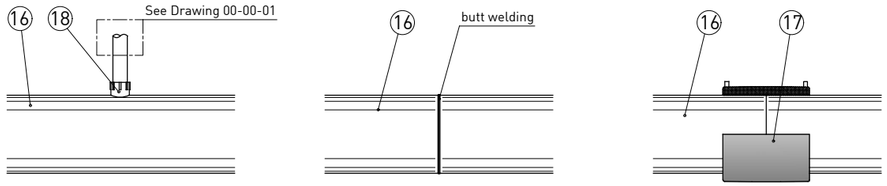
CAUTION

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.



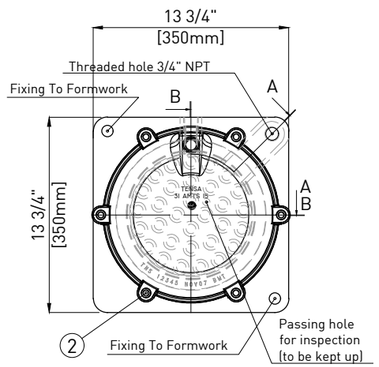
w/ welded port | butt welded | electrofused

INTERMEDIATE COUPLING DETAILS

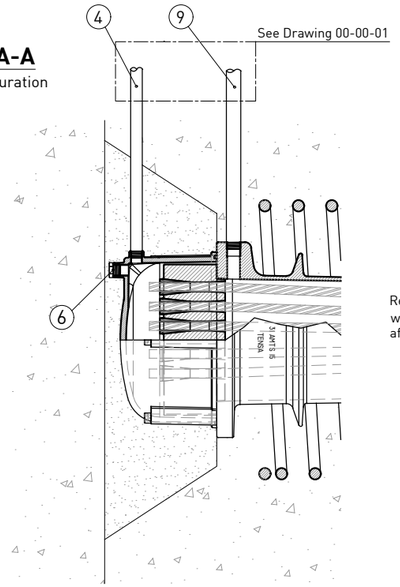
see installation procedures

SECTION A-A

large duct configuration

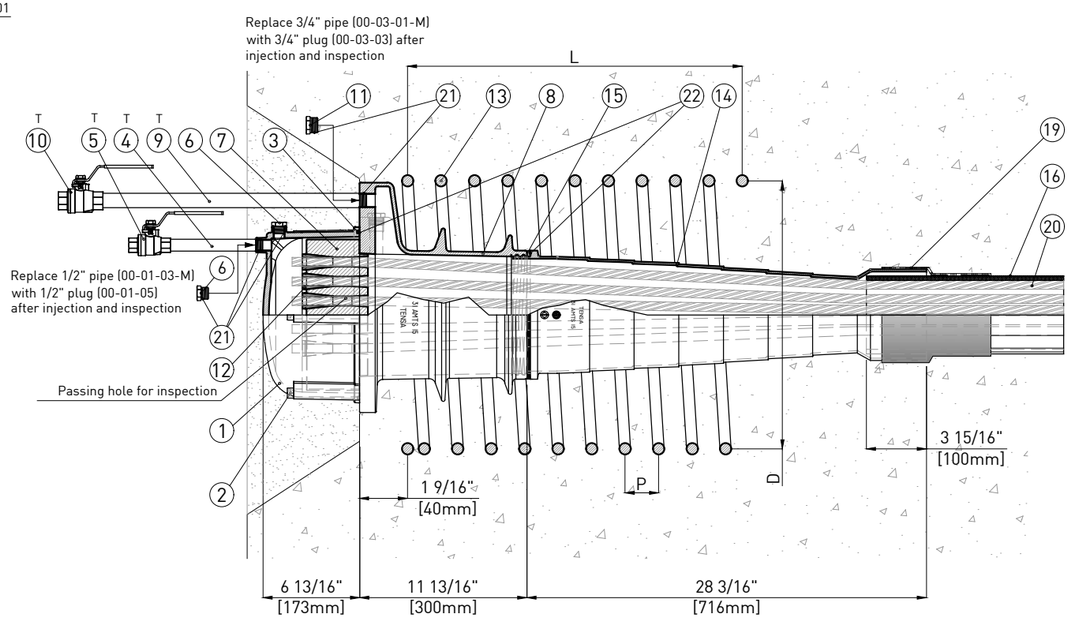


END VIEW



SECTION B-B

top injection and venting



SECTION A-A

front injection and venting

BILL OF MATERIALS			
ITEM	PART #	DESCRIPTION	MATERIAL
1	31-01-00	Protection Cap	Nylon S-PA0401 - according to ASTM D5989
2	31-01-01	Protection Cap Bolts	Stainless Steel GR316L - according to ASTM F593
3	31-01-02	Protection Cap O-Ring	NBR - according to FDoT Tab.2.2.1.7-1 Sec.960
4	00-01-03-M	NPT Pipe Nipple 1/2"	SCH40 steel
5	00-01-04-M	NPT Ball Valve 1/2"	SCH40 steel
6	00-01-05	NPT Plug 1/2"	High Density Polyethylene - according to ASTM D3350
7	E-31-02-00	Wedge Plate	Steel AISI C1045 Normalized
8	31-03-00	Anchor	Ductil Iron ASTM A536 GR80-55-06 + Galvanization according to ASTM A123
9	00-03-01-M	NPT Pipe Nipple 3/4"	SCH40 steel
10	00-03-02-M	NPT Ball Valve 3/4"	SCH40 steel
11	00-03-03	NPT Plug 3/4"	High Density Polyethylene - according to ASTM D3350
12	00-04-00	Wedges	Steel AISI 12L14 - according to ASTM A108 + Heat treatment
13	31-05-00	Spiral	Steel GR60, #6 - according to ASTM A615
14	31-06-00	Trumpet	High Density Polyethylene - according to ASTM D3350
15	31-06-01	Compression Seal	NBR - according to FDoT Tab.2.2.1.7-1 Sec.960
16	E-IU-31-07-08	Smooth Plastic Duct 5.563"	High Density Polyethylene - according to ASTM D3350
17	E-IU-31-07-12	Electrofusion Duct Coupler 5.563"	High Density Polyethylene - according to ASTM D3350
18	00-07-04-EM	Vent Port 3/4" NPT PE	Polyethylene - according to ASTM D3350
19	E-IU-27-07-13	High Temp 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

NOTE: Components marked with "T" on the drawing are temporary

MISCELLANEOUS MATERIALS	
ITEM	DESCRIPTION
21	Commercially available thread seal tape
22	Commercially available and compatible silicone grease

SPIRAL		
CONCRETE CLASS	4000 PSI [27.5MPA]	6500 PSI [45MPA]
LENGTH (L)	25-1/2" [649mm]	20-7/8" [529mm]
DIAMETER (D)	20-1/2" [521mm]	15-3/4" [401mm]
PITCH (P)	2-3/8" [60mm]	
BAR DIAMETER	#6 - 3/4" [19mm]	
N. OF TURNS	12	10

INSTALLATION

1. Preassemble anchor (AN) and plastic trumpet (PT) (some silicone grease shall be used to facilitate the threading and the compression of the gasket).
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 rotated such as the side injection hole points up.
3. The position of the spiral rebar (SR) shall be secured to the AN or to adjacent rebar by tack-welding or proper fixing. The SR shall be rotated such that it won't interfere with 3/4" NPT pipe attachment (if using side injection hole). Align axis of SR with AN. Seal unused port in AN.
4. Install the smooth duct as shown on shop drawings and insert it into PT , sealing the connection 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 injection 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.
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 (keeping up the inspection hole), 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 spiral 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 using six bolts (some silicone grease shall be used to facilitate the compression of the O-ring).
14. Thread ½" NPT pipe for injection onto the PC and the ¾" NPT pipe onto AN. Use a ½" plug to secure the hole on PC not used (some thread seal tape shall be used to improve the tightness of the threadings).
15. Carry out the pressure test.

Injection can now proceed.

16. Wax 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 injection inlets/outlets have to be sealed with plugs soon after injection.
18. Fill holes with non-shrink grout after post injection operation and inspection are completed.

Rev.	Date	Description	Drawn	Checked
0	02/13/20	First issue	L.C.	T.C.

Material :	Treatment :
-	-

TENSA AMERICA | GRUPPO DE ECCHER

Title :

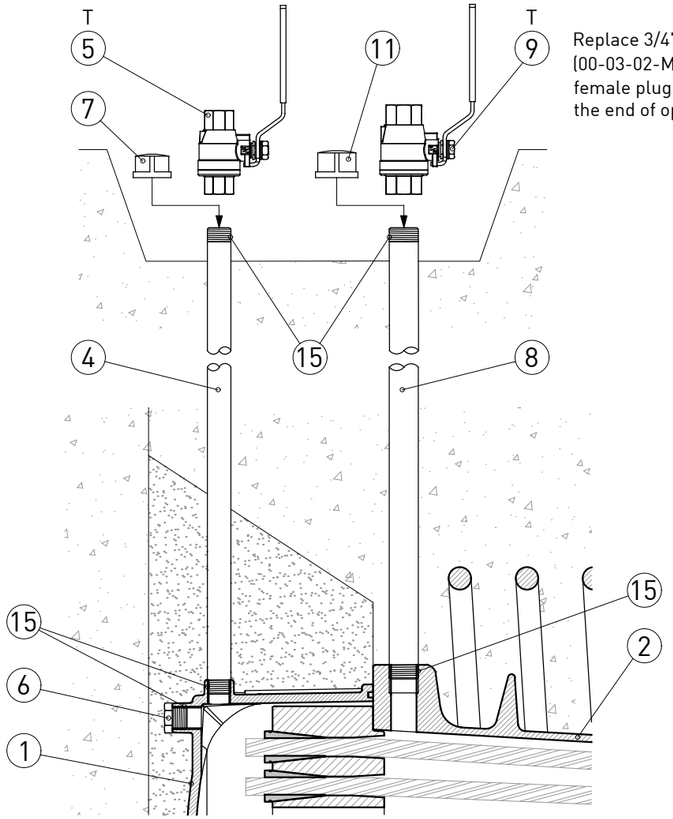
EXTERNAL UNBONDED PT SYSTEM ASSEMBLY for 31AMTS15 (31-0.6")

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 : 02/13/2020	Dimensions : INCH [mm] mm FOR REFERENCE ONLY
Part # : E-31-00-00	Code : -

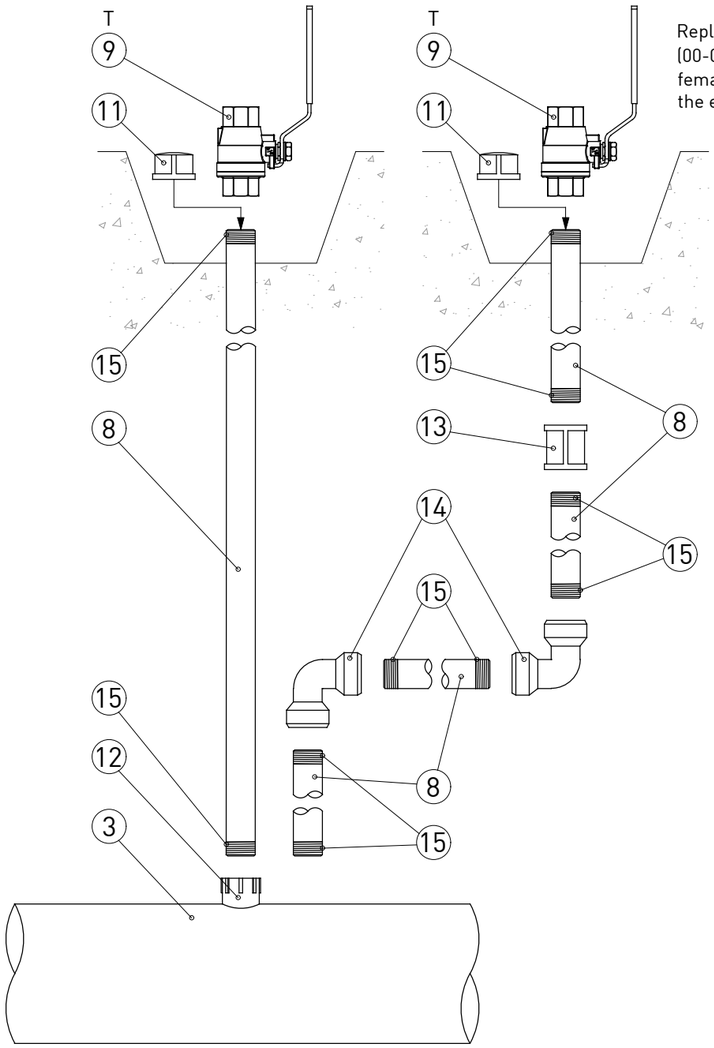
Replace 1/2" ball valve (00-01-04-M) with 1/2" female plug (00-01-06) at the end of operations

Replace 3/4" ball valve (00-03-02-M) with 3/4" female plug (00-03-04) at the end of operations



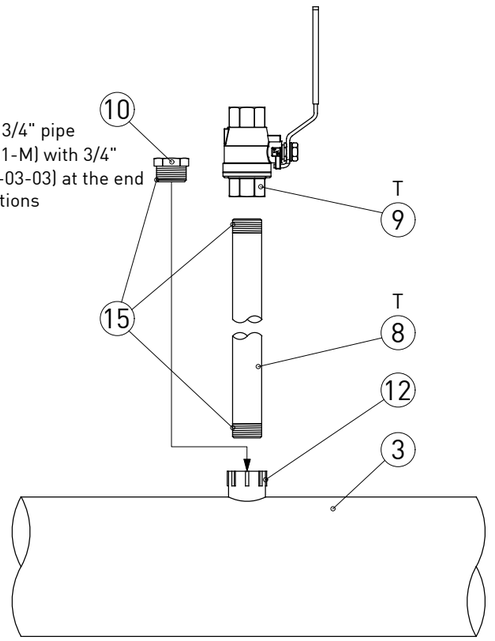
ANCHORAGE CONFIGURATION

top venting and injection



PIPE INTERNAL CONFIGURATION

Replace 3/4" pipe (00-03-01-M) with 3/4" plug (00-03-03) at the end of operations



PIPE EXTERNAL CONFIGURATION

BILL OF MATERIALS			
ITEM	PART #	DESCRIPTION	MATERIAL
1	XX-01-00*	Protection Cap	Nylon S-PA0401 - according to ASTM D5989
2	XX-03-00*	Anchor	Ductil Iron ASTM A536 GR80-55-06 + Galvanization according to ASTM A123
3	E-IU-XX-07-08*	Smooth Plastic Duct	High Density Polyethylene - according to ASTM D3350
4	00-01-03-M	NPT Pipe Nipple 1/2"	SCH40 steel
5	00-01-04-M	NPT Ball Valve 1/2"	SCH40 steel
6	00-01-05	NPT Plug 1/2"	High Density Polyethylene - according to ASTM D3350
7	00-01-06	NPT Female Plug 1/2"	SCH40 steel
8	00-03-01-M	NPT Pipe Nipple 3/4"	SCH40 steel
9	00-03-02-M	NPT Ball Valve 3/4"	SCH40 steel
10	00-03-03	NPT Plug 3/4"	High Density Polyethylene - according to ASTM D3350
11	00-03-04	NPT Female Plug 3/4"	SCH40 steel
12	00-07-04-EM	Vent Port 3/4" NPT PE	Polyethylene - according to ASTM D3350
13	00-07-06	NPT Nipple Coupler 3/4"	SCH40 steel
14	00-07-07	NPT Elbow 3/4"	SCH40 steel

* depending from system dimension

NOTE:

- Vent assemblies can be used as inlet, outlet or drain; when elbows are present, the vent cannot be used for injection / inspection;
- Epoxy grout shall be used to fill recessess: make reference to FDoT standard plans index 462-003 for post-tensioning anchorage and tendon filling details
- Concrete cover must meet FDoT Structures Design Guidelines Section 1.4.2
- Components marked with "T" on the drawing are temporary

MISCELLANEOUS MATERIALS	
ITEM	DESCRIPTION
15	Commercially available thread seal tape

Rev.	Date	Description	Drawn	Checked
0	04/26/18	First issue	L.C.	T.C.

Material : -	Treatment : -

TENSA GRUPPO DE ECCHER | AMERICA

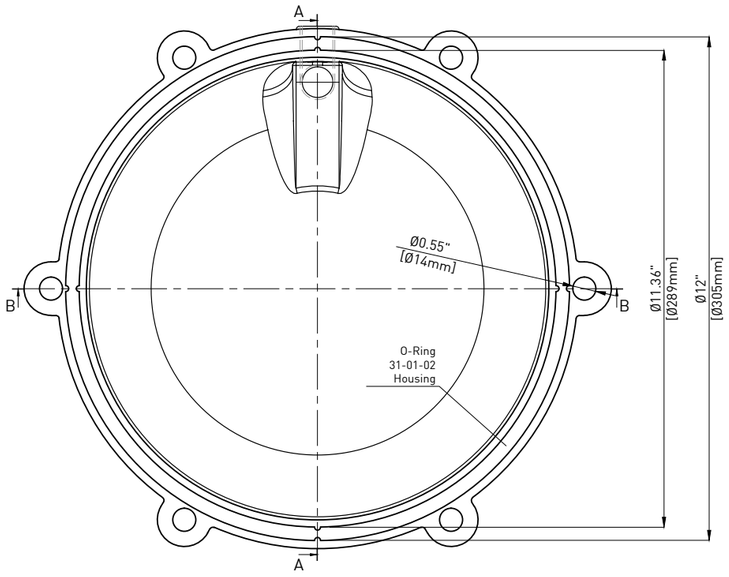
Title :

INTERNAL UNBONDED / EXTERNAL VENT ASSEMBLIES

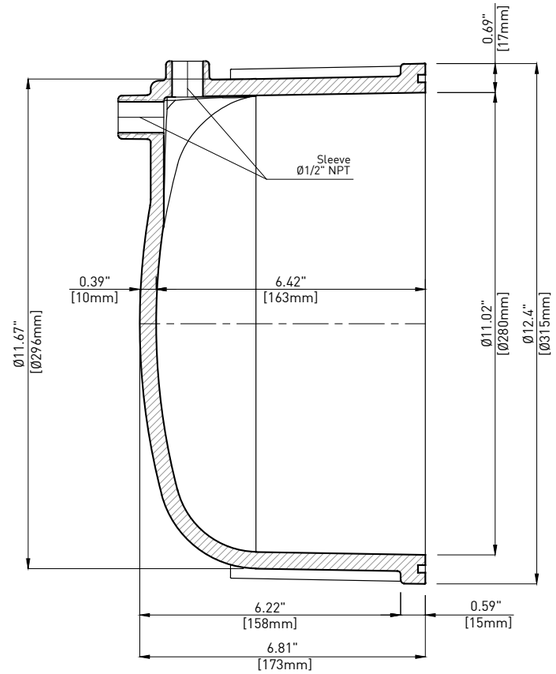
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

		Drawn : L.CIVATI	Checked : T.CICCONE
Date : 04/26/2018	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 00-00-01**	Code : -

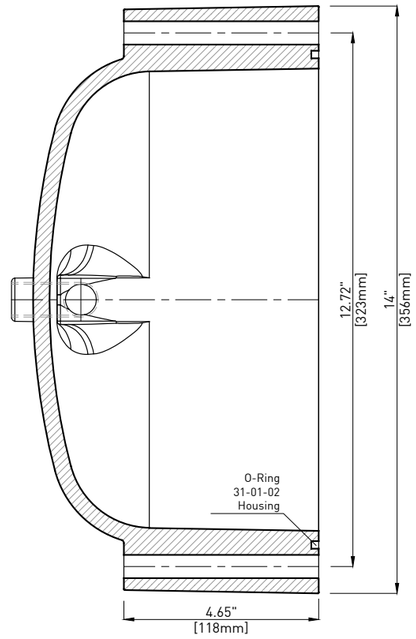
BOTTOM VIEW



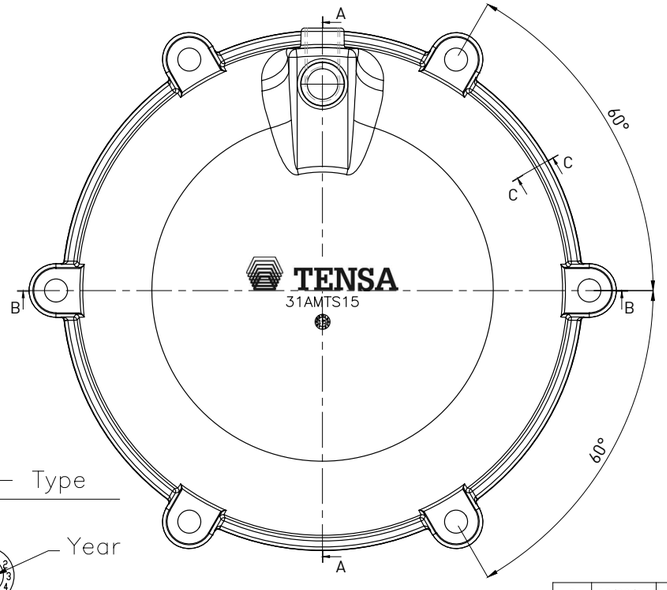
SECTION A-A

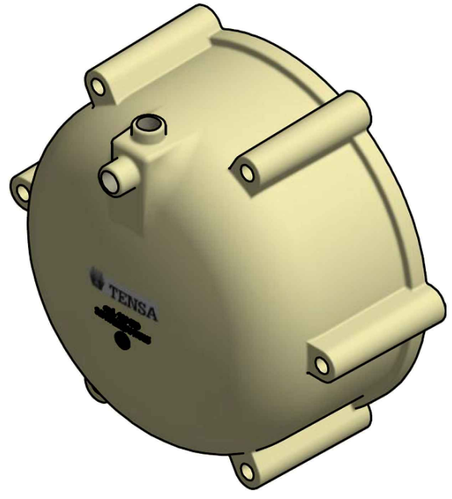


SECTION B-B

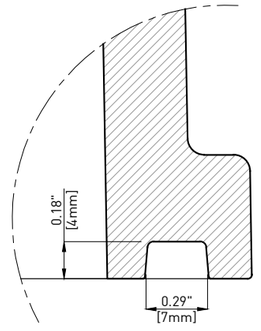


TOP VIEW

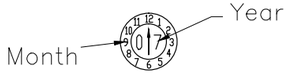




SECTION C-C

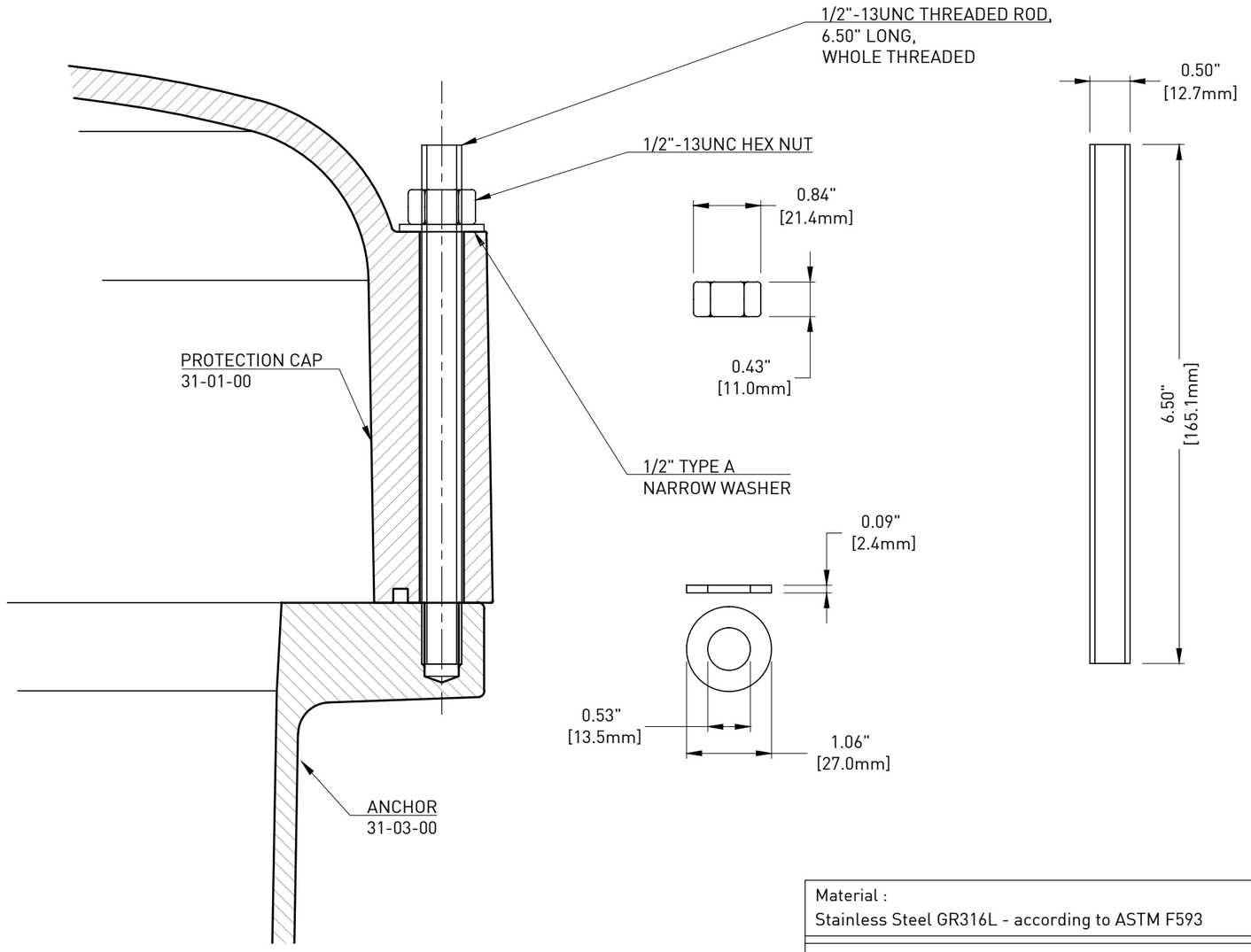


Marking — Type



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

Material : Nylon S-PA0401 - according to ASTM D5989		Treatment : -
TENSA GRUPPO DE ECCHER | AMERICA		Title : **PROTECTION CAP for 31AMTS15**
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 # : 31-01-00** / Code : -



Material :	Treatment :
Stainless Steel GR316L - according to ASTM F593	-

TENSA GRUPPO DE ECCHER | AMERICA

Title :

PROTECTION CAP BOLTS

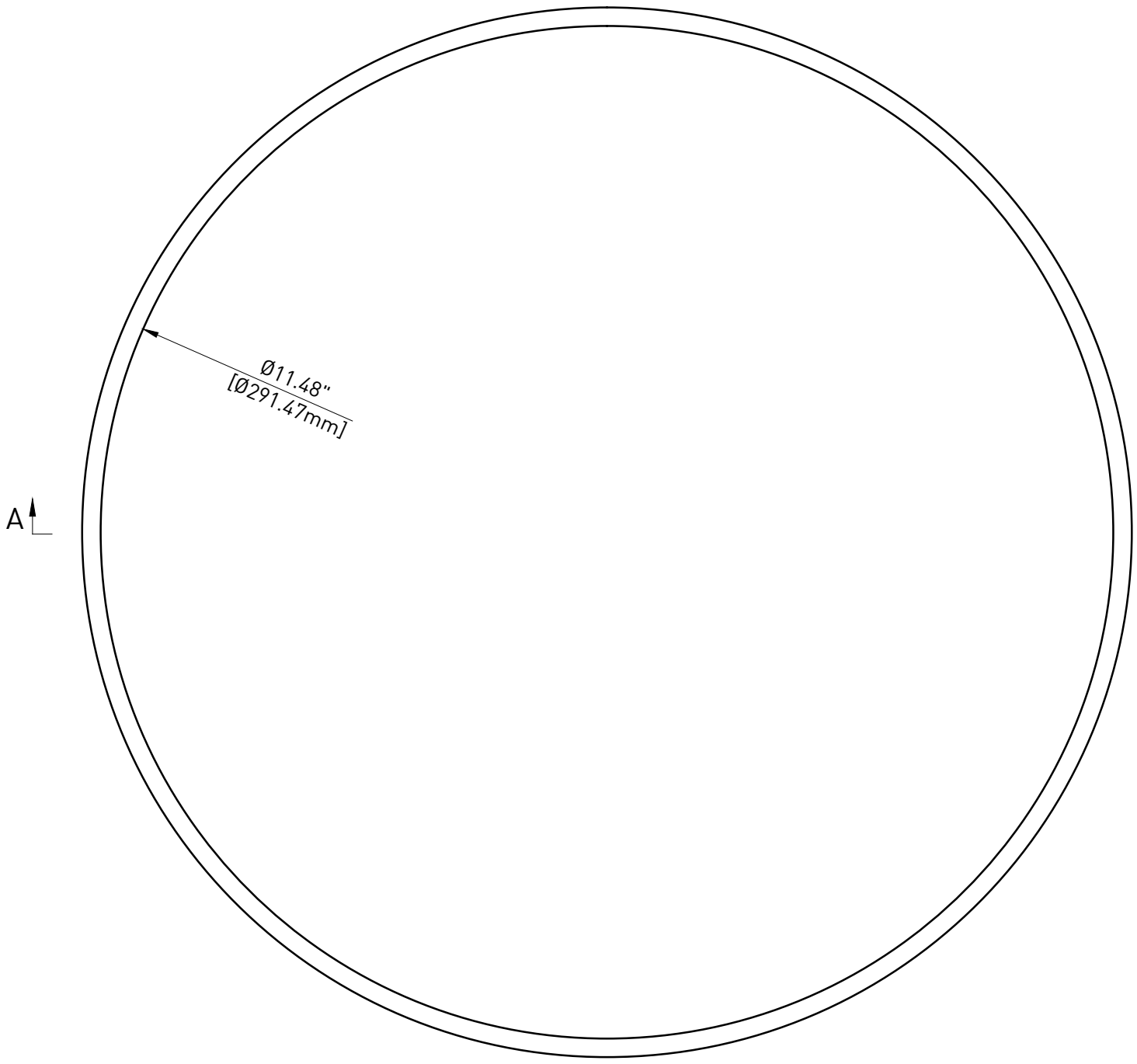
for 31AMTS15

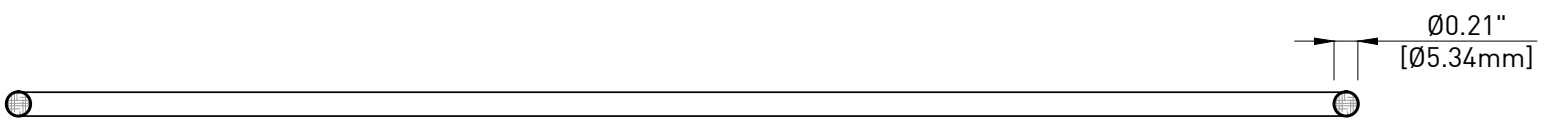
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

Drawn : F.MORAGLIA	Checked : T.CICCONE

Date : 12/20/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-01-01**	Code : -

Rev.	Date	Description	Drawn	Checked
0	12/20/16	First issue	F.M.	T.C.





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 AMERICA
GRUPPO DE ECCHER

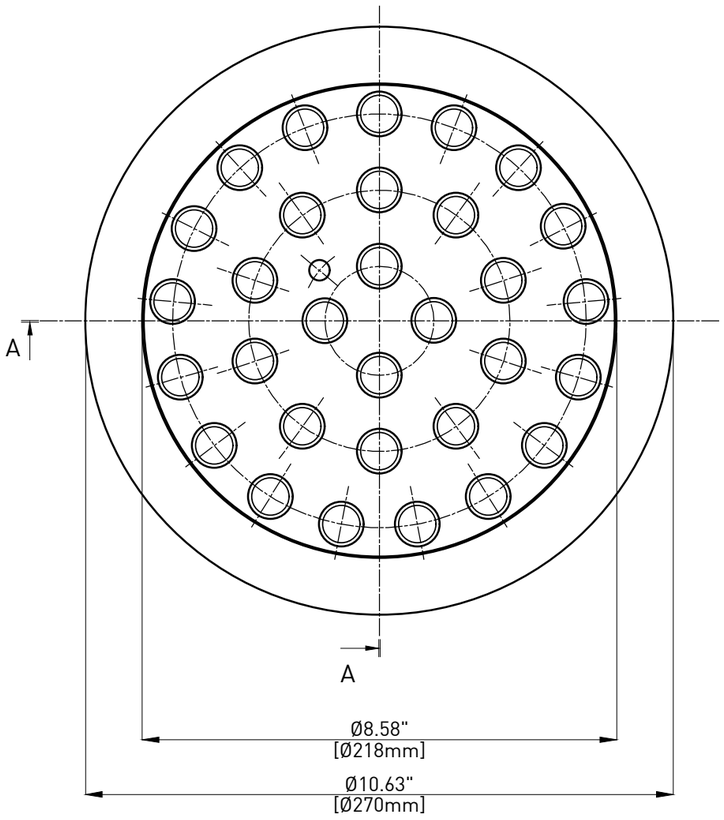
Title :

Centro Guarnizioni TIGER s.r.l
PROTECTION CAP O-RING
for 31AMTS15 PT SYSTEM

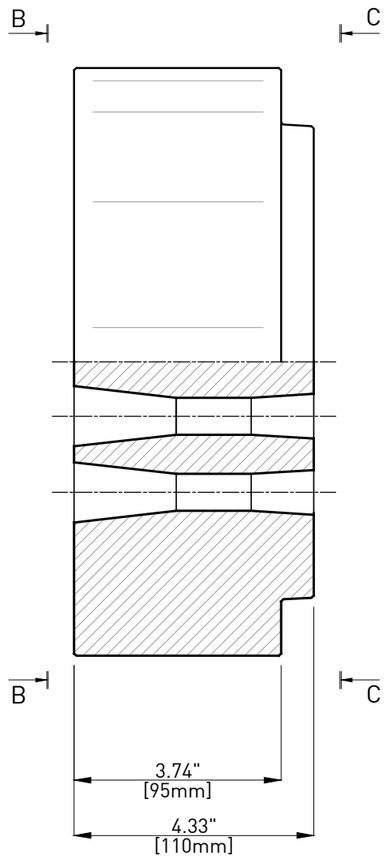
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

Drawn : L.CIVATI		Checked : T.CICCONE	
Date : 12/20/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-01-02**	Code : OR 061150

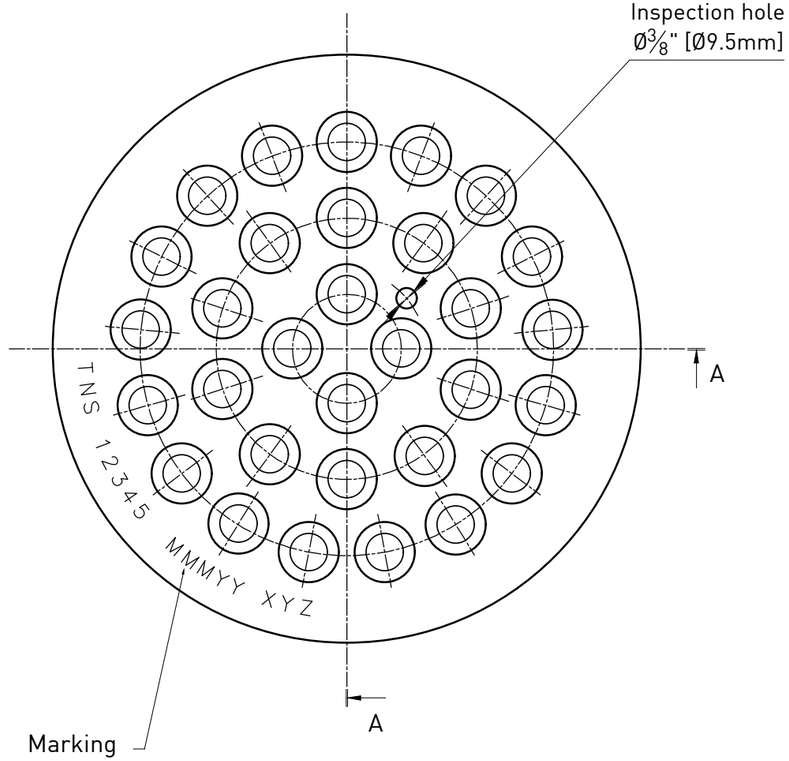
VIEW C-C



SECTION A-A



VIEW B-B



Material :	Treatment :
Steel AISI C1045 Normalized	-

TENSA GRUPPO DE ECCHER | AMERICA

Title :

WEDGE PLATE
for 31AMTS15 (31-06") External and Internal Unbonded systems

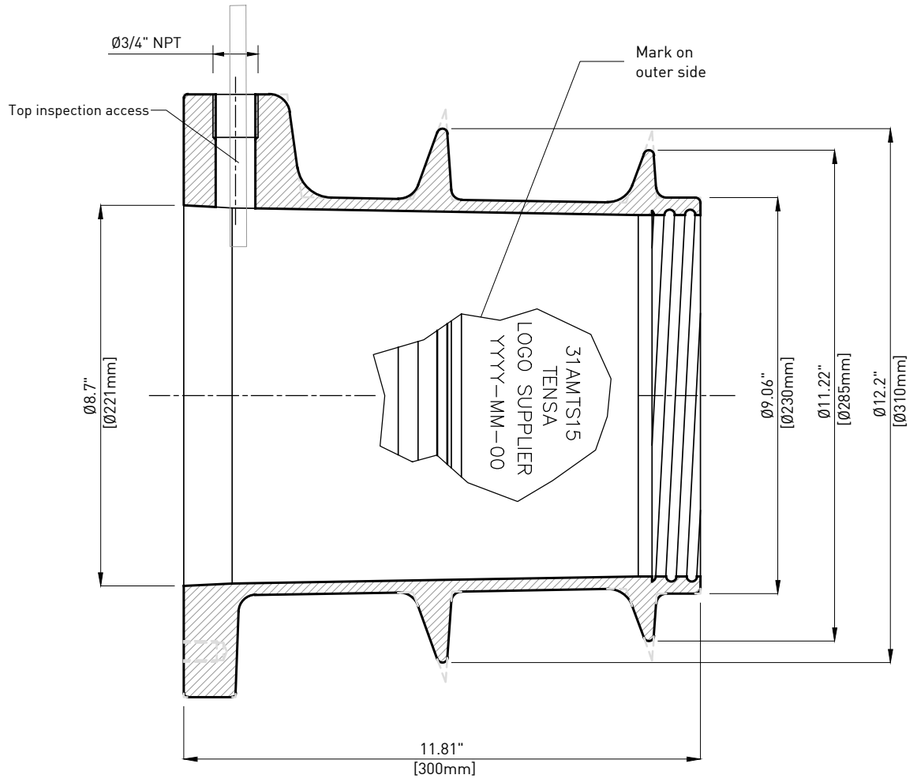
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

Drawn : L.CIVATI	Checked : T.CICCONE

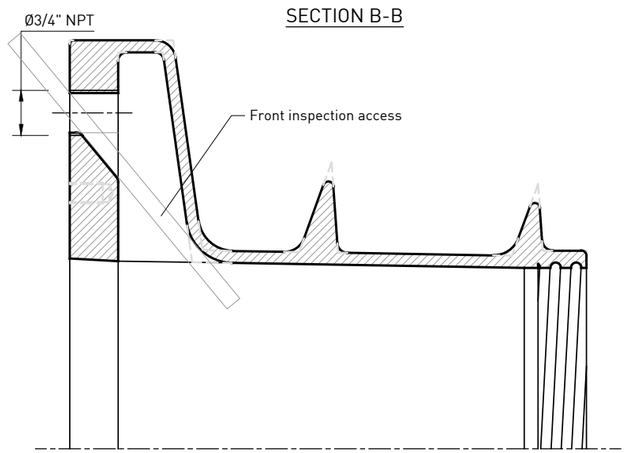
Date : 12/20/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : E-IU-31-02-00**	Code : -

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

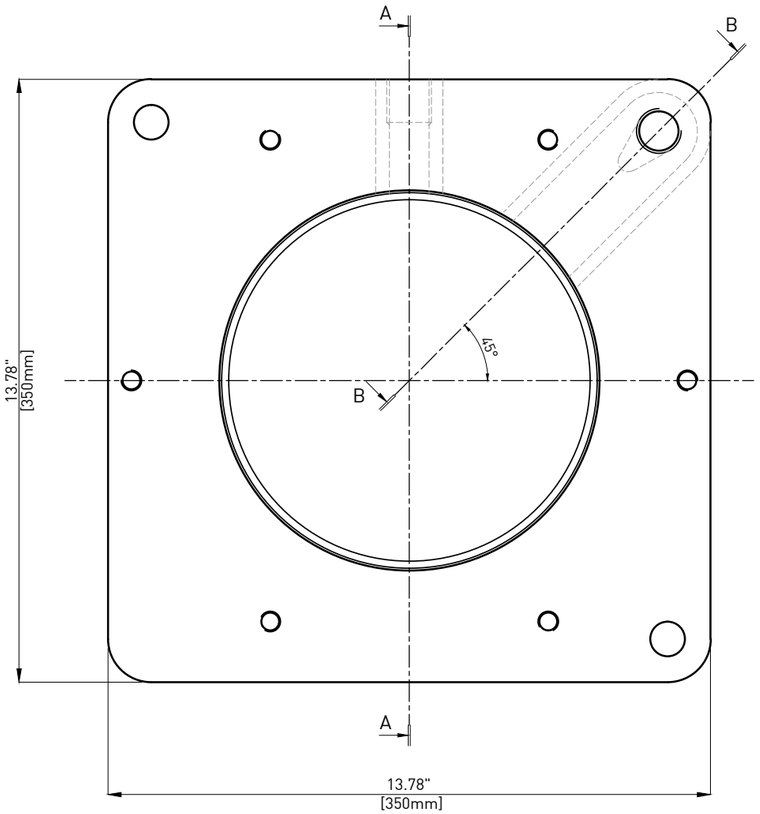
SECTION A-A



SECTION B-B



FRONT VIEW



Material :	Treatment :
Ductil Iron ASTM A536 GR80-55-06	Galvanization according to ASTM A123

TENSA GRUPPO DE ECCHER | AMERICA

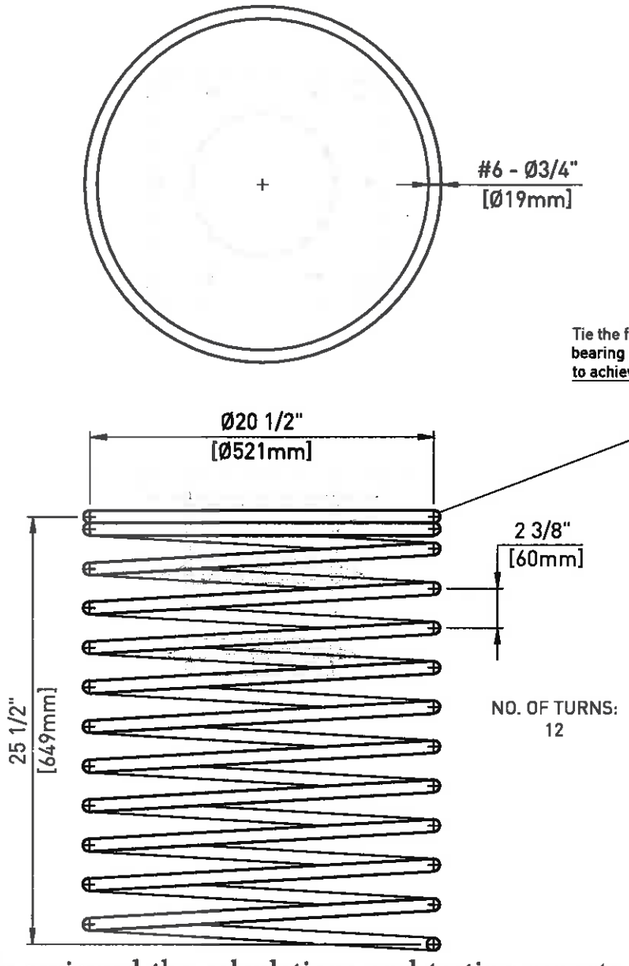
Title :

ANCHOR 31AMTS15 (31-0.6")

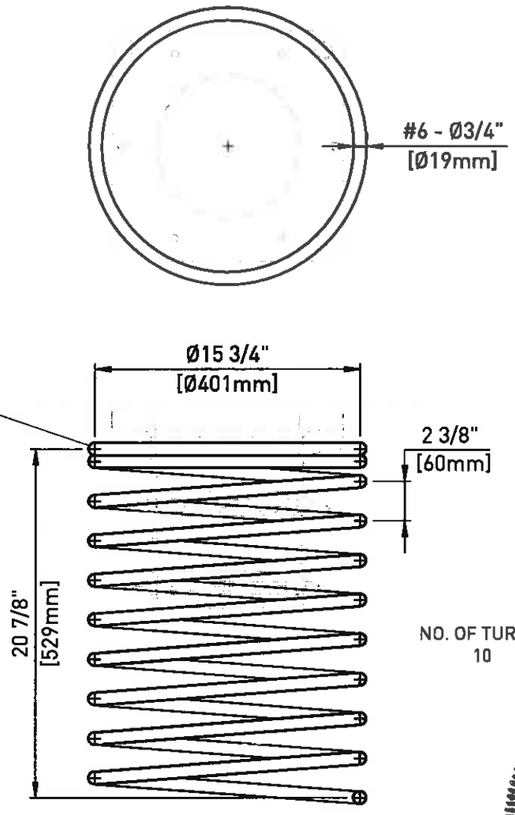
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917 1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL		Drawn : F.MORAGLIA	Checked : T.CICCONE
Date : 12/20/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-03-00**	Code : -

Rev.	Date	Description	Drawn	Checked
0	12/20/16	First issue	F.M.	T.C.

STANDARD SPIRAL
FOR CONCRETE CLASS f'_{ci} = 4000psi (27.5MPa) *



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



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.

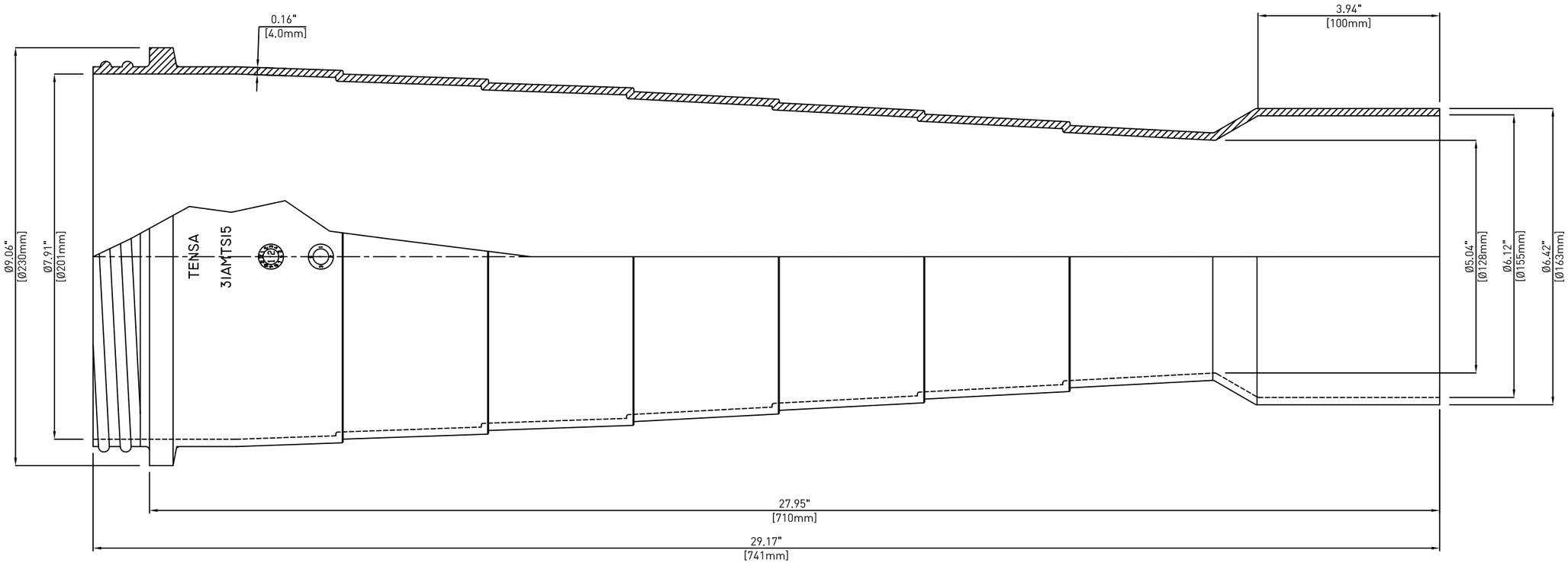
(*) Do not apply post-tensioning forces until the concrete mean compressive strength f'_{ci} is not less than the values shown in the present drawing.

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

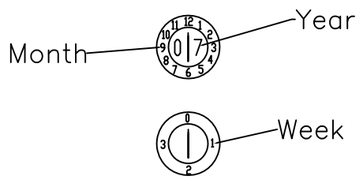
Rev.	Date	Description	Drawn	Checked
0	12/20/17	First issue	F.M.	T.C.

R. CRAIG FINLEY JR. LICENSE NO. 34234 STATE OF FLORIDA PROFESSIONAL ENGINEER
12/22/17

Material : Steel Rebar GR60, #6 - according to ASTM A615	Treatment : -
TENSA AMERICA GRUPPO DE ECCHER	Title : **SPIRAL REBAR for 31AMTS15**
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917 1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL	Drawn : F.MORAGLIA / Checked : T.CICCONE
Date : 12/20/2017 / Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-05-00** / Code : -



Marking – Type



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

TENSA AMERICA GRUPPO DE ECHEVER

Title :

TRUMPET for 31AMTS15

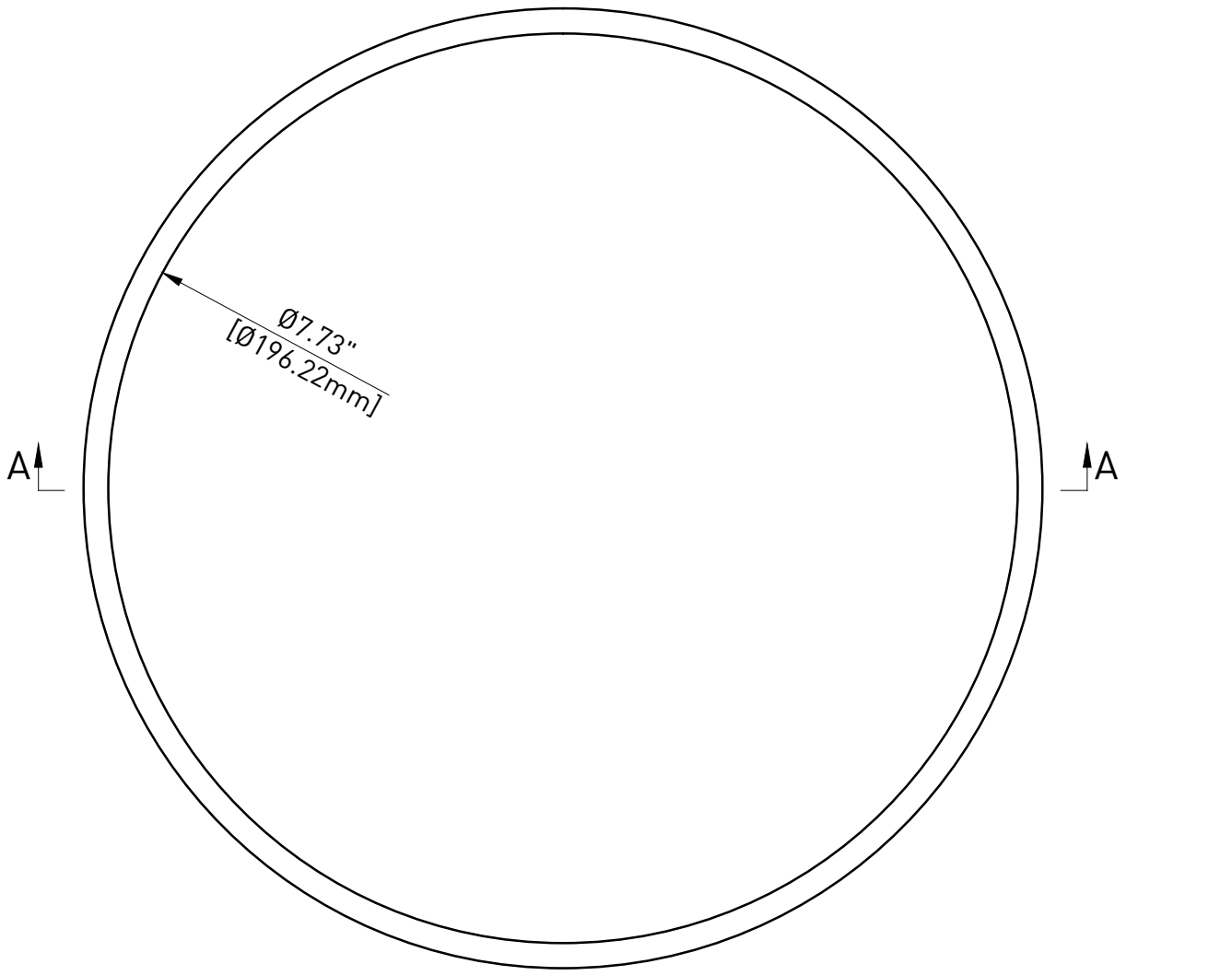
Bonded and Internal Unbonded / External systems

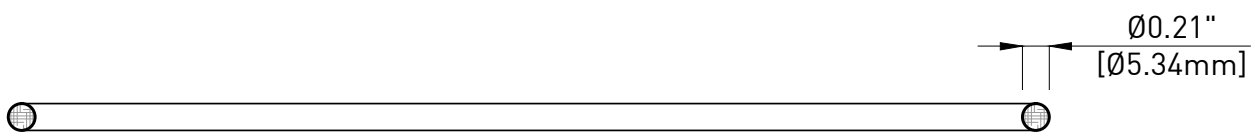
TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
1111 KANE CONCOURSE, S.TE 200 - BAY HARBOR ISLAND - 33154 FL

Drawn : L.CIVATI	Checked : T.CICCONE

Date : 12/20/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-06-00**	Code : -

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





SECTION A-A

NOTE:

- This drawing is not intended for manufacturing purposes.

Rev.	Date	Description	Drawn	Checked
0	08/23/16	First issue	L.C.	T.C.

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

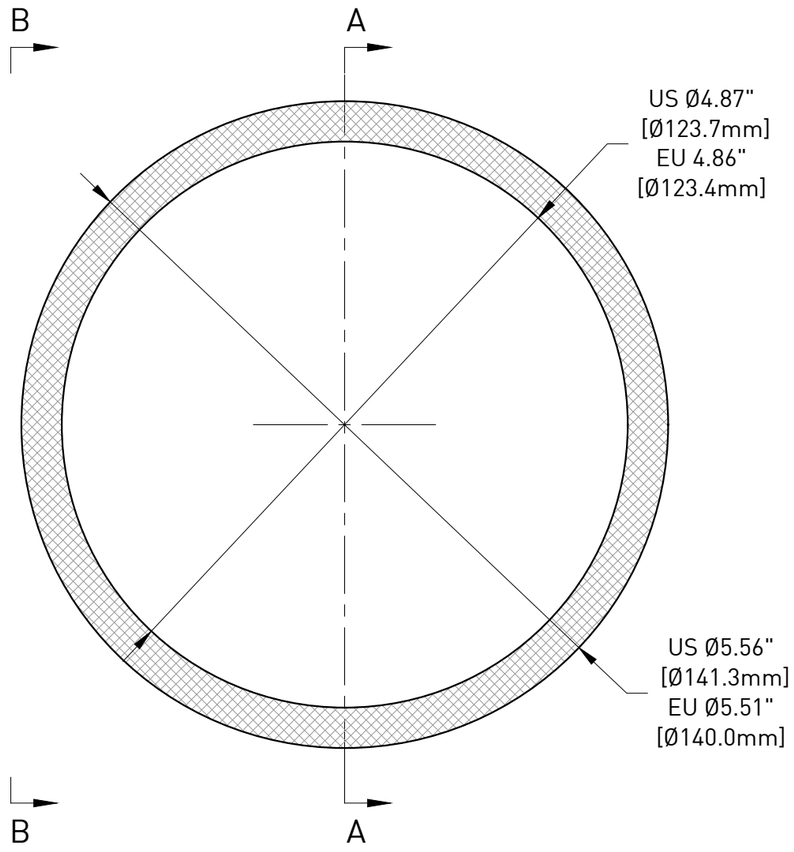
TENSA GRUPPO DE ECCHER | AMERICA

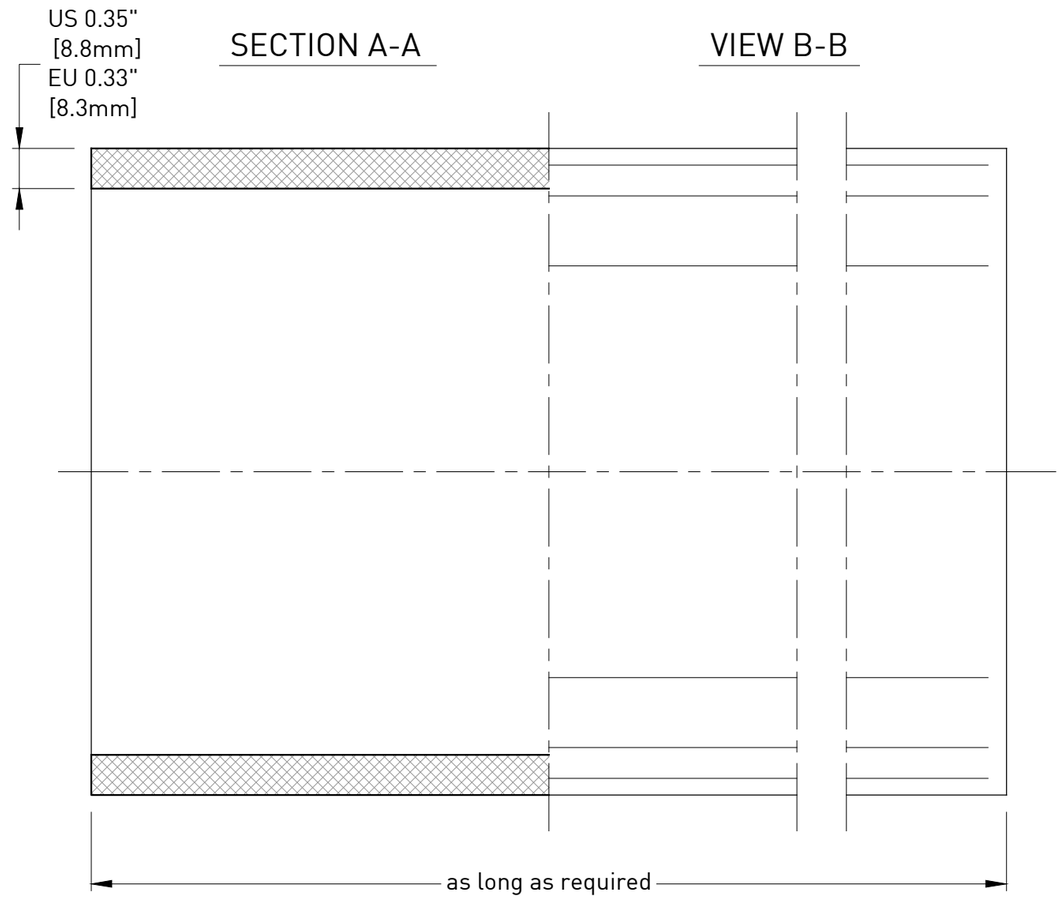
Title :

Centro Guarnizioni TIGER s.r.l
COMPRESSION SEAL
for 31AMTS15
between Anchor and Trumpet

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 : 08/23/2016	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : 31-06-01**	Code : OR 06775





Minimum radius of curvature for prefabricated sections of duct	13 ft (3.96 m)
Minimum radius of curvature for straight sections of duct to be field bent	30 ft (9.14 m)

NOTE:

- This drawing is not intended for manufacturing purposes;
- Duct meets FDoT requirements (Par. 2.2.1.2 and 2.4.4 Section 960):

  - maximum dimensional ratio (DR) of 17 as per ASTM D3035 or ASTM F714
  - 125 psi rated
  - minimum cell class of 445574C as per ASTM D3350
  - minimum OIT of 40 minutes as per ASTM D3895

Rev.	Date	Description	Drawn	Checked
A	10/08/19	Updated with measures for US and European versions	L.C.	T.C.
0	04/26/18	First issue	L.C.	T.C.

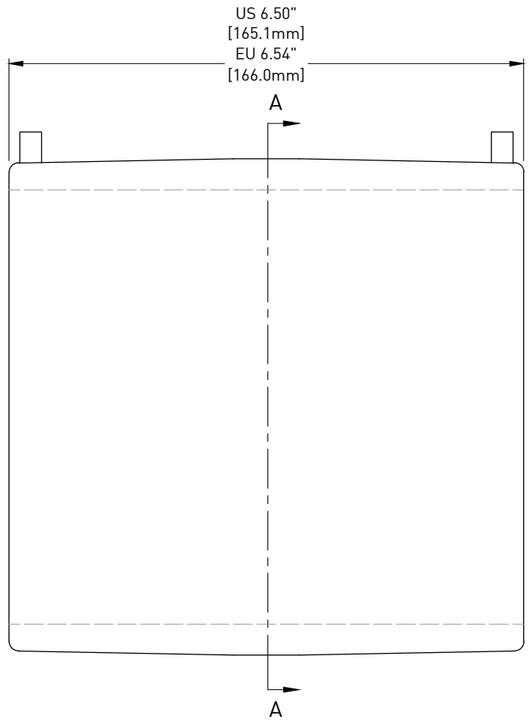
Material : High Density Polyethylene- according to ASTM D3350	Treatment : -

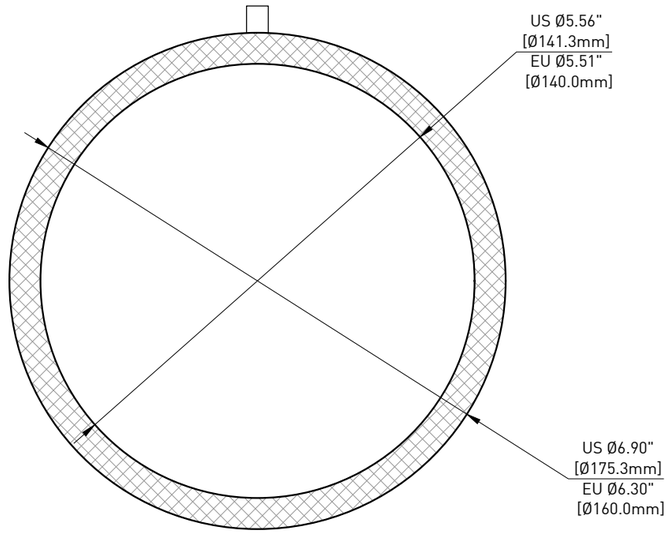
TENSA AMERICA
GRUPPO DE ECCHER

Title :
**SMOOTH PLASTIC DUCT 5.563"
for External and Internal Unbonded
Systems - Standard fit for 31AMTS15
Alternate fit for 27AMTS15**

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 : 10/08/2019	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : E-IU-31-07-08**	Code : -





SECTION A-A

INSTALLATION

Preparing the duct

1. Scrape the duct up to 0.4" (10mm) beyond the insertion length of the fitting.
2. Clean the welding area and let it dry.
3. Insert the duct ends straight into the fitting fot the correct length.
4. Install the aligners in order to keep straight position.

Welding Process

5. Connect the welding cables to the electrofusion coupler connectors and enter the welding parameters in the device.
6. At the end of the welding cycle, disconnect the cables and wait for the cooling.
7. Remove the aligners.

NOTE:

- The United States (US) coupler must be used with the corresponding US duct; the European (EU) coupler must be used with the corresponding EU duct;
- The installation procedure is general; reference to manifacturer's instruction manual for the detailed installation instructions;
- This drawing is not intended for manufacturing purposes;
- Coupler meets FDoT requirements (Par. 2.2.1.5 Section 960):

  - 150 psi rated
  - minimum cell class of 445574C as per ASTM D3350
  - minimum OIT of 40 minutes as per ASTM D3895

Rev.	Date	Description	Drawn	Checked
A	10/08/19	Updated with measures for US and European versions	L.C.	T.C.
0	04/26/18	First issue	L.C.	T.C.

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

TENSA GRUPPO DE ECCHER | AMERICA

Title :

ELECTROFUSION COUPLER
for 5.563" HDPE DUCT CONNECTION
Standard fit for 31AMTS15
Alternate fit for 27AMTS15

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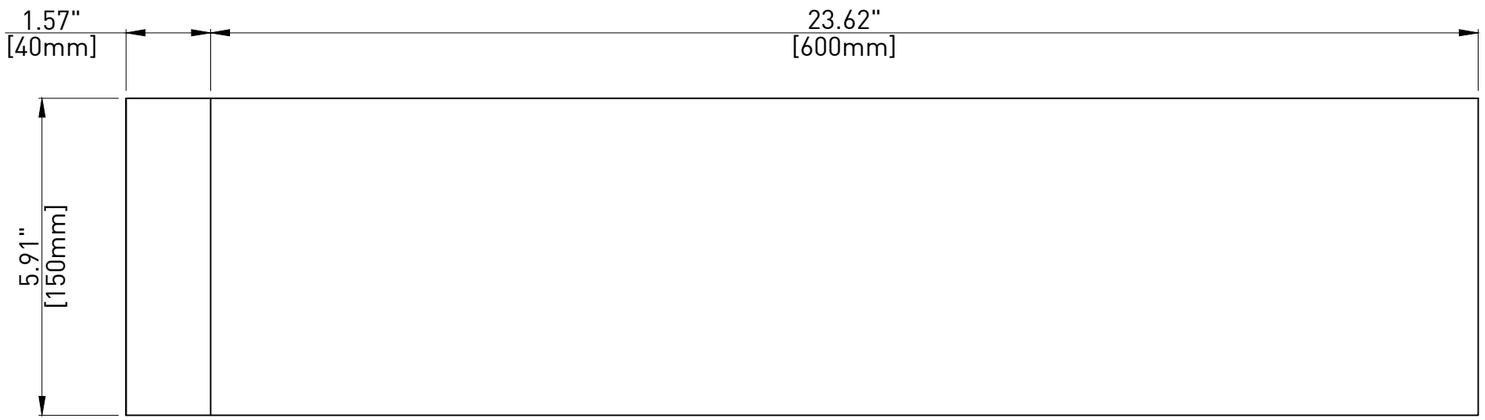
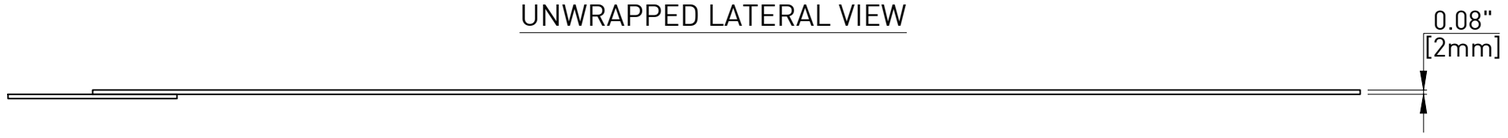
Drawn : L.CIVATI | Checked : T.CICCONE

Date : 10/08/2019 | Dimensions : INCH [mm] mm FOR REFERENCE ONLY | **Part # : E-IU-31-07-12** | Code : -

UNWRAPPED PLAN VIEW



UNWRAPPED LATERAL VIEW



NOTE:

- Thickness is type L, i.e. 0.035" [0.9 mm] backing + 0.043" [1.1 mm] adhesive;
- This drawing is not intended for manufacturing purposes;
- Heat shrink sleeve meets or exceeds FDoT requirements (Table 2.2.1.8-1 Section 960);
- For the installation make reference to manifacturer procedure

Rev.	Date	Description	Drawn	Checked
A	03/06/20	Width reduction from 300 to 150 mm	L.C.	T.C.
0	04/27/18	First issue	L.C.	T.C.

Material : Coated Polyolefin Backing - according to FDoT Tab.2.2.1.8-1 Sec.960	Treatment : -

TENSA | AMERICA
GRUPPO DE ECCHER

Title :
CANUSA-CPS
HIGH TEMPERATURE HEAT SHRINK SLEEVE
Standard fit for 27AMTS15 and 31AMTS15
External and Internal Unbonded Systems

TENSA AMERICA LLC - www.tensaamerica.com - PHONE: +1 305-866-9917
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		Drawn : L.CIVATI	Checked : T.CICCONE
Date : 03/06/2020	Dimensions : INCH [mm] mm FOR REFERENCE ONLY	**Part # : E-IU-27-07-13**	Code : KLNN-125-150-BK