2020 - SECTION 300

EXTERNAL REFERENCE & STANDARDS DOCUMENTS

Water Testing Sequence

1 **Initial Flush** - Before the start of construction, the contractor shall contact and schedule D/C to flush the tie-in sections and take a turbidity, Bacteria and free & total chlorine tests. *DC personnel required.*

2 **Turbidity Testing 5 ntu Flush -** After construction (including services) and before the Pressure Test as per AWWA standards, the contractor/consultant will schedule the initial fill and flushing with D/C personnel and provide the pipe volumes for mains and services. DC will operate the boundary valve and the contractor is responsible to flush the newly installed infrastructure. The results of the turbidity test shall be recorded by the consultant and/or contractor, this will include location, date & time, pipe size, velocity and turbidities. If velocities cannot be achieved, it is the responsibility of the contractor and consultant to find other methods to clean the pipe. The Turbidity test results will be taken and recorded by the consultant at all hydrants and/or sampling points. The consultant/contractor will be charged for time and water when 3 exchanges of water are exceeded. *DC personnel required. Consultants are now required to have a Turbidity meter to take samples. DC personnel are there to assist in valve operation and flow meter placement, if DC's services are required beyond that it will be at a charge to the consultant/contractor and a service call log must be filled out prior to the scheduling of any tests.*

3 **Meter Cart** - At this point all remaining tests performed by the contractor shall use The meter cart.

4 **Pressure test** - After a minimum of 3 exchanges of water & a turbidity of less than 5 ntu is achieved, the consultant/contractor will do the Pressure Test with *Aquatera Engineering to witness.*

5 **High Chlorine** - When the Pressure Test passes, a High End Chlorination Test (greater than 25 mg/l) is conducted by the contractor/consultant with *Aquatera Engineering to witness.*

6 **Schedule** - Turbidity Test (2 ntu) - At this point, the contractor shall contact Aquatera D/C department to schedule flushing for 2 ntu after dechlorination.

7 **Low Chlorine** - After 24 hours, a Low End Chlorination Test (greater than 10 mg/l) is conducted by the contractor/consultant with *Aquatera Engineering to witness.*

8 **Dechlorination** - After the Low End Chlorination Test the lines are flushed by the contractor to dechlorinate. Contractor shall have a water truck or water tanks on site to catch the chlorinated water and dechlorinate it completely before releasing it or shall dispose of it at special dump facility (Tervita or Newalta). Aquatera cannot dechlorinate chlorine higher than system chlorine with our equipment.

9 **Free & Total** - Followed by a Free and Total Chlorine Test with Aquatera engineering to witness. Consultants are now required to have a meter to take Free and Total Samples. If DC personnel's services are required it will be at a charge to the consultant/contractor and a service call log must be filled out prior to the scheduling of any tests.

10 **Turbidity Testing 2 ntu Flush -** Upon completion of Free & Total Chlorine Test, DC personnel will turn the boundary to assist to flush the lines and perform a Turbidity Test (less than 2 ntu). If an "ntu of less than 2" cannot be achieved the contractor/consultant will be required to pay for water and time exceeding 3 water exchanges. *DC personnel required.* The consultant/contractor will be charged for time and water when 3 exchanges of water are exceeded.

11 **Bacterial Test Day1 -** The Consultant/Contractor will perform the Bac-T test with *Aquatera Engineering to witness.*

12 **Bacterial Test Day2 -** After 24 hours or more, the second days Bac-T is taken by the consultant/contractor with *Aquatera Engineering to witness.*

13 **Commissioning Water turn on –** Once the test package has been approved by Aquatera and the CCC inspection and subsequent re-inspections have been completed with no remaining major deficiencies, Aquatera will commission the system and perform the hydrant flow test (pre-payment is required for all flow tests). The bacterial tests will be considered stale date 60 days after their sample date and new bacterial test will be required, if the CCC inspection and subsequent re-inspections have not been completed and the water has not been turned on in that time frame.

Pipe Size		Minimum Time	Length for Minimum Time		Time for Longer Meter Length	Time for Longer Feet Length
mm	in	min:sec	m	ft	sec	sec
100	4	1:53	182.0	600	0.62 L	0.19 F
125	5	2:31	137.0	450	1.10 L	0.34 F
150	6	2:50	121.3	400	1.40 L	0.43 F
200	8	3:47	90.8	300	2.49 L	0.76 F
250	10	4:43	72.8	240	3.89 L	1.19 F
300	12	5:40	60.7	200	5.61 L	1.71 F
375	15	7:05	48.5	160	8.76 L	2.67 F
450	18	8:30	40.5	133	12.62 L	3.85 F
525	21	9:55	34.7	114	17.17 L	5.24 F
600	24	11:20	30.2	100	22.43 L	6.84 F
675	27	12:45	26.8	88	28.38 L	8.65 F
750	30	14:10	24.4	80	35.04 L	10.68 F
900	36	17:00	20.1	66	50.47 L	15.38 F
1050	42	19:54	17.4	57	68.71 L	20.94 F
1200	48	22:47	15.2	50	89.74 L	27.35 F

where L = length of test section in meters
F = length of test section in feet

example – If there is 0.5 meters (1.65 ft.) of water above the invert of a buried PVC sewer line, what must the air-test pressure be?

solution – The static head of the groundwater at the pipe invert will be:

0.5 m x (9.73 kPa / m) = 4.87 kPa
therefore, the total air-test pressure should be:
4.87 kPa + 24.0 kPa = 28.87 kPa

or

1.64 ft. x (.43 psi / ft.) = .71 psi
therefore, the total air-test pressure should be:
.71 psi + 3.5 psi = 4.21 psi

Since this value is less than 34.0 kPa (5.0 psi), the installer may proceed with the air test using this start pressure.

Knowing the density of water to be 1000 kg/m^3 (62.4 lb/ft^3), the maximum head of groundwater permitted above the invert of a PVC sewer pipe for an air test is 1 meter (3.3').

2. **Water Testing**

Infiltration – The allowable infiltration for any pipe section should be measured by a weir or current meter placed in an appropriate manhole. This is an acceptable method of leakage testing only when the ground-water level is above the top of the pipe throughout the section of line being tested. It is especially
useful when the water table is well above the top of the pipe. Usually the designer will give explicit instructions for conducting the test.

Exfiltration – This test is suitable for very dry areas, or where the water table is suitably low that test pressures can easily exceed the static head of the water table. Test pressures should be a minimum of 5.9 kPa (0.9 psi) above the water table head. The test section of pipe shall be filled with water and the leakage rate measured.

For sizes 100 mm - 375 mm (4" - 15"), the allowable leakage rate shall be 4.63 liters per mm of pipe diameter per kilometer per 24 hours (50 USgal./inch/mile/day). For sizes 450 mm (18") and larger, the allowable rate for testing shall be 0.93L/mm/km/day (10 USgal./inch/mile/day). Should the allowable leakage rate be exceeded for either an infiltration or exfiltration test, the installer must locate and repair any deficiencies at his own expense until a successful test is conducted. Tests are typically conducted from manhole to manhole.

Deflection Testing

Deflection is the way a flexible pipe reacts to vertical soil loads when buried in a trench. It illustrates how the pipe and surrounding soil work together to easily withstand common, and even extreme soil loads.

The maximum deflection of plastic pipe or fittings can be accurately predicted by the designer by knowing the pipe stiffness, soil stiffness and the height of cover. For the majority of underground PVC sewer pipe applications, with proper compaction, the deflection will be well within the recommended maximum allowable of 7.5%. However, if the designer has reason to believe that excessive deflection may be present, a deflection test may be necessary.

There are two commonly used methods of performing deflection tests on PVC sewer pipe:

1. Go/No-Go Device
2. Physical Measurement

ALBERTA SPECIFICATION FOR CAST IRON PRODUCTS

Table of Contents

1 GENERAL REQUIREMENTS

1.1 Product supplied shall be in new and serviceable condition.

1.2 Gray iron shall conform to ASTM A48 latest edition: Class is shown on individual drawings and castings.

1.3 Ductile iron shall conform to ASTM A536 latest edition: class is shown on individual drawings and product.

1.4 Requirements for manufacturing testing shall conform to AASHTO M306, ASTM A48 and ASTM A536

1.5 Any reference to United States in the AASHTO or ASTM specifications shall mean Canada for our purposes.

1.6 All tests and sampling of samples shall be witnessed by a Canadian professional engineer.

2 TESTING AND FREQUENCY

2.1 Gray iron test bars. Samples (3) of gray iron test bars shall be poured twice annually from the metal supplied to the individual casting. Preparation of sample and testing shall be in accordance with ASTM A48 – latest samples made be tested, identified and be witnessed by a Canadian engineer. Test results shall be submitted and stamped by a professional engineer.

Tensile Strength	
Class 20	20 ksi
Class 25	25 ksi
Class 30	30 ksi
Class 35	35 ksi

2.2 Ductile iron test bars. Samples of ductile iron test bars (3) poured twice annually from the metal supplied to an individual casting. Preparation of sample and testing shall be In accordance with ASTM A536 latest edition. Samples made shall be witnessed by a Canadian engineer, identified and tested. Test results shall be submitted and stamped by same engineer.

	Grade 60-40-18	Grade 65-45-12	Grade 80-55-06	Grade 100-70-03	Grade 120-90-02
Tensile strength, min, psi	60 000	65 000	80 000	100 000	120 000
Tensile strength, min, MPa	414	448	552	689	827
Yield strength, min, psi	40 000	45 000	55 000	70 000	90 000
Yield strength, min, MPa	276	310	379	483	621
Elongation in 2 in. or 50 mm, min	18	12	6.0	3.0	2.0

2.3 Proof Load Testing

Proof load testing shall be performed on the grate and cover using a 9"x 9" block. Test is according to AASHTO M306. Load is taken to 178 kn and recorded. Test shall be witnessed and recorded by a profession engineer from Canada.

(Typically the load is 10% higher than 178 and hold for 1 minute.)

2.4 FAR Reports

First article reports are done on first casting coming out of the pattern mould. Dimensions are taken comparing these to actual drawing dimensions and recorded.

The report shall be taken at initial casting of new pattern and twice thereafter per year.

3 DRAWING SUBMISSION

Stamped by a professional engineer shall to submitted to the owner of the castings. These drawings will display all necessary dimensions along with tolerances.

All specifications regarding the castings shall be displayed on drawings. Required Marking shall be on drawings. The casting is built to this drawing. Tolerances as follows:

Casting Pattern Dimension	Allowable Tolerance
Mating Parts: Less than 50 mm	+/- 0.8 mm
Mating Parts: 300 mm to 50 mm	+/-1.5 mm
Mating Parts: Greater than 300 mm	+/-3.0 mm
Other Dimensions to 900 mm	+/-3.0 mm

4 CERTIFICATION BY ENGINEER

Certificate of compliance shall be given to owner by profession engineer. This certifies that the engineer is comfortable that the foundry is meeting the specifications well as tests.

5.1 WORKMANSHIP AND FINISH

Castings shall be free from cracks, porosity, claws and excessive shrinkage.

Castings shall be true to pattern.

Castings shall be sandblasted or cleaned and ground to eliminate surface imperfections.

Coated or painted castings will not be accepted.

Manhole cover castings shall not rock when mated with corresponding frame. Surfaces shall be machined or ground as noted on Drawing

5.2 MARKINGS

Castings shall be marked with identification markings which include:

City specifications.

Foundry identification marking including month and year of production, as well as the class or serial of material (ASTM for example), as well as an identifier such as a heat code and/or serial number that traces the product to test bar data and metallurgical composition records.

Markings shall be located in such a manner that they are easily identifiable.

The markings shall be located on the “non wear” location of the product.

State country of origin visibly on castings.

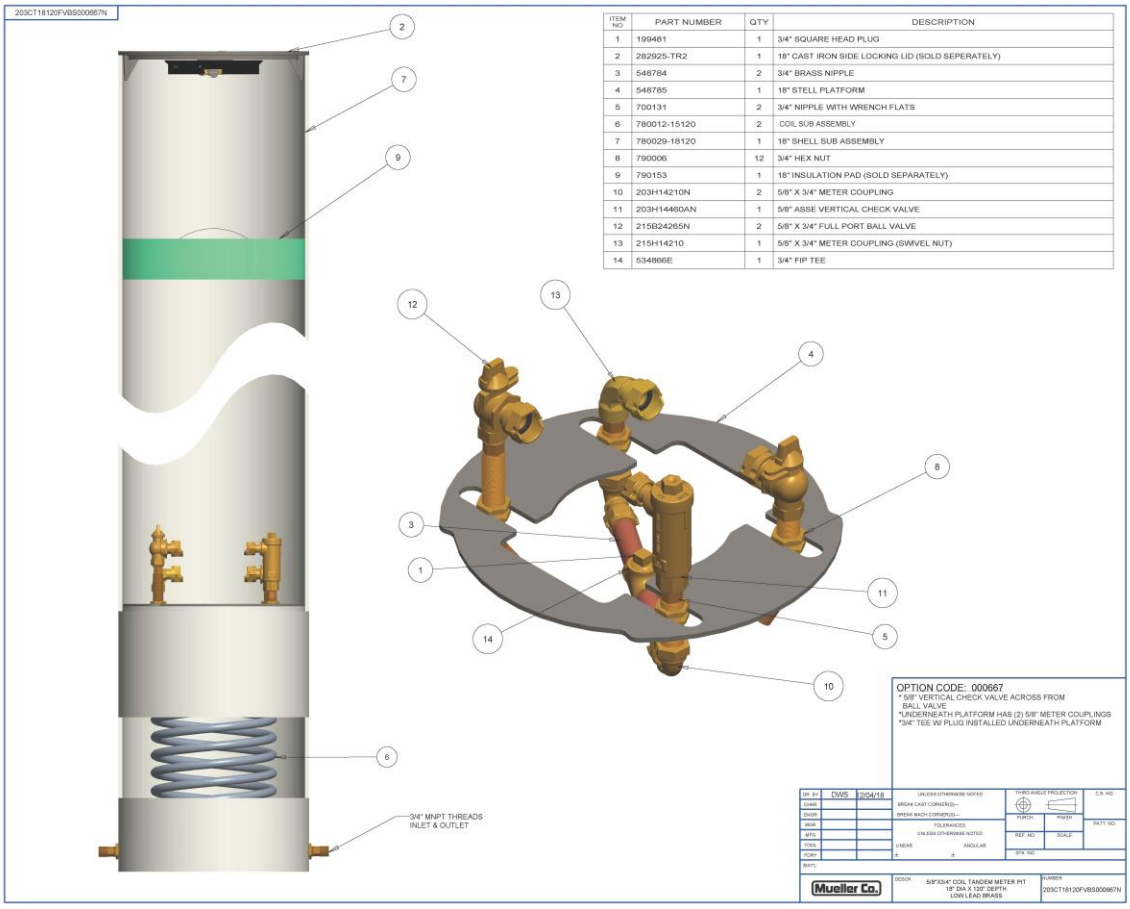
6 REFERENCE DOCUMENTS REQUIRED

6.1 ASTM-A48 – Latest Edition

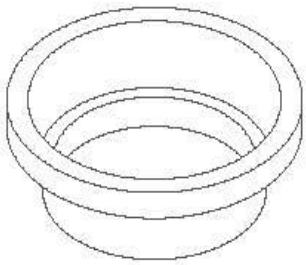
6.2 ASTM A536 – Latest Edition

6.3 AASHTU M306 – Latest Edition

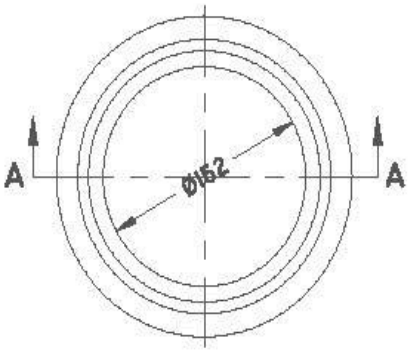
May 24, 2015



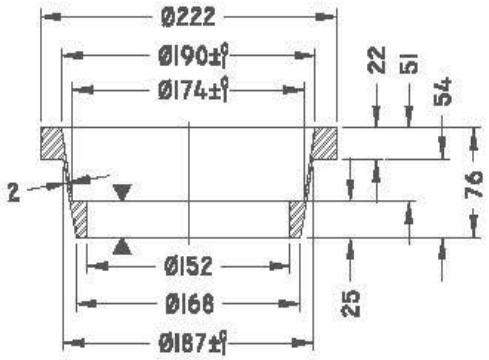
ITEM NO	PART NUMBER	QTY	DESCRIPTION
1	199481	1	3/4" SQUARE HEAD PLUG
2	282925-TR2	1	18" CAST IRON SIDE LOCKING LID (SOLD SEPERATELY)
3	546784	2	3/4" BRASS NIPPLE
4	546785	1	18" STELL PLATFORM
5	700131	2	3/4" NIPPLE WITH WRENCH FLATS
6	780012-15120	2	COIL SUB ASSEMBLY
7	780029-18120	1	18" SHELL SUB ASSEMBLY
8	790006	12	3/4" HEX NUT
9	790153	1	18" INSULATION PAD (SOLD SEPARATELY)
10	203H14210N	2	5/8" X 3/4" METER COUPLING
11	203H14460AN	1	5/8" ASSE VERTICAL CHECK VALVE
12	215B24265N	2	5/8" X 3/4" FULL PORT BALL VALVE
13	215H14210	1	5/8" X 3/4" METER COUPLING (SWIVEL NUT)
14	534866E	1	3/4" FIP TEE



ISO VIEW



PLAN



SECTION A-A

MATERIAL:

* GREY CAST IRON TO CONFORM TO ASTM A48, CLASS 20 (LATEST EDITION).
* GENERAL TOLERANCES - ±1.
* NO DEVIATION SHALL BE ACCEPTABLE FOR DIMENSIONS WHICH ARE LESS THEN 10MM.

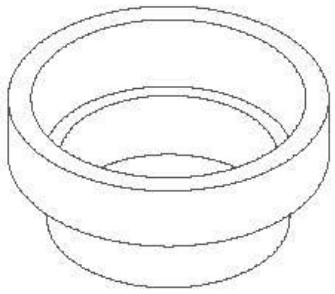
▲ BEARING SURFACE

NO.	DATE	REVISION	BY

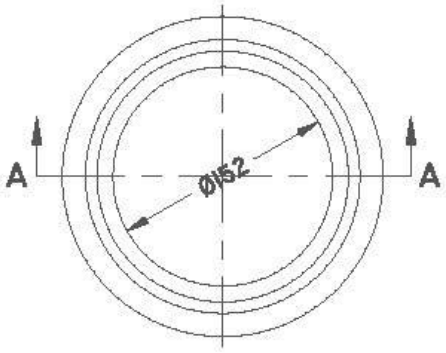
TROJAN INDUSTRIES INC.

AVB CROWN SURFACE ADAPTER I"

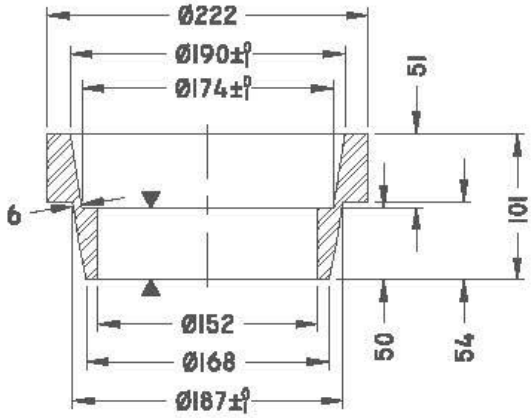
SCALE:	DATE:	DRAWING NO:	MATERIAL SPECIFICATIONS AND NAME:	METRIC
NTS	OCT 29, 2018	AVBCSAIA		DIMENSIONS ARE IN MILLIMETERS
DRAWN BY: J.P.	CHECKED BY:			



ISO VIEW



PLAN



SECTION A-A

MATERIAL:

* GREY CAST IRON TO CONFORM TO ASTM A48, CLASS 20 (LATEST EDITION).
* GENERAL TOLERANCES - ±1.
* NO DEVIATION SHALL BE ACCEPTABLE FOR DIMENSIONS WHICH ARE LESS THEN 10MM.

▲ BEARING SURFACE

NO.	DATE	REVISION	BY

TROJAN INDUSTRIES INC.

AVB CROWN SURFACE ADAPTER 2"

SCALE:	DATE:	DRAWING NO:	MATERIAL SPECIFICATIONS AND MASS:	
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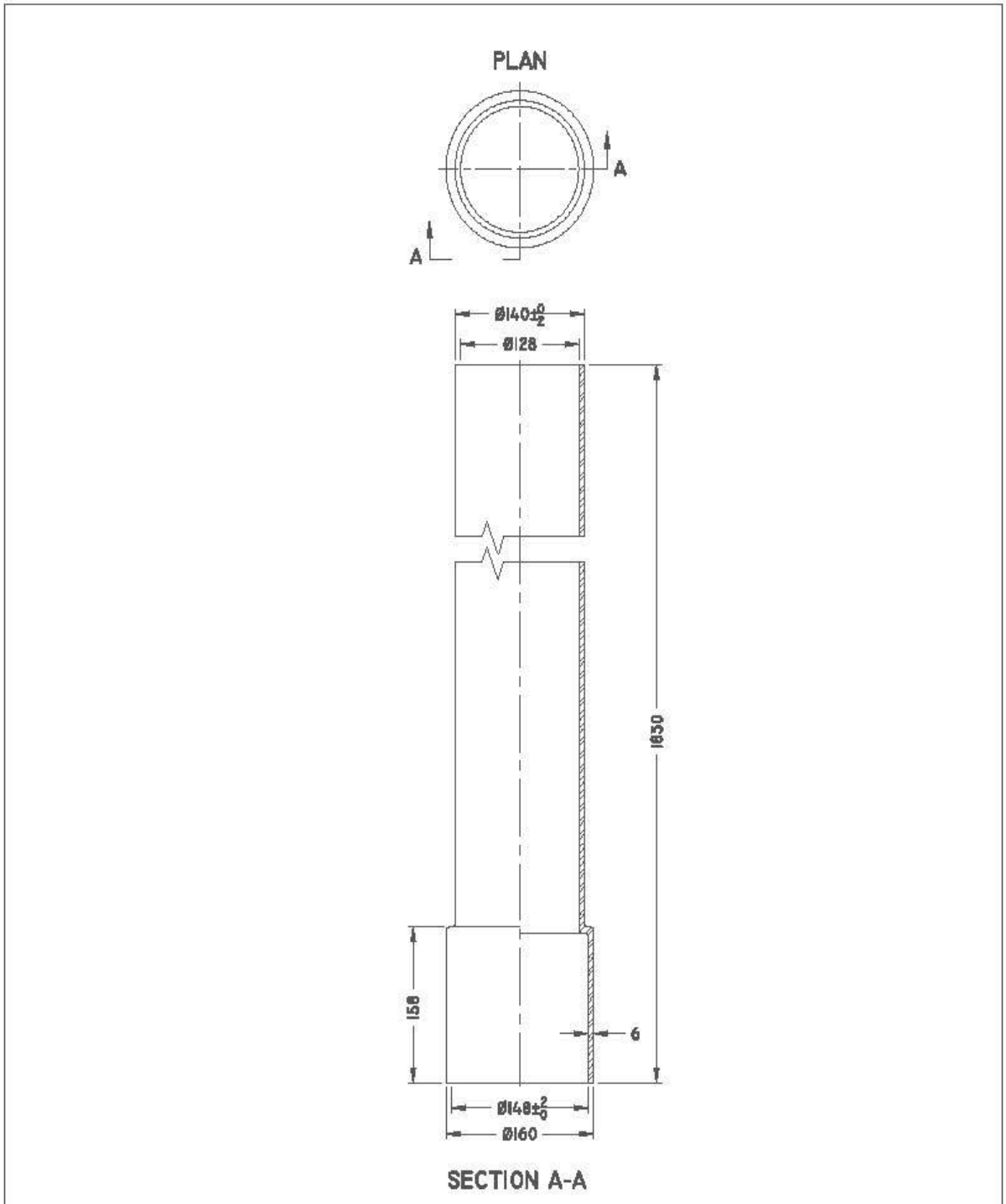
DRAWN BY: J.P.	CHECKED BY:			DIMENSIONS ARE IN MILLIMETERS



NO.	DATE	REVISION	BY

TROJAN INDUSTRIES INC.

AVB INTERMEDIATE EXTENSION 72"

SCALE:	DATE:	DRAWING NO:	MATERIAL SPECIFICATIONS AND MARK:	
NTS	OCT 27, 2016	7108 72"	GREY CAST IRON CLASS 20 WITH AA(LATEST EDITION)	METRIC
DRAWN BY: J.P.	CHECKED BY:			DIMENSIONS ARE IN MILLIMETERS