Santa Maria
WATER DISTRICT

June 30, 2025

P-RFQ No. 2025-085

REQUEST FOR QUOTATION

SUPPLY AND DELIVERY OF UPVC ELBOW AND UPVC PIPE
(CONST-2025-06-020)

The Santa Maria Water District (SMWD) hereinafter referred to as "the Purchaser", through its Bids and Awards Committee (BAC), invite interested parties to submit price quotation for the project, "**SUPPLY AND DELIVERY OF UPVC ELBOW AND UPVC PIPE"** through Small Value Procurement (Sec. 34 of R.A. No. 12009) with Approved Budget for the Contract (ABC) of Seven Hundred Seventy-Nine Thousand Seven Hundred Thirty Pesos and Sixty-Six Centavos Only **(₱779,730.66).**

	Description	Qty	Unit	Unit Cost	Total Amount
1	**UPVC ELBOW 50mm X 45 DEG**	16	PC		
2	**UPVC ELBOW 75mm X 22.5 DEG**	2	PC		
3	**UPVC ELBOW 75mm X 45 DEG**	6	PC		
4	**UPVC PIPE w/ Power Lock 100mm**	6	LM		
5	**UPVC PIPE w/ Power Lock 50mm**	894	LM		
6	**UPVC PIPE w/ Power Lock 75mm**	1113	LM		
7	**UPVC PIPE-O w/ Power Lock 150mm**	72	LM		
	*** nothing follows ***				
	*** please see attached technical specifications ***				
	*** All technical specifications must be complied with ***				

Likewise, it is understood that Purchaser's specifications are minimum requirements. The Bidder/Supplier may offer higher specifications or additional items, if any. Failure to comply with the mandatory requirements shall render the quotation ineligible/disqualified.

Procurement procedures will be conducted in accordance with the provisions of the Implementing Rules and Regulations (IRR) of Republic Act No. 12009 (New Government Procurement Reform Act).

It is the intent of the Purchaser to evaluate the quotation for the item and award will be made to the quotation resulting in the overall lowest cost, meeting purchaser's technical specifications.

Pursuant to Appendix A "Documentary Requirement for Alternative Methods of Procurement of Annex "H: of 2016 revised IRR of RA No. 9184, the following documents are required to be submitted along with your quotation/proposal.

1. PhilGEPS Registration Number
2. Mayor's/Business Permit
3. Omnibus Sworn Statement – an unnotarized omnibus sworn statement can be submitted along with the quotation/proposal provided that a notarized copy shall be submitted prior to confirmation of the award by the supplier/contractor.

(044) 815-3363 / (044) 815-3238
smwdbulacan@yahoo.com
www.smwdbulacan.gov.ph
#302 J.P. Rizal St., Poblacion, Santa Maria, Bulacan

4. Income/Business Tax Return

Additional Requirements to be Submitted along with your quotation/proposal:

1. Photo Copy of Sample Sales/Service Invoice (SI)
2. Certificate of Registration (BIR FORM 2303)
3. Tax Clearance

Failure to meet any one of the aforementioned requirements will result to rejection of your proposal/quotation.

Your prices must be quoted in Philippine Peso and must include the unit price and total price, inclusive of all taxes to be paid and other incidental cost to the delivery site if the contract is awarded. Quotations exceeding the Approved Budget for the Contract shall be rejected.

Payment shall be through check and advance payment is not allowed.

The duly accomplished quotation form may be typewritten or handwritten and may be placed in sealed envelope marked **SUPPLY AND DELIVERY OF UPVC ELBOW AND UPVC PIPE** (RFQ No. 2025-085) and must be submitted on or before **July 4, 2025, 11:00AM** at the SMWD main office. It may also be sent via electronic mail on our official email address at smwdbulacan@yahoo.com on the specified time stated above and address to the **BAC Chairperson, Ms. Maria Leonora S. Romarate**.

Quotations shall be valid for thirty (30) calendar days from the deadline of submission of the same.

The delivery period shall be based on the agreement made with the supplier from the receipt of the Purchase Order (PO). The supplier should inform the purchaser at least two (2) days before the date of delivery. The Purchaser shall have the right to reject or to return the items that will be declared defective and non-compliant with the specifications The delivery will be made only during working days from 8:00 AM to 5:00 PM.

DELIVERY SITE: General Services Division of SMWD located at 301 J. P. Rizal St., Dulong Bayan, Santa Maria, Bulacan.

The Santa Maria Water District reserves the right to accept or reject any quotation, and to annul the procurement process and reject all quotations at any time prior to Contract award, without thereby incurring any liability to the affected supplier or suppliers. SMWD also reserves the right to waive any required formality in the proposals received, and select the proposal which it determines to be the most advantageous to the government.

Prepared by:

Sgd
Romel P. Lazaga
Procurement Analyst

Noted by:

Sgd
Maria Leonora S. Romarate
BAC Chairperson

TECHNICAL SPECIFICATIONS FOR

ORIENTED UNPLASTICIZED POLYVINYL CHLORIDE (PVC-O) PIPES

This standard specifies the requirements for oriented unplasticized polyvinyl chloride (uPVC-O) pipes with nominal outside diameter of 90mm to 500mm intended for the conveyance of potable water under pressure and of temperatures up to 45°C for use below ground.

The pipes shall be made of unplasticized polyvinyl chloride compound/formulation. This compound/formulation shall consist substantially of PVC-U resin/powder, to which shall be added only those additives necessary to facilitate the production of pipes and fittings in accordance with ISO 16422:2014 standards.

A. CLASSIFICATION

Pipes shall have a material classification of 500 with nominal pressure PN16 (1.6 MPa or 232 Psi).

B. REQUIREMENTS

1. Materials

- The raw material must be "Virgin Resin" from a recognized top-quality resin company. In-plant blending of non-compounded resins is non-acceptable.
- The pipe shall meet the requirements of the National Sanitation 3 Institute of Science and Technology or other approved testing laboratories and shall be made from non-toxic, non-lead-based plasticizer.
- The use of manufacturer's own reprocessed material, produced during the manufacture and works testing of products and conforming to the material requirements of ISO 16422, is permitted. Reprocessed or recycled material obtained from external sources shall not be used.
- When measured according to the methods described in ISO 3126, unplasticized polyvinyl chloride pipe shall conform with the following dimensions conforming to the wall thickness table in ISO 16422.

Table 1. SMWD PVC-O Pipe Dimension Requirements

NOMINAL DIAMETER (DN)	OUTSIDE DIAMETER (OD)		WALL THICKNESS
	min.	max.	min.
mm	mm	mm	mm
90	90.0	90.3	2.0
110	110.0	110.4	2.4
125	125.0	125.4	2.8
140	140.0	140.5	3.1
160	160.0	160.5	3.5
200	200.0	200.6	4.4
225	225.0	225.7	5.0
250	250.0	250.8	5.5
315	315.0	316.0	6.9
355	355.0	356.1	7.8
400	400.0	401.2	8.8
450	450.0	451.4	9.9
500	500.0	501.5	11.0

- The minimum depth of engagement of integral sockets with elastomeric (fix) sealing ring type joints shall conform to ISO 2045.

2. Physical Characteristics

- **Appearance** – The pipe shall be homogeneous throughout and free from cracks, holes, encrustations and other foreign inclusions. Excessive die lines and/or stress marks (particularly in the socket and bell groove) as well as discernible material marbling are not allowed. The ends of the pipe shall be cleanly cut and square to the axis of the pipe.
- **Color** – The pipe shall be blue in color extruded from the compound resins that consist of carbon blue (2% minimum) to resist UV penetration and shall be uniform throughout the entire surface of the pipe.
- **Pipe Ends** – Pipes with plain end(s) to be used with elastomeric sealing ring type joints shall have a chamfer conforming to Figure 1 of ISO 16422.
- **Ovality and Waviness** – Pipe should be round and should not have wavy inside and outside surface.
- **Weight** – oriented uPVC pipes should be less than half of ordinary uPVC pipes weight of the same nominal external diameter.

3. Mechanical Properties

- The pipe shall conform with the mechanical properties specified in Table 2.

Table 2. SMWD PVC-O Pipe Mechanical Properties and Characteristics Requirements

PARAMETER	UNITS	VALUE ISO 16422
Minimum required strength (MRS)	MPa	50
Overall service coefficient (C)	-	1.4
Design stress (σ)	MPa	36
Short term elasticity modulus (E)	MPa	>4,000
Resistance to axial traction	MPa	>48
Resistance to hoop traction	MPa	>85
Shore hardness D	-	81-85
Density	kg/dm^3	1.35-1.46
PVC Resin K value	-	>64
Poisson coefficient	-	0.35-0.41
Vicat temperature	°C	>80
Lineal expansion coefficient	$°C^{-1}$	$0.8X10^{-4}$
Thermal conductivity	Kcal/mh °C	0.14-0.18
Specific heat at 20 °C	cal/g °C	0.20-0.28
Dielectric stiffness	kV/mm	20-40
Dielectric constant at 60 Hz	-	3.2-3.6
Transverse resistivity at 20 °C	Ω/cm	$>10^{16}$
Absolute roughness (ka)	mm	0.007
Absolute roughness (Hazen Williams)	-	150
Manning roughness coefficient (n)	-	0.009

The ring stiffness of pipes conforming to this International Standard may be determined in accordance with ISO 9969. Pipes of stiffness less than 4 KN/m^2 might not be suitable where high

vacuum or external pressure could be developed, and could need special installation techniques when installed below ground.

4. Joints

- Joints must be 100 percent watertight and are guaranteed not to displace once the pipes have been installed. **To ensure perfect fit of joints, the PVC-O pipes must have machine installed fixed seals.**
- Polypropylene Ring with a synthetic rubber lip shall be used for sizes 90mm up to 500mm.
- This watertight sealing type joints includes a Polypropylene ring and a synthetic rubber lip which allows the seal to be integrated with the pipe, avoiding joint displacement or movement while the installation is taking place.
- In order to do the assembly, it is necessary to apply lubricant on the chamfer of the spigot end and in the rubber ring joint, and push by hand until the mark of the spigot end is no longer seen.

Table 3. SMWD PVC-O Pipe Hub Dimension Requirements

NOMINAL DIAMETER (DN)	SOCKET LENGTH (SL)	MAXIMUM DIAMETER (Dmax)
mm	mm	mm
90	160	117
110	180	140
125	185	154
140	190	174
160	200	197
200	235	243
225	240	271
250	265	301
315	310	374
355	345	419
400	375	472
450	380	527
500	385	587

C. SAMPLING AND TESTING

- At least one piece or set (depending on the quantities specified by the test method) of sample/s per production batch (one production run or one production shift, whichever is shorter) shall be taken at random for testing in accordance with the methods and procedures specified in this standard.
- Pressure testing shall be conducted in accordance with ISO 1167.
- Pipes shall be tested at 0°C in accordance with ISO 3127, and shall have a true impact rate (TIR) of not more than 10% when using masses given in table below (ISO 16422 reference). The radius of the striker nose shall be R=12.5mm.

Table 4. Classified Striker Mass and Drop Height Conditions for the Falling-Weight Impact Test

NOMINAL SIZE	TOTAL MASS
mm	kg
90	5
110	6.3
125	6.3
140	8
160	8
200	10
≥250	12.5

D. MARKING

- The pipe shall be clearly marked in white text and shall not exceed 0.15mm. deep consisting of but not limited to the following information spaced at intervals of not more than one meter:

  1. Name of Product
  2. Outside diameter and thickness, mm
  3. Pressure Rating
  4. Manufacturer's name and/or its recognized trademark
  5. Material Code / Reference Standard
  6. Date of Manufacture

- The pipe manufacturer shall provide certification that all the pipe testing/characteristic has been performed/meet on the specific product in accordance with ISO 16422:2014.
- **The pipe manufacturer must have a Philippine Standard Quality Certification Mark issued by The Bureau of Philippine Standards for oriented unplasticized polyvinyl chloride (PVC-O) pipes.**

TECHNICAL SPECIFICATIONS FOR
UNPLASTICIZED POLYVINYL CHLORIDE (uPVC) PIPES

This standard specifies the requirements for unplasticized polyvinyl chloride (uPVC) pipes with nominal outside diameter of 63mm to 500mm intended for the conveyance of potable water under pressure and of temperatures up to 45°C for use below ground.

The pipe shall conform with the requirements of the Philippine National Standard Specification for Unplasticized Polyvinyl Chloride (uPVC) Pipes for Potable Water Supply (PNS 65:1993) except as otherwise specified herein. Conforming to ISO Standards, BPS PNS-65 & ISO R-161, and must be duly accepted & approved by MWSS & LWUA.

A. DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

- Nominal Pressure (PN) – The normal maximum internal pressure that the pipe can sustain in continuous use. This is expressed in megapascals (MPa) at 28°C.
- Design Maximum Induced Stress – The estimated maximum tensile stress on the wall of the pipe along the transverse axis due to internal pressure to which the pipe can be subjected continuously without failure. This is used in calculating the wall thickness of the pipe. For the purpose of this standard, the maximum induced stress is 8.5MPa at 28°C.
- Pipe Series (s) – It is used in classifying the pipe, which is the ratio of the design maximum induced stress to the nominal pressure of the pipe. The pipe series number may be rounded off to the nearest whole number.
- Nominal Dimensions – Nominal dimensions and values indicated herein are minimum limits as defined in this standard.
- Unplasticized Polyvinyl Chloride (uPVC) Pipe – A pipe produced basically from an extrusion grade PVC material of high molecular weight which does not contain any plasticizer.
- Rework Material – PVC plastics from a processor's own production that has been reground, palletized or solvated after having been previously processed.

B. CLASSIFICATION

Pipes shall be classified in accordance with the pipe series and/or the nominal pressure as follows:

- **Series 8 (PN 1.03 MPa) – 150 psi:** In designing the maximum nominal pressure of the uPVC pipe under ambient temperatures other than 28°C, Table 1 – Maximum Induced Stress for other Temperatures may be utilized in arriving at the maximum induced stress to be used. The said table may also be used in derating the nominal pressures of the pipe specified in this standard.

Table 1. Maximum Induced Stress for Other Temperatures

Water Temperatures, t, °C	Coefficient to be Applied to the Maximum Induced Stress
0 < t < 25	1
25 < t < 35	0.8
35 < t < 45	0.63

C. REQUIREMENTS

1. Materials

a) Class 12454-A or 12454-B Virgin Compound as defined in ASTM D1784, with HDR Rating of 4,000 psi at 23°C.

b) The material from which the pipes are made shall consist substantially of polyvinyl chloride that conforms with PNS 291, to which may be added only those additive necessary to facilitate the manufacture of quality pipes of good surface finish and sound physical, mechanical and chemical properties.

c) None of the additives shall be used separately or together in quantities sufficient to constitute a toxic, organoleptic or microbial growth hazard or to impair the fabrication or welding properties of the product, or to impair the chemical, mechanical and physical properties (particularly long-term hydrostatic and impact strength) as defined in this standard.

d) The use of the manufacturer's own clean rework material produced during the manufacture and production testing of products conforming with this standard is permissible. No other rework material shall be used.

2. Physical Characteristics

a) Appearance – The pipe shall be homogeneous throughout and free from cracks, holes, encrustations and other foreign inclusions. Excessive die lines and/or stress marks (particularly in the socket and bell groove) as well as discernible material marbling are not allowed. The ends of the pipe shall be cleanly cut and square to the axis of the pipe.

b) Color – The color of the pipe shall be blue nearest to RAL 5012 and shall be uniform throughout the entire surface of the pipe.

c) Effect of Materials on Water Quality – When used under the conditions for which they are designed, non-metallic materials in contact with, or likely to come into contact with potable water shall not constitute a toxic hazard, shall not support microbial growth and shall not give rise to unpleasant taste or odor, cloudiness or discoloration of the water. Concentration of substances, chemicals and biological agents leached from materials in contact with potable water, and measurements of the relevant organoleptic /physical parameters shall not exceed the maximum values recommended by the World Health Organization in its publication "Guidelines for Drinking Water Quality" Vol. 1 "Recommendations" (WHO, Geneva, 1984).

d) Pipe Ends – should be cleanly cut and square to the axis of the pipe. 15% chamfering at the spigot end.

e) Ovality and Waviness – pipe should be round and should not have wavy inside and outside surface.

If lead or mono/di-alkyl tin compound are permitted to be used as stabilizers, the quantities of lead on tin measured as metals shall be determined in accordance with the method described in PNS 966/ISO 3114. The permitted levels shall not exceed the limits specified in Table 2.

Table 2. Maximum Levels of Toxic Substances

TOXIC SUBSTANCES	EXTRACTION		TOTAL CONCENTRATION OF 3 EXTRACTS
mg/L	1st	3rd	
Lead, mg/L	1	0.05	
Di-alkyl Tin, C4 and other higher monologues measured as tin, mg.L		0.02	
Cadmium, mg/L			0.01
Mercury, mg/L			0.001

f) Physical Properties – The pipe shall conform with the physical properties specified in Table 3.

Table 3. Physical Properties

PROPERTY	VALUE	TEST METHOD
Vicat Softening Temperature, °C, minimum	76	PNS 952/ISO 2507
Longitudinal Reversion, %, max.	5	PNS 951/ISO 2505
Water Absorption, g/m2, max	40	PNS 953/ISO 2508

g) Resistance to Acetone – The pipe shall not show signs of delamination or disintegration when immersed in acetone. Flattening and/or swelling of the pipe shall not be deemed constitute failure when tested in accordance with PNS 978/ISO 3472.

h) Resistance to Sulfuric Acid – The mass of the specimen shall not increase by more than 0.316 g nor decrease by more than 0.013 g when tested in accordance with PNS 979/ISO 3473. the effect of the acid on the surface appearance of the specimen (roughening, bleaching or blackening) shall be ignored.

3. Mechanical Properties

The pipe shall conform with the applied pressure for the hydrostatic pressure tests indicated in Table 5 of PNS 65:1993 when tested in accordance with PNS 509/ISO 1167.

Table 4. Applied Pressure for Pressure Test at 28°C

SERIES	8
	MPa
Burst Pressure	4.56
Short Term Pressure	4.30
Long Term Pressure	3.00

For specific calculation, the following formula for deriving the applied pressure may be used:

$$p = \frac{2 \times S \times {}^{t}\text{min.}}{{}^{D}m - {}^{t}\text{min.}}$$

where:

p is the applied pressure, MPa

S is the design stress at 28^0C, MPa

$^{t}min.$ is the minimum wall thickness, mm

^{D}m is the maximum mean outside diameter, mm

a) Hydrostatic Pressure Test Requirement:

1) Burst Pressure – The pipe shall withstand the applied pressure for at least 60 seconds without failure. The value for the induced stress used in calculating pressure requirements is 37.5 MPa at 28°C.
2) Short Term Pressure – The pipe shall withstand the applied pressure for at least one hour without failure. The value for the induced stress used in calculating pressure requirement is 35.7 MPa at 28°C.
3) Long Term Pressure – The pipe shall withstand the applied pressure for at least 1000 hours without failure. The value for the induced stress used in calculating pressure requirement is 24.6 MPa at 28°C.

b) Resistance to External Blows – The true impact rate of the batch at 28°C shall not exceed 10% when tested in accordance with PNS 967/ISO 3127.

NOTE: The true impact rate is the total number of broken test pieces divided by the total number of blows, expressed as percentage as if the whole bath had been tested. In practice, test pieces are drawn at random from the batch and only estimate of the true impact rates are obtained.

c) Flattening – The pipe shall not show evidence of splitting, cracking and breaking when flattened to a minimum of 40% of its outside diameter when tested in accordance with PNS 800/ASTM D2241.

4. Joints

- Elastomeric Neoprene rubber sealing ring type joints shall be used for sizes 63mm up to 500mm.
- The Elastomeric Neoprene rubber conforming to ASTM D3139 with the back flow design and Stiffener for permanent lock.
- Joints must be 100 percent watertight and are guaranteed not to displace once the pipes have been installed. **To ensure perfect fit of joints, the PVC-O pipes must have machine installed fixed seals.**
- Please provide sample upon submission of bid.

D. SAMPLING AND TESTING

- At least one piece or set (depending on the quantities specified by the test method) of sample/s per production batch (one production run or one production shift, whichever is shorter) shall be taken at random for testing in accordance with the methods and procedures specified in this standard.
- The pipes shall be tested in accordance with the method prescribed in this standard.
- The frequency of sampling and testing of pipes is shown in Table 5.

Table 5. Sampling and Testing Schedule for Assessment of Compliance

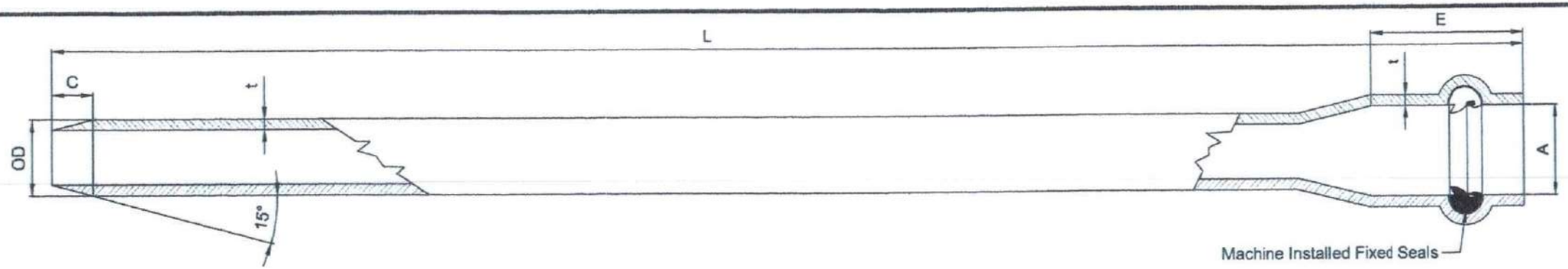
REQUIREMENTS	MINIMUM FREQUENCY
General Requirements	
Diameter and Wall Thickness	Hourly
Length	Every 8 hours
Appearance	Every pipe
Type Test	
Material	Once every 6 months or every change of formulation
Effect of materials on water quality	-do-
Vicat Softening	-do-
Water Absorption	-do-
Resistance to Sulfuric Acid	-do-
Long Term Pressure	-do-
Joints	-do-
Quality Control Test	
Longitudinal Reversion	Every 8 hours
Resistance to Acetone	-do-
Burst Pressure	-do-
Short Term Pressure	Every 24 hours
Resistance to External Blows	Every 8 hours

E. MARKING

- The pipe shall be clearly marked with the following information spaced at intervals of not more than one meter:

1. Name of Product
2. Nominal outside diameter, mm
3. Series and/or Nominal Pressure MPa
4. Manufacturer's name and/or its recognized trademark
5. The words "Made in the PHL" or Made in the Phil."
6. The words "For Potable Water"

- **The pipe manufacturer must have a Philippine Standard Quality Certification Mark issued by The Bureau of Philippine Standards for unplasticized polyvinyl chloride (uPVC) pipes.**



Dimension

Nominal Diameter (DN)	Diameter Tolerance OD (mm)	A (mm)	L (M)	E (mm)	CLASS 500 PN 16 Bar Min. "t" (mm)
90	+0.30	84.0	5.95	160	2.0
110	+0.40	104.0	5.95	180	2.4
125	+0.40	117.8	5.95	185	2.8
140	+0.50	132.4	5.95	190	3.1
160	+0.50	151.4	5.95	200	3.5
200	+0.60	189.2	5.95	235	4.4
225	+0.70	212.8	5.95	240	5.0
250	+0.80	236.4	5.95	265	5.5
315	+1.00	298.0	5.95	310	6.9
355	+1.10	336.0	5.95	345	7.8
400	+1.20	378.4	5.95	375	8.8
450	+1.40	426.0	5.95	380	9.9
500	+1.50	472.8	5.95	385	11.0

Pipe Material:

Made of unplasticized polyvinyl chloride compound/formulation consist substantially of uPVC resin/powder. Virgin Resin from a recognized top-quality resin company.

Rubber Ring Gasket:

Polypropylene ring with a synthetic rubber lip

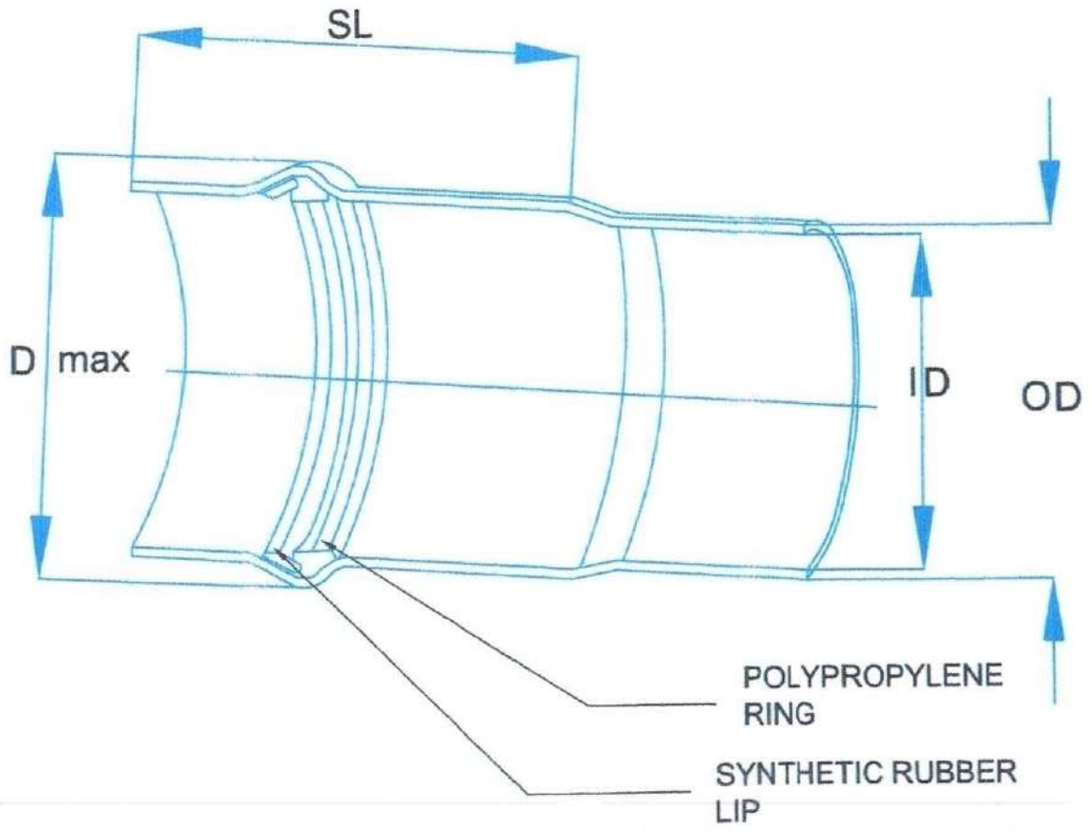
Pipe Material Technical Characteristics

Standard and Characteristic	Units	Value ISO 16422
Minimum required strength (MRS)	MPa	50.0
Overall service coefficient (C)	-	1.4
Design Stress	MPa	36.0
Short term elasticity modulus (E)	MPa	>4,000
Resistance to axial traction	MPa	>48
Resistance to hoop traction	MPa	>85
Shore hardness D	-	81-85
Density	kg/dm3	1.35 - 1.46
PVC Resin K value	-	>64
Poisson coefficient	-	0.35-0.41
Vicat temperature	deg. C	>80
Lineal expansion coefficient	deg. C	0.8x10^-4
Thermal conductivity	Kcal/mh deg. C	0.14-0.18
Specific heat at 20 deg.C	cal/g deg. C	0.20-0.28
Dielectric stiffness	kV/mm	20-40
Dielectric constant at 60Hz	-	3.2-3.6
Transverse resistivity at 20 deg. C	ohm/cm	>10^16
Absolute roughness (ka)	mm	0.007
Absolute roughness (Hazen Williams)	-	150
Manning roughness coefficient (n)	-	0.009

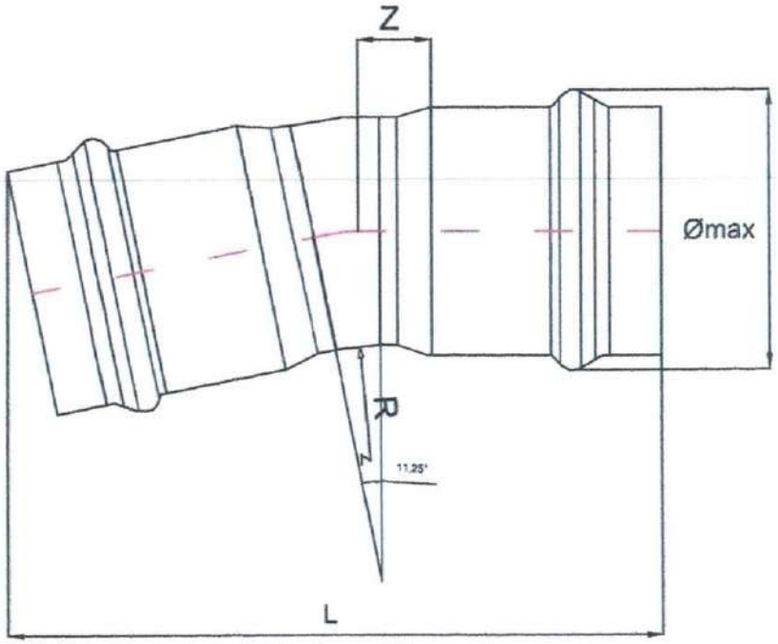
STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT	SHEET NO.
PVC-O PIPE (CLASS 500 - PN16)	Prepared By: Sgd Engr. Raymond Patrick N. Soriano, Supervising Engineer A; Sgd Engr. Christian A. Reyes, Supervising Engineer A	Approved By: Sgd Engr. Carlos N. Santos, Jr., General Manager 5/30/25	1

Rubber Ring Gasket: The watertight seal includes a Polypropylene ring and a synthetic rubber lip which allows the seal to be integrated with the pipe, avoiding joint displacement or movement while the installation is taking place.

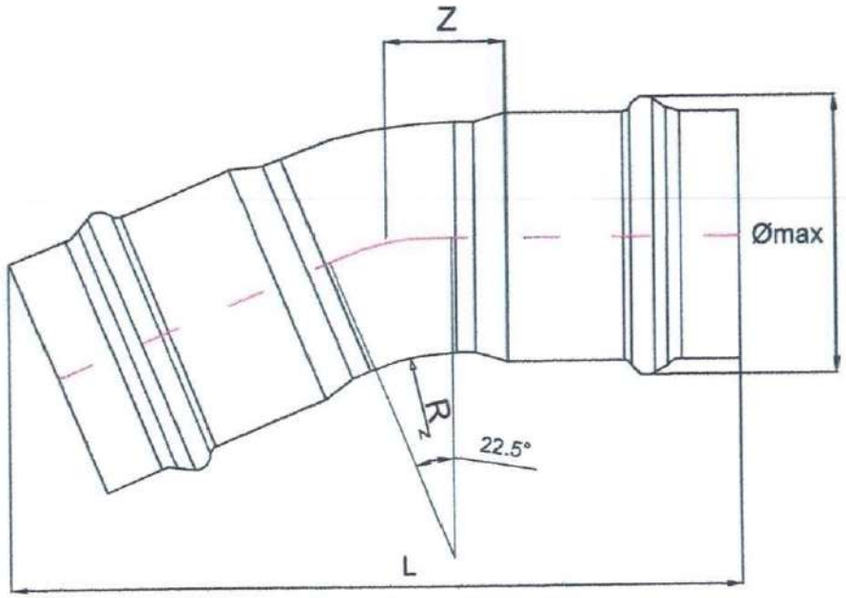
Nominal Diameter (DN)	Socket Length (SL)	Maximum Diameter (D max)	Socket limit mark
mm	mm	mm	mm
90	160	117	125
110	180	140	140
125	185	154	140
140	190	174	145
160	200	197	160
200	235	243	170
225	240	271	180
250	265	301	225
315	310	374	240
355	345	419	275
400	375	472	290
450	380	527	310
500	385	587	315



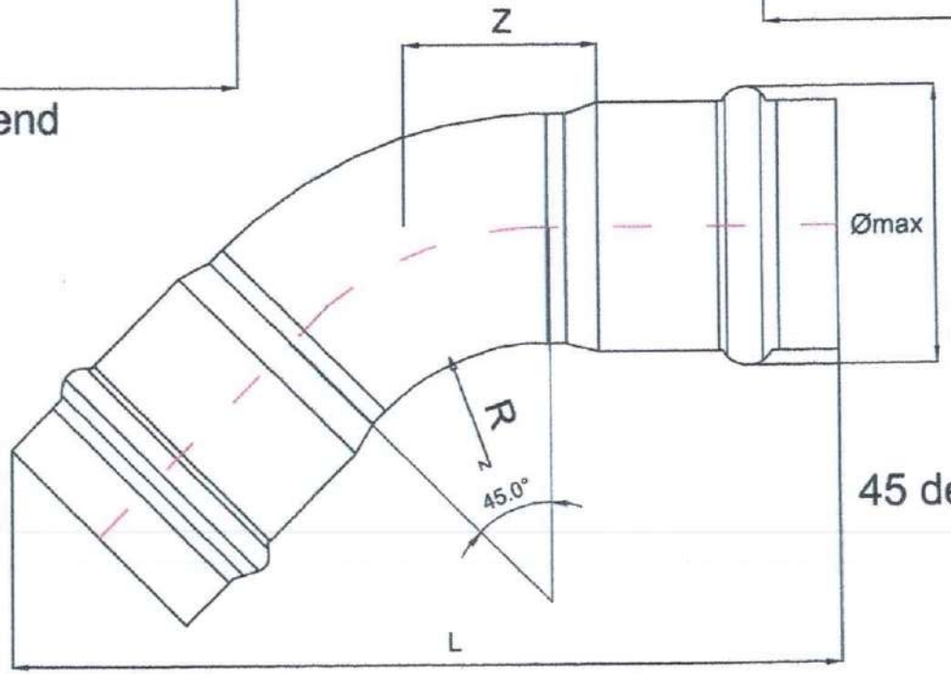
STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT		SHEET NO.
PVC-O PIPE (CLASS 500 - PN16)	Prepared By: Engr. Raymond Patrick N. Soriano, Supervising Engineer A (Sgd)	Engr. Christian A. Reyes, Supervising Engineer A (Sgd)	Approved By: Engr. Carlos N. Santos, Jr., General Manager (Sgd) 6/30/20	2



11.25 deg.Bend



22.5 deg.Bend



45 deg.Bend

STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT			SHEET NO.
PVC-O PIPE (CLASS 500 - PN16)	Prepared By: Engr. Raymond Patrick N. Soriano, Supervising Engineer A (Sgd)	Engr. Christian A. Reyes, Supervising Engineer A (Sgd)	Approved By: Engr. Carlos N. Santos, Jr., General Manager (Sgd) 5/30/25	3

11.25 deg. Bend

DN	Ømax (mm)	L (mm)	Z (mm)	Radius (mm)	CLASS 500 PN 16 Bar Weight (kg)
110	140	455	55	165	1.0
160	200	535	70	240	2.2
200	245	595	80	300	4.0
250	305	690	95	375	6.0
315	375	790	115	475	13.0
400	475	925	140	600	24.4
500	575	1090	165	750	29.4

22.5 deg. Bend

DN	Ømax (mm)	L (mm)	Z (mm)	Radius (mm)	CLASS 500 PN 16 Bar Weight (kg)
110	140	490	70	165	1.0
160	200	585	95	240	2.4
200	245	655	110	300	4.3
250	305	765	135	375	6.4
315	375	885	160	475	14.5
400	475	1045	200	600	27.5
500	575	1240	240	750	33.0

45 deg. Bend

DN	Ømax (mm)	L (mm)	Z (mm)	Radius (mm)	CLASS 500 PN 16 Bar Weight (kg)
110	140	555	105	165	1.1
160	200	680	145	240	2.9
200	245	770	175	300	5.1
250	305	910	215	375	7.7
315	375	1070	265	475	17.5
400	475	1280	330	600	33.7
500	575	1530	400	750	40.4

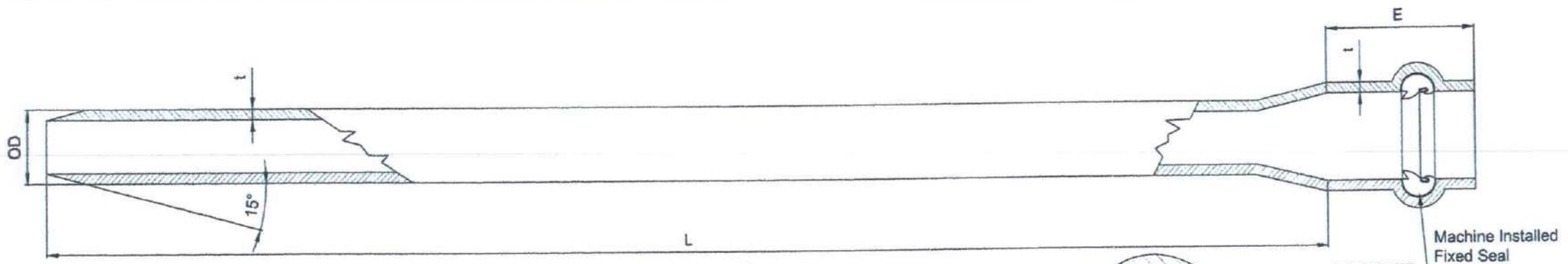
Pipe Material:

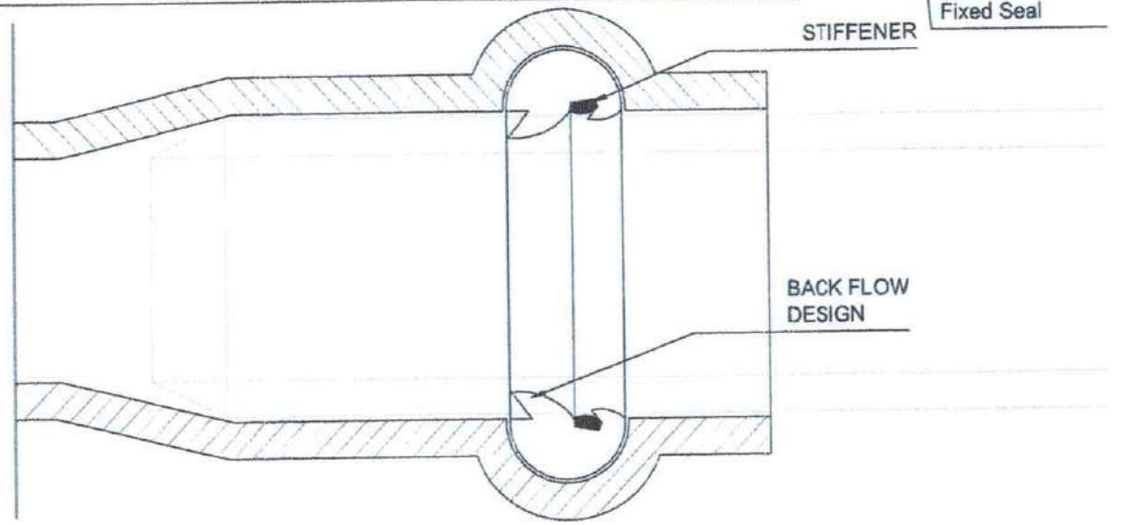
Made of unplasticized polyvinyl chloride compound/formulation consist substantially of uPVC resin/powder. Virgin Resin from a recognized top-quality resin company.

Rubber Ring Gasket:

Polypropylene ring with a synthetic rubber lip

STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT	SHEET NO.
PVC-O PIPE (CLASS 500 - PN16)	Prepared By: Sgd Engr. Raymond Patrick N. Soriano, Supervising Engineer A; Sgd Engr. Christian A. Reyes, Supervising Engineer A — Approved By: Sgd Engr. Carlos N. Santos, Jr., General Manager 5/30/25	4





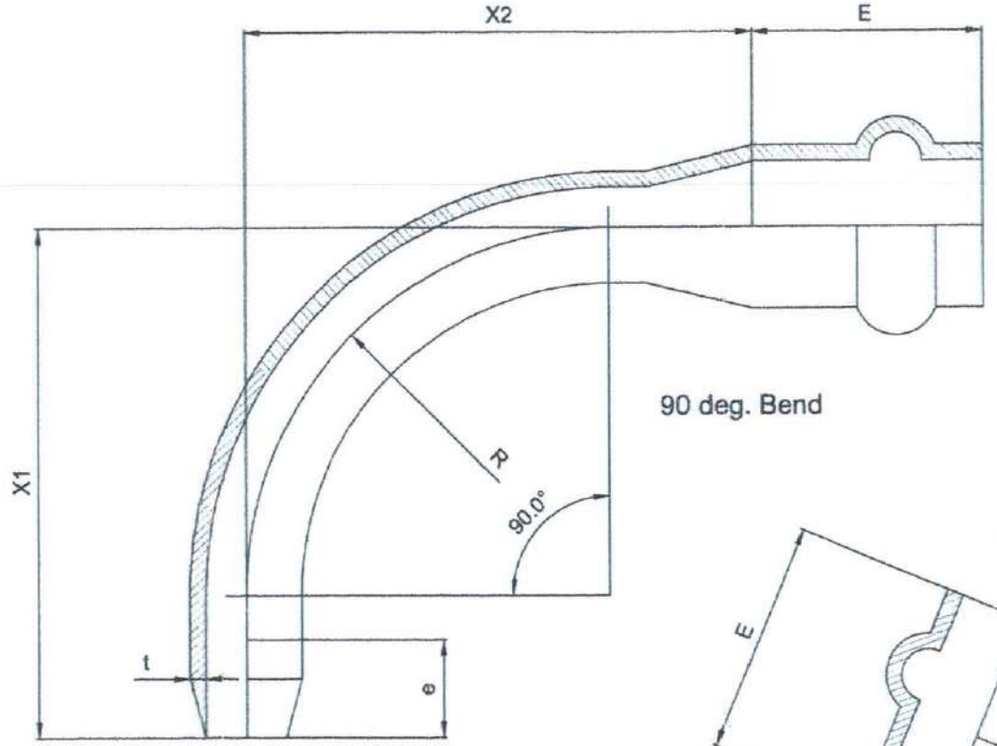
Pipe Material: Class 12454-A or 12454-B
Virgin Compound as Defined in ASTM D1784, with HDR Rating of 4,000 PSI at 23 C°

Rubber Ring Gasket: Elastomeric Neoprene Rubber Conforming to ASTM D3139 with BACK FLOW DESIGN and STIFFENER for PERMANENT LOCK

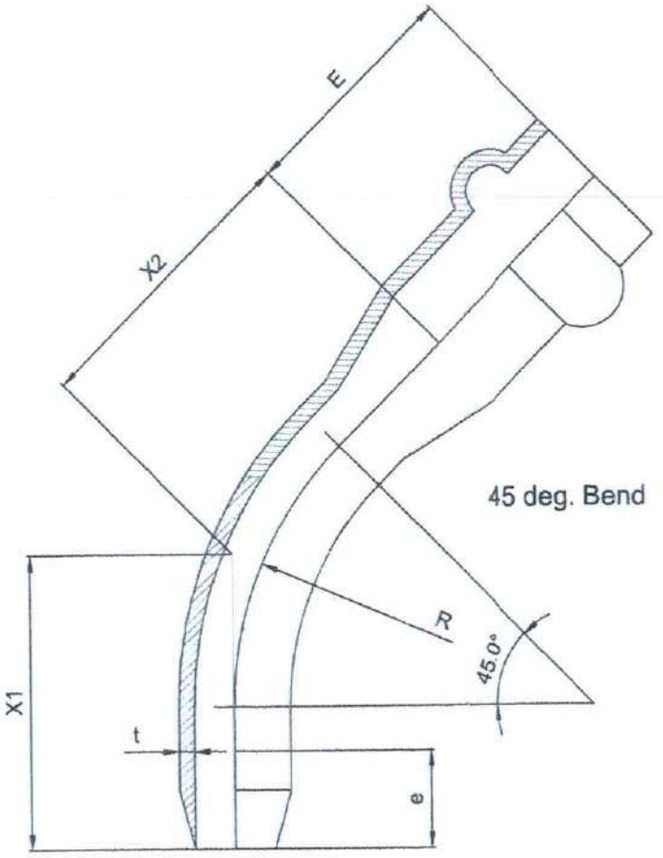
OD	diameter tolerance		A (mm)	C (mm)	L (M)	E (mm)	SERIES 8 (CLASS 150) PN 1.03 MPa
	OD (mm)	oval (mm)					Min. "t" (mm)
63	0.30	± 0.8	63.6 - 64.1	8	6	97	3.6
90	0.30	± 1.1	91.8 - 91.4	12	6	107	5.2
110	0.40	± 1.4	111.4 - 111.8	14	6	114	6.3
160	0.50	± 2.0	162.0 - 162.5	16	6	131	9.2
225	0.70	± 2.7	227.7 - 228.4	20	6	154	12.9
280	0.90	± 3.0	283.0 - 283.9	26	6	173	16.0
315	1.00	± 3.8	318.8 - 319.8	36	6	195	18.0

Applied Pressure for Pressure Test	
SERIES 8 (CLASS 150) PN 1.03 MPa	
Burst Pressure (psi)	658.65
Short Term Pressure (psi)	621.09
Long Term Pressure (psi)	433.32

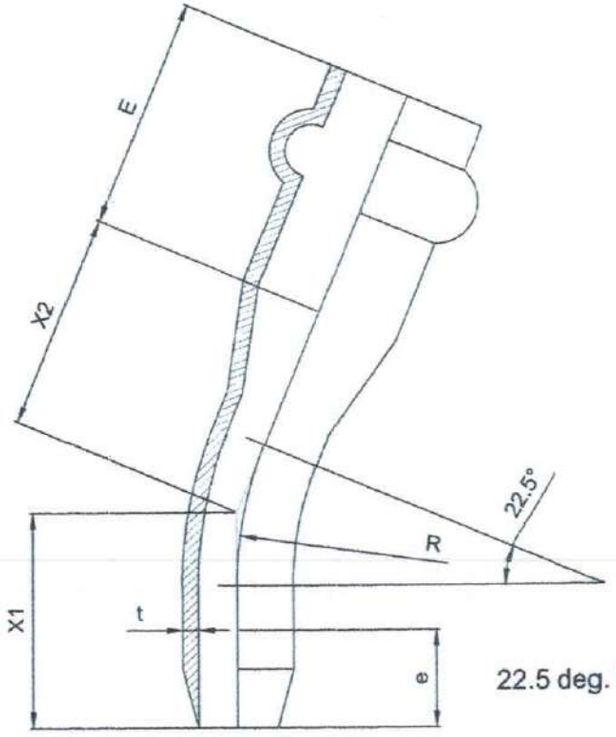
STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT	SHEET NO.
uPVC PIPE (SERIES 8/CLASS 150)	Prepared By: Sgd Engr. Raymond Patrick N. Soriano, Supervising Engineer A; Sgd Engr. Christian A. Reyes, Supervising Engineer A Approved By: Sgd Engr. Carlos N. Santos, Jr., General Manager 5/30/24	5



90 deg. Bend



45 deg. Bend



22.5 deg. Bend

STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT			SHEET NO.
uPVC PIPE (SERIES 8/CLASS 150)	Prepared By: Engr. Raymond Patrick N. Soriano, Supervising Engineer A (Sgd)	Engr. Christian A. Reyes, Supervising Engineer A (Sgd)	Approved By: Engr. Carlos N. Santos, Jr., General Manager (Sgd)	6

90 deg. Bend

OD	diameter tolerance		R (mm)	X1 (mm)	X2 (mm)	E (mm)	e (mm)	SERIES 8 (CLASS 150) PN 1.03 MPa
	OD (mm)	oval (mm)						Min. "t" (mm)
90	0.30	± 1.1	250	450	320	107	110	5.2
110	0.40	± 1.4	290	500	370	114	121	6.3
160	0.50	± 2.0	480	720	580	131	145	9.2
225	0.70	± 2.7	750	1020	880	154	177	12.9
280	0.90	± 3.0	1050	1360	1200	173	204	16.0

Pipe Material: Class 12454-A or 12454-B Virgin Compound as Defined in ASTM D1784, with HDR Rating of 4,000 PSI at 23 C°

Rubber Ring Gasket: Elastomeric Neoprene Rubber Conforming to ASTM D3139 with BACK FLOW DESIGN and STIFFENER for PERMANENT LOCK

45 deg. Bend

OD	diameter tolerance		R (mm)	X1 (mm)	X2 (mm)	E (mm)	e (mm)	SERIES 8 (CLASS 150) PN 1.03 MPa
	OD (mm)	oval (mm)						Min. "t" (mm)
90	0.30	± 1.1	250	300	170	107	110	5.2
110	0.40	± 1.4	290	330	200	114	121	6.3
160	0.50	± 2.0	480	440	290	131	145	9.2
225	0.70	± 2.7	750	580	440	154	177	12.9
280	0.90	± 3.0	1050	740	580	173	204	16.0

Applied Pressure for Pressure Test	
SERIES 8 (CLASS 150) PN 1.03 MPa	
Burst Pressure (psi)	658.65
Short Term Pressure (psi)	621.09
Long Term Pressure (psi)	433.32

22.5 deg. Bend

OD	diameter tolerance		R (mm)	X1 (mm)	X2 (mm)	E (mm)	e (mm)	SERIES 8 (CLASS 150) PN 1.03 MPa
	OD (mm)	oval (mm)						Min. "t" (mm)
90	0.30	± 1.1	250	250	120	107	110	5.2
110	0.40	± 1.4	290	270	140	114	121	6.3
160	0.50	± 2.0	480	335	185	131	145	9.2
225	0.70	± 2.7	750	420	280	154	177	12.9
280	0.90	± 3.0	1050	520	360	173	204	16.0

STANDARD SHOP DRAWING	SANTA MARIA WATER DISTRICT			SHEET NO.
uPVC PIPE (SERIES 8/CLASS 150)	Prepared By: Engr. Raymond Patrick N. Soriano, Supervising Engineer A (Sgd)	Engr. Christian A. Reyes, Supervising Engineer A (Sgd)	Approved By: Engr. Carlos N. Santos, Jr., General Manager (Sgd)	7