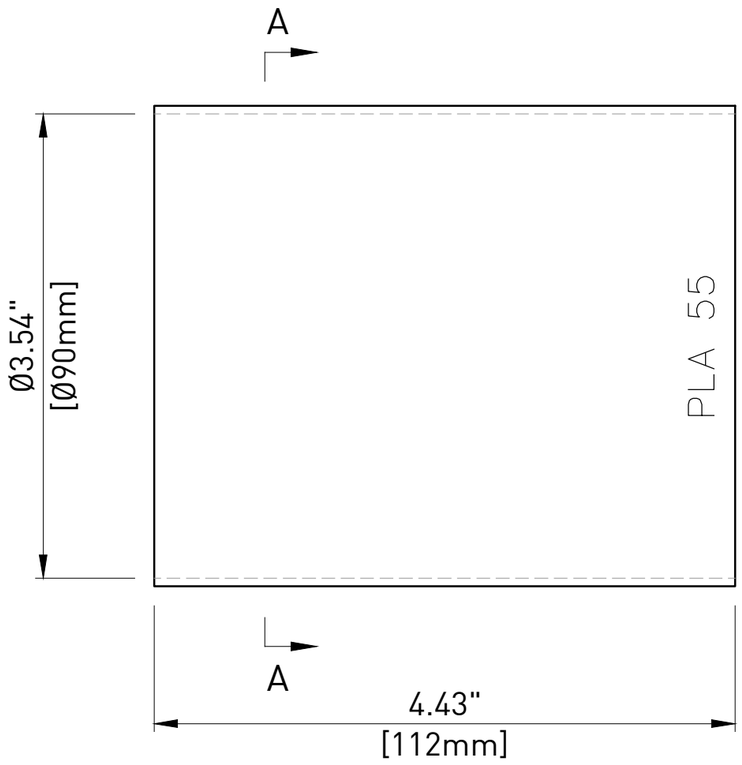
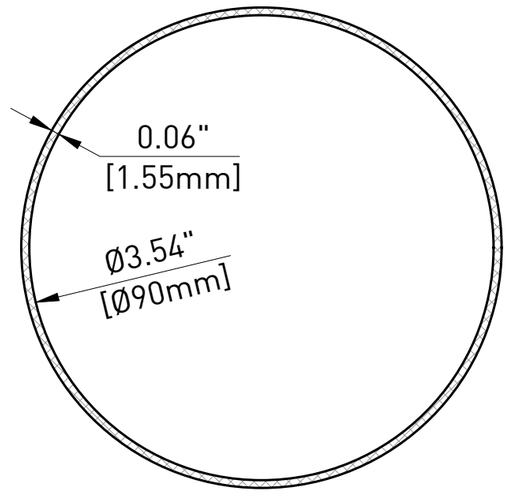
| | | | |
|---|---|---|---|
| Drawn : L.CIVATI | Checked : T.CICCONE | | |
| Date : 12/20/2016 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-07-02** | Code : 220106 |

## ELEVATION




## SECTION A-A




INSTALLATION

Surface Preparation

1. Lightly abrade the coupler (or trumpet) and duct to a distance of 2 inches (50mm) beyond each end of the shrinksleeve.
2. Wipe clean the coupler (or trumpet) and duct to remove foreign contaminants. Ensure that the components are dry before cleaning.

Installation

3. Completely remove the inner release liner from the sleeve and center the shrinksleeve over the joint to be sealed.
4. Using the appropriate sized heat gun or torch, begin at the center of the shrinksleeve and heat circumferentially around the duct and coupler. Use broad strokes.
5. Continue heating from the center toward one end of the shrinksleeve until recovery is complete (sleeve has shrunk). In a similar manner heat and shrink the remaining side. Shrinking has been completed when the adhesive begins to ooze at the shrinksleeve edges all around the circumference.
6. Finish shrinking the sleeve with long horizontal strokes over the entire surface to ensure a uniform bond.
7. Allow the shrinksleeve to cool for two hours prior to usage.

Inspection

8. Check the full contact of sleeve with the coupler (or trumpet) and duct.
9. Check that adhesive flows beyond both sleeve edges.
10. Check that no cracks or holes are present in shrinksleeve backing.

NOTE:

- The installation procedure is general; reference to manifacturer's instruction manual for the detailed installation instructions;
- This drawing is not intended for manufacturing purposes;
- Heat shrink sleeve meets or exceeds FDoT requirements (Table 2.2.1.8-1 Section 960);
- Tabular sleeve diameter:

  - 3.5" [90mm] as supplied
  - 2.3" [55mm] fully recovered

| Rev. | Date | Description | Drawn | Checked |
|---|---|---|---|---|
| 0 | 05/03/18 | First issue | L.C. | T.C. |

| | | | |
|---|---|---|---|
| Material :<br>Coated Polyolefin Backing - according to FDoT Tab.2.2.1.8-1 Sec.960 | | Treatment :<br>- | |
| TENSA GRUPPO DE ECCHER \| AMERICA | | Title :<br>**CANUSA-CPS HEAT SHRINK SLEEVE**<br>**Standard fit for 4APTS15** | |
| TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917<br>1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL | | Drawn : L.CIVATI | Checked : T.CICCONE |
| Date : 05/03/2018 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : I-4-07-06** | Code : PLA-55-112-BK |