

SECTION 2 - MATERIALS

2-00 GENERAL

All materials and equipment installed in SBMWD's water system shall meet all state and federal standards as well as standards developed by nationally recognized organizations such as AWWA, ANSI and NSF. In order to protect human health, all materials and equipment shall meet ANSI/NSF 60, *Drinking Water Treatment Chemicals - Health Effects*, and ANSI/NSF 61, *Drinking Water System Components - Health Effects* standards, and shall be so certified by an ANSI accredited certification program.

2-01 DUCTILE IRON PIPE

2-01.01 GENERAL

Ductile iron pipe shall conform to the requirements of the AWWA Standard C151. Unless otherwise specified, size four-inch (4") through eight-inch (8") shall be Pressure Class 350. Pipe ten-inch (10") or larger shall be minimum Thickness Class 50.

2-01.02 PIPE JOINTS

Ductile iron pipe shall be furnished in eighteen-foot (18') or twenty-foot (20') nominal laying lengths and shall have a push-on joint employing a single rubber gasket in accordance with AWWA Standard C111, ("TYTON" Joint as manufactured by U.S. Pipe, or approved equal).

Where restrained joints are indicated on the drawings, push-on joints shall be restrained in accordance with the requirements of Section 2-12.02.

2-01.03 COATING AND LINING

All pipe shall have the interior cement-mortar lined with a seal coat in accordance with AWWA Standard C104, and the outside coated with a bituminous material as specified in AWWA Standard C151.

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2-01.04 POLYETHYLENE PROTECTIVE WRAPPING

Polyethylene encasement shall be V-Bio Enhanced Polyethylene protective wrapping (polywrap) conforming to the requirements of ANSI/AWWA C105/A21.5 and shall consist of three layers of co-extruded linear low density polyethylene (LLDPE), fused into a single thickness not less than 8-mils. The inside surface of the Polywrap to be in contact with the pipe exterior shall be infused with a blend of antimicrobial biocide to mitigate microbiological influenced corrosion and a volatile corrosion inhibitor to control galvanic corrosion. Tubing shall be taped and secured with general purpose polyethylene tape, 2 inches wide and 10 mils thick (Scotchrap No. 50, Plicoflex No. 340, Protecto Wrap No. 200, Polyken No. 900, or approved equal).

Polywrap for ductile iron pipe shall be furnished and installed on all buried water lines, except where water lines are within a steel casing pipe, in accordance with the requirements of AWWA C105 and as specified herein. Polywrap shall be installed to prevent any section of the pipe, fittings, valves, services, or appurtenances from contacting the soil.

The polywrap shall be taped to provide a snug fit along the pipe. Minimum tubing size shall allow for an overlap of 12 inches; i.e., flat tube width in inches = $(3.14 \times \text{Diameter}) + 12$ inches. An additional 3-layer of polywrap shall be made at all tapping locations a minimum of 12 inches in width. Openings for service taps, blowoffs, or similar appurtenances shall be cut in the polywrap during backfilling of the trench. Corporation stops and copper service lines shall be wrapped with polywrap for a minimum clear distance of 3 feet from the water main.

Any punctures, tears or other damage shall be patched with polywrap and tape in accordance with the requirements of AWWA C105 and manufacturer's instructions. Rocks or other material that could damage the polywrap shall not be included in the backfill.

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Polywrap shall be utilized unless the project's geotechnical report demonstrates that the soil is non-corrosive.

2-02 SPECIAL APPLICATIONS USING POLYVINYL CHLORIDE PIPE (NOT USED)

2-03 COPPER TUBING

2-03.01 GENERAL

This specification shall cover the requirements for 1-inch thru 2-inch seamless, annealed, Type "K", copper water tube. Copper tubing shall meet the requirements of ASTM B-88, "Specifications for Seamless Copper Water Tube". The 1½-inch and 2-inch copper water tube shall be of the rigid type.

2-03.02 DIMENSIONS

Copper tubing shall be furnished in coils or straight lengths, as follows:

<u>SIZE</u>	<u>FORM</u>	<u>LENGTH</u>
1"	Coils	60' to 100'
1½" & 2"	Straight Lengths (rigid)	20'

Coils shall be wound in a single layer flat with a minimum 24-inch inside diameter.

2-03.03 TEMPER

Copper tubing shall be furnished in the annealed condition in accordance with the technical property requirements of ASTM B-88. Straight lengths shall be annealed after being drawn.

2-04 RED BRASS PIPE

Brass pipe shall conform to the requirements of the "Specifications for Seamless Red Brass Pipe, Standard Sizes" ASTM Specification B-43 and referenced in the Appendix to AWWA Standard C800.

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Fittings shall be of bronze conforming to the requirements of ASTM B-62, "Specifications for Composition Bronze or Ounce Metal Castings".

2-05 MAIN LINE VALVES

2-05.01 GENERAL

Valves shall be iron-body fusion bonded epoxy lined, nonrising stem, butterfly, or fully encapsulated resilient wedge disk type and shall not have more than two internal moving parts. All valves shall open by turning the wrench nut counter-clockwise. Operating nut for butterfly valves shall be placed at the north or east side of the water line, unless impractical to do so.

When required, aboveground installations shall be resilient seat/wedge disk type valves with outside screw and yoke.

All bronze parts shall contain not more than 7 percent zinc, nor more than 2 percent aluminum.

Stems shall be bronze, and equipped with a 2-inch operating nut conforming to AWWA C509. The valve manufacturer shall employ a positive physical means of indicating the specified stem material to insure ready recognition during inspection.

The bolts and nuts on the bonnet shall be stainless steel type 304 or 316.

The cast or ductile iron exterior of all valves shall be coated with two coats of asphalt varnish conforming to Federal Specification TT-V-51, unless the valve is to be used in aboveground or vault installation. See Section 2-14 for coating on aboveground or vault installation.

The cast or ductile iron interior of all valves shall be protected with fusion bonded epoxy. Coating shall conform to AWWA Standard C550, "Protective Epoxy Interior Coating for Valves and Hydrants".

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Resilient wedge type valves with a flanged end may be used as "tapping valves".

All valves shall be provided with a stem extension if depth of valve nut exceeds 5 feet. All valve extensions shall be centered in the valve well by use of a guide and shall operate freely without binding after installation.

2-05.02 GATE VALVES

Gate valves shall conform to the requirements of AWWA Standard C509, "Resilient-Seated Gate Valves for Water Supply Service", with fully encapsulated disc and as supplemented herein.

All gate valves shall be equipped with double O-ring stem seals.

2-05.03 APPROVED GATE VALVE MANUFACTURERS

ACIPCO American Flow Control Series 500 & Series 2500
American R/D Series 2000 & Series 2500
Clow Resilient Wedge Valve Series 6100
Mueller A-2360
American AVK Series 25
Or Approved Equal

2-05.04 BUTTERFLY VALVES

Butterfly valves shall conform to the requirements of AWWA Standard C504, except the valves shall be tested and certified for 150 psi differential pressure in the closed position. Valves shall be short body rated for working pressures up to 150 psi. Valves shall be designed for buried installation. Valve body, flange and disc material shall be ductile iron or cast iron. Flanges shall be drilled per ANSI/B16.1, 125-pound standard bolt template. The ductile iron or cast iron interior shall be shop coated with NSF approved fusion bonded epoxy at 12 mils DFT. The exterior shall be shop coated with two coats of asphalt varnish per Federal Specification TT-C-494A or fusion bonded epoxy at 12-mils DFT.

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Valve operators shall be the manual type. Buried valves shall come furnished with a standard 2" AWWA nut. The operators shall be of a worm gear or traveling nut type with adjustable stops to limit the disc travel and shall be totally enclosed and self locking. The actuator shall be capable of withstanding 450 foot-pounds at the stops. The actuator shall also be sized for bi-directional seating at 16 feet per second. All external bolts shall be stainless steel. The operator shall be of the size required for opening and closing the valve in accordance with AWWA C-504. All valve operators shall be designed for permanent installation and operation and shall be fully gasketed, sealed, and factory packed with grease.

Valve shaft material shall be stainless steel. Valve resilient rubber seat shall be peroxide cured EPDM rubber located either on the disc or body of the valve. Resilient rubber seats located on the disc shall have a stainless steel seat on the body of the valve to mate with the resilient rubber seat. Resilient rubber seats located on the disc shall be mechanically retained with a continuous stainless steel ring or investment cast with overlapping sections, serrated grooves and shoulders and Nylok cap screws. Resilient seats located on the body shall be furnished with a stainless steel seating edge on the disc to mate with the resilient rubber body seat.

Affidavits of compliance shall be furnished for the butterfly valves. Affidavits shall include "holiday free" NSF approved paint, actuator stops compliance of 450-pounds, proof-of-design per section AWWA C504 latest version for valves and actuator, seat leak test in both directions.

2-05.05 APPROVED BUTTERFLY VALVE MANUFACTURERS

M & H	4500
Muller	B-3211 (Linesal XP)
Pratt	Ground hog
Val-Matic	Series 2000
Or Approved Equal	

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2-05.06 END CONNECTIONS & GASKET MATERIAL

Valves shall have mechanical joints or flanged ends, or a combination of both. Gaskets shall conform to the requirements of Section 2-08.03 of these specifications.

Unless otherwise shown on plans, all valves installed at fitting shall be flanged by mechanical ends, with the flange abutting the fitting.

2-06 AIR AND VACUUM, AIR RELEASE, AND COMBINATION AIR VALVES

Air and Vacuum, Air Release and Combination Air Valves shall conform to AWWA C512 and be designed for a working pressure of 150 psi, unless otherwise specified. Float, linkage and all internal parts shall be 8-18 stainless steel. Interior coating for cast iron body shall be NSF 61 approved fusion bonded epoxy. Valves shall be APCO as manufactured by Valve and Primer Corporation, Crispin by Multiplex Manufacturing Co., Cla-Val, or approved equal.

	<u>APCO</u>	<u>CRISPIN</u>	<u>CLA-VAL</u>
Air/Vacuum	Series 140	Series AL	Series 35
Air Release	50/200A	Series AR/PL	Series 34
Combination Air	Series 140C	Series UL	Series 36

2-07 FIRE HYDRANTS

2-07.01 GENERAL

Fire hydrants shall be of the wet-barrel type, conforming to AWWA C503, and as supplemented herein. The Engineer may require a break-off check valve with the wet-barrel type due to location, terrain, available drainage area, and/or system pressure.

2-07.02 MATERIALS AND PARTS

Fire hydrants used in residential areas shall have one 2-1/2-inch hose outlet and one 4-inch pumper outlet. Fire hydrants used in commercial/industrial areas shall have two 2 1/2-inch hose outlets and one 4-inch pumper outlet. Outlet threads shall conform

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to ANSI-B26 "National Standard Fire-Hose Coupling Screw Threads".

Fire hydrants shall be furnished with a pentagon shaped operating nut 1-1/8 inch per side, and opening shall be counterclockwise. Fire hydrants shall be furnished with hollow break off bolts or an equivalent grounded break off spool at the ground level flange.

Fire hydrants shall be equipped with plastic outlet nozzle caps attached to the body of the fire hydrant with non-kinking electro-galvanized steel chains and fitted with appropriate neoprene rubber gaskets.

All fire hydrant burys shall be cast iron, asphalt coated and cement lined. Fire hydrant burys shall be provided with a Mechanical Joint-end at the shoe.

Wet barrel type fire hydrants shall have a nominal six-inch (6") base flange with a six-hole bolt pattern. All internal working parts, including stem, shall be bronze containing no more than seven percent (7%) zinc or two percent (2%) aluminum or 316 stainless steel. The inside of the Cast Iron or Ductile Iron body shall be epoxy lined.

2-07.03 APPROVED FIRE HYDRANT MANUFACTURERS

Clow	F - 860, F-2060, and LB 430
James Jones Co.	J-3765 and J-4060
American AVK	2490

2-08 MAIN LINE PIPE FITTINGS

2-08.01 GENERAL

Main line pipe fittings shall conform to the requirements of AWWA Standard C110, "Ductile Iron and Gray-Iron Fittings, 3-inch Through 48-inch, for Water and Other Liquids".

Short body type fittings conforming to AWWA Standard C153 may be used for sizes 4-inch through 24-inch.

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All fittings shall be made of ductile iron. Fittings up to 24-inch size shall be 350 psi pressure ratings and over 24-inch size shall be 150 psi pressure rating. Fittings shall be cement mortar lined in accordance with AWWA Standard C104, "Cement Mortar Lining for Ductile-Iron Pipe and Fittings for Water".

2-08.02 END CONNECTIONS

2-08.02.1 MECHANICAL JOINTS

Mechanical Joints shall conform to the requirements of AWWA Standard C111 "Rubber-Gasket Joint for Ductile Iron Pressure Pipe and Fittings". Glands shall be made of ductile iron.

2-08.02.2 FLANGED FITTINGS

Flanged fittings shall conform to the requirements of AWWA Standard C110 or C153. Flanges shall be drilled to ANSI B16.1, 125 lb. standard bolt template. The 250 lb. flanges, when required, shall be drilled to ANSI B16.1, 250 lb. standard bolt template.

2-08.03 GASKETS

Gaskets for flanged fittings shall be either ring or full-faced, 1/8-inch thick, vulcanized styrene butadiene rubber (SBR) or Neoprene rubber gaskets. The full-faced gaskets shall extend from the inside diameter of the flange to beyond the outside edge of the bolt holes. Use ring type gaskets for 14-inch and larger sizes. Whenever blind flanges are shown, the gasket shall consist of 1/8-inch thick SBR or neoprene rubber sheet which shall cover the entire inside surface of the blind flange and shall be cemented to the surface of the blind flange. In lieu of rubber gasket, the 1/16-inch polytetrafluoroethylene (PTFE) GORE-TEX GR sheet gasketing material, applied full-faced, is an approved equal.

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2-08.04 BOLTS AND NUTS FOR MECHANICAL JOINTS AND FLANGED FITTINGS

Tee-head bolts and hexagonal nuts for all mechanical joints shall be high strength, low alloy steel, meeting the current provisions of American National Standard ANSI/AWWA C111/A21.11, "Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings", and must be Cor-Ten as manufactured by NSS Industries, or approved equal. Stainless Steel nuts and bolts that come with approved stainless steel tapping sleeves are allowed; however, the Contractor shall strictly follow the torque limitations and shall use Anti-Cease as manufactured by Loc-Tite or approved equal with the stainless steel nuts and bolts.

Hexagonal bolts, nuts and washers for flanged fittings shall be zinc plated, high strength, low-carbon steel conforming to the chemical and mechanical requirements of ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength, Grade A.

All exposed nuts and bolts shall be coated after assembly with an approved mastic as described in Section 2-09.01. Threads shall be showing beyond the installed nuts and correct size (diameter) bolts shall be used in all installations.

2-08.05 TAPPING SLEEVES

All Tapping Sleeves for tapping a water main under pressure shall conform to the following requirements:

2-08.05.1 DUCTILE IRON, GRAY IRON AND ASBESTOS-CEMENT PIPE

Tapping sleeves shall be of the mechanical joint type. All tapping sleeves specified in this Section must withstand a 150 psi minimum working pressure. Tapping sleeves that seal only around the opening in the pipe may be used. For working pressures above 150 psi, special approval must be obtained

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from the SBMWD.

Mechanical joint type tapping sleeves shall be made of ductile iron and conform to the requirements of AWWA Standard C110 "Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids" and AWWA Standard C111 "Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings". All interior and exterior surfaces of ductile iron sleeves shall be lined and coated with a fusion bonded epoxy coating. Approved mechanical joint type tapping sleeves are listed in Section 2-08.05.2.

2-08.05.2 APPROVED DUCTILE IRON TAPPING SLEEVE MANUFACTURERS

Mueller	Model H-615 (Used on DIP or CIP)
Mueller	Model H-619 (Used on AC Pipe)
Tyler	Ductile Iron MJ Tapping Sleeve or approved equal

2-08.05.3 (NOT USED)

2-08.05.4 (NOT USED)

2-08.05.5 CONCRETE CYLINDER PIPE

At the sole discretion of the SBMWD, tapping sleeves for concrete cylinder pipe may be required to be of the weld-on type, provided that welding is performed by a State certified pipe welder. For concrete cylinder pipe with a steel cylinder wall thickness of 13 gauge or thinner, the SBMWD may require a full circle, split body, fabricated steel type tapping sleeve, conforming to the provisions of Section 2-08.05.4 of these specifications.

2-08.05.6 APPROVED TAPPING SLEEVES MANUFACTURERS FOR CONCRETE CYLINDER PIPE

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Full Circle Two-Piece Type:

Koppl Model AS-150
APAC Style 503
Or approved equal

Weld-On Type:

Koppl Model CN-100
APAC Style 504
Superior Style 826
Or approved equal

2-09 MAIN LINE COUPLINGS

2-09.01 SLEEVE TYPE COUPLINGS

Sleeve type couplings shall provide a flexible, water tight connection between two plain ends as described on the construction drawings. For ductile iron and gray iron pipe, all couplings shall be ductile iron solid sleeve type couplings conforming to AWWA C 110, with mechanical joint ends and body not less than 12 inches long. For steel or asbestos cement pipe, all couplings shall be standard steel couplings, with body not less than 7 inches long. Bolts for exposed steel couplings shall be hot-dip galvanized. Bolts for buried steel couplings shall be of type 316 stainless steel. All sleeve type steel couplings shall be fusion bonded epoxy lined with Scotchkote 206N, as manufactured by 3M/Corrosion Protection Products, or approved equal. Steel couplings shall be epoxy primed with a minimum thickness of 3.0 mils prior to shipment.

Steel sleeve type couplings which are to be buried, shall be coated with a mastic after they are assembled. Coal-tar mastics shall be Protecto-Wrap No. CA1200 coating as manufactured by Protecto-Wrap Company, Denver, Colorado or an approved equal.

2-09.01.1 APPROVED SLEEVE TYPE COUPLINGS
 MANUFACTURERS FOR DUCTILE IRON AND
 GRAY IRON PIPE

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Clow - MJ Solid Long Sleeves
Tyler Corporation - 5-144L Long Solid Sleeves
Romac Style 501 Series
Or approved equal

2-09.01.2 APPROVED FLEXIBLE COUPLING
MANUFACTURERS FOR STEEL OR ASBESTOS
CEMENT PIPE

Smith Blair, Inc. - 411 Steel Couplings
Dresser Industries, Inc. - Style 38
Romac Style 400
Or approved equal

2-09.02 MECHANICAL GROOVED-TYPE COUPLINGS

Mechanical grooved-type couplings shall provide a positive thrust restraint by locking two grooved or shouldered ends of pipe together. The couplings shall be Style 77 for steel pipe and Style 31 for ductile iron pipe as manufactured by Victaulic Company, or approved equal. These couplings shall have Grade H rubber gaskets and the interior shall be lined with fusion bonded epoxy. Mechanical grooved-type couplings shall be used in aboveground or vault installation only.

2-09.03 DISMANTLING JOINTS

Dismantling joints shall be a self-contained flanged restrained joint fitting, including both flanged components and sufficient harness bars to withstand the imposed thrust. The dismantling joint shall be designed to provide no less than 5 inches of longitudinal adjustment and shall be installed with 4 inches of inward adjustment and 1 inch of expansion. The pressure rating will be determined by the flange configuration and all commonly used flanges shall be available. As standard, flanges conforming to AWWA C207 class D shall be used.

The dismantling joint shall be furnished as a complete assembly consisting of spigot piece,

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flange adapter, tie bars and gasket.

The spigot piece and the flange adapter shall be steel per AISI C1010-C1015. All exterior fasteners including tie bars shall be 304 or 316 stainless steel. Stainless steel fasteners and tie bars shall not be painted. Gasket material shall be EPDM or Buna-S. The dismantling joint shall be coated inside and out with a fusion bonded Epoxy coating applied to a thickness of 5 -10 mils. The epoxy shall comply with the requirements of NSF 61 and AWWA C550.

The dismantling joint shall comply with AWWA C219 where applicable, and the manufacturer shall operate an accredited Quality Management System to ISO 9001. The design pressure rating shall be equal to or greater than the mating flanges. The gasket seal and compression stud and nut arrangement shall be separate and independent of the tie bar restraint system. Seals between companion flanges and dismantling joint flanges shall be made by full faced or drop in ring-style gaskets. Tie bar diameter shall be equal to the corresponding bolt diameter of the mating flange and shall not extend outside the diameter of the flange diameter.

The dismantling joint shall be Style 131 as manufactured by Dresser Industries, or approved equal.

2-10 SERVICE LATERAL INSTALLATION

2-10.01 GENERAL

All valves and fittings for use in the buried service line from the main to the meter setting appurtenance shall conform to the requirement of AWWA standard C800 "Underground Service Line Valves and Fitting". Materials in contact with potable water shall be made from copper alloy No. C83600, in accordance with ASTM B-62. This alloy contains nominally 85 percent copper and 5 percent each tin, lead and zinc. All corporation stops and angle

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meter valves used for copper installations shall have compression connection of copper tubing. Approved manufacturers are James Jones, Ford, Mueller, and A.Y. McDonald.

2-10.02 FITTINGS

2-10.02.1 CORPORATION STOPS

Corporation stops shall have inlet threads per AWWA National Pipe Thread (NPT) as specified by AWWA Standard C800 "Underground Service Line Valves and Fittings". Outlet shall be compression connection for copper tube.

2-10.02.2 ANGLE METER VALVES

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All angle meter valves shall be full port "ball" type, have a locking 90° rotation wing on the key operator, and with full 90-degree or 360-degree rotation of tee head. All valves for 5/8 x 3/4 inch and 1-inch meters shall have a compression connection inlet and a meter swivel nut outlet. All 2-inch valves shall have a compression connection inlet for 2-inch copper tubing and a meter flange outlet slotted to accommodate 1½-inch and 2-inch meters. Slot should not extend to the outside edge - open slot will not be accepted.

2-10.02.3 COUPLINGS AND SOLDER

Couplings required in 2-inch service laterals shall be made with copper tube fittings in accordance with ANSI B16.22. The diametral clearance between the tube and fitting shall be .004 to .010 inches. Solder shall be 95/5 (tin-antimony) or an approved equal. Solder with a lead content of 0.2 percent or greater will not be accepted.

2-10.02.4 BOLTS AND NUTS FOR METER FLANGE CONNECTIONS

All bolts, nuts and washers for flanged fittings shall be silicon-bronze per ASTM B98 or of an approved similar metal as the flanges, to resist corrosion and for easy removal after lengthy service.

2-10.03 SERVICE SADDLES

All service saddles shall be bronze conforming to ASTM B-62, double strap, and tapped for AWWA taper thread as specified by AWWA Standard C800 "Underground Service Line Valves and Fittings".

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2-10.04 METER BOXES

Meter boxes shall be polymer concrete having a compressive strength of 4,000 psi. Meter boxes shall have a polymer concrete cover. Body of the meter box shall be constructed with a "ring" at the top to prevent settlement. Meter boxes shall have a mesh wire installed at the base to prevent filling the meter box by gopher activity.

Where required, meter boxes shall have traffic load rating covers. Meter boxes shall be manufactured by Armorcast Products Company or approved equal, as indicated below.

<u>Meter Size</u>	<u>CDR Box/Cover</u>
5/8" x 3/4" and 1"	A6000485/ A6000484R
1½" and 2"	A6001419/ A6001420R

2-11 SMALL METERS

2-11.01 POSITIVE DISPLACEMENT TYPE

2-11.01.1 GENERAL

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Meters 2-inch or less in size are classified as small meters and shall conform to AWWA C700, Standard Specifications for "Cold Water Meters - Displacement Type, Bronze Main Case". All meters shall consist of a bronze main case with serial numbers stamped on the main case. All meters shall be read in 100x cubic feet and shall be issued by SBMWD only.

2-11.01.2 APPROVED POSITIVE DISPLACEMENT TYPE METER MANUFACTURERS

Hendy Technology Group:

5/8" x 3/4"	Model T-10
1"	Model T-10
1½"	Model T-10
2"	Model T-10

Badger Metering Systems:

5/8" x 3/4"	Model SR
1"	Model SR
1½"	Model SR
2"	Model SR

Badger Meter With Itron ERT Transceiver:

5/8" x 3/4"	Model EB2 Recordall M25
3/4"	Model EB2 Recordall M35
1"	Model EB2 Recordall M70
1½"	Model EB2 Recordall M120
2"	Model EB2 Recordall M170

2-11.02 TURBINE TYPE

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2-11.02.1 GENERAL

Where specified 1½-inch and 2-inch turbine type meters shall be installed. All turbine meter installations shall include a strainer and shall conform to AWWA C701 and shall be issued by SBMWD only.

2-11.02.2 APPROVED TURBINE TYPE METER MANUFACTURERS

Hendy Technology Group:

1½"	Model HP Turbine
2"	Model HP Turbine

Actaris Metering Systems:

1½"	Model W-120 DRS
2"	Model W-160 DRS

2-12 THRUST RESTRAINING MATERIALS

All mechanical thrust restraining devices shall be ductile iron designed to withstand a working pressure of at least 250 psi with minimum safety factor of two and the heat treat hardened restraining mechanism shall consist of wedges which, when activated, impart a multiple wedging action against the pipe.

2-12.01 MECHANICAL JOINT FITTINGS

Restraining devices for mechanical joint fittings shall be incorporated with design of the follower gland and shall include a restraining mechanism which when activated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. The joint shall maintain flexibility after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536. The mechanical joint restraint shall be MEGALUG as manufactured by EBAA Iron, Inc., Uni-Flange Series 1400 as manufactured by Ford Meter Box, Inc. or approved equal.

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2-12.02 PUSH-ON PIPE BELLS

Where restrained joints are indicated on the Construction Drawings, push-on joints shall be restrained with "Field-Lok" gaskets as manufactured by U.S. Pipe or approved equal. "TR-Flex" restrained joint pipe as manufactured by U.S. Pipe or approved equal is also an acceptable option for restraint of push-on joints. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.

2-12.03 FLANGE ADAPTERS

Flange Adapters shall be manufactured from ductile iron per ASTM A536 and shall have bolt circles and bolt holes to meet ANSI B16.1 - Class 125 or Class 250 if required and shown on the plans. Flange Adapters shall be as manufactured by EBAA IRON, Inc., Uni-Flange by Ford Meter Box Company, Inc., Tyler Corporation, or approved equal.

2-12.04 CONCRETE THRUST BLOCKS

Thrust Blocks are generally unacceptable to the SBMWD. Concrete for thrust blocks shall conform to Concrete Class 420-C-2000. If thrust block is to be disturbed or backfill is to be placed prior to developing its required strength, additional mechanical thrust restraining devices approved by the SBMWD shall be installed. Concrete for In-Line Thrust Blocks shall conform to Class 560-C-3250.

2-13 SHOP DRAWING AND MATERIAL SUBMITTALS

The Contractor shall furnish to the SBMWD such working drawings, data on materials, certifications of materials, and equipment and samples as are required for the proper control of the work, including, but not limited to, those working drawings, data and samples specifically required in Section 1.0 of these specifications. The shop drawings shall be submitted at least ten (10) working days before such drawings will be required for commencing the work.

2-13.01 SBMWD SUPPLIED MATERIALS

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In the cases where the SBMWD will supply materials to the Contractor, the Contractor shall coordinate the ordering of said materials with the SBMWD Inspector. The Contractor shall provide a 72-hour turnaround time between the time the material is requested to the time the materials will be available for pick-up at the SBMWD Yards (in-stock items). Out of stock items may take longer than 72-hours for SBMWD to procure and it is the Contractor's responsibility to determine the amount of lead time that is necessary. The Contractor shall be responsible for delivery of the materials from the SBMWD to the project site.

In no instance shall a materials order by a Contractor be allowed to be picked up in phases by the Contractor. The Contractor shall pick up the entire material order one time only, whether or not the materials are needed. Once the materials have been transferred to the Contractor, SBMWD will not be held liable for theft or loss of the materials nor be held responsible for a storage location of these materials by the Contractor.

Any excess or spare materials the Contractor desires to return to SBMWD will be allowed on a case-by-case basis with the SBMWD Inspector. The Contractor shall thoroughly clean said material(s) and be held responsible for any restocking fee incurred by SBMWD.

2-14 COATINGS - ABOVEGROUND INSTALLATIONS

After ALL Testing and Disinfection has passed, but prior to Final Acceptance by the SBWMD, all aboveground installations shall be coated in accordance with the following:

Remove ALL dirt, oil, grease, rust, concrete, bituminous coating, and other contaminants from surfaces to be painted by sand-blasting, pickling, or wire brushing as required. Clean all surfaces with solvent then apply primer to all surfaces to be painted. Allow primer to dry, then apply intermediate coat to all surfaces; allow intermediate coat to dry, then apply finish coat.

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The underlined generic terms in the above paragraph shall be considered together as a coating system and shall be supplied by a single manufacturer selected from the list of Approved coating Systems at the end of this section.

The above-specified work shall be accomplished per the appropriate sections of Steel Structures Painting Manual, Volumes 1 and 2, published by the SSPC of Pittsburgh, Pennsylvania AND strict adherence to the manufacturer's recommendations.

Approved Coating Systems By Manufacturer:

<u>Manufacturer</u>	<u>Carboline</u>	<u>Tnemec</u>	<u>Dunn Edwards</u>
Solvent	Surface Cleaner No. 3	Xylol (Xylene)	GMA 571 Bio- degradable Cleaner
Primer	891 High-Gard @ 4-6 mils DFT	Series 69 @ 3-5 mils DFT	670 HS @ 4-8 mils DFT
Intermediat e Coat	891 High Gard @ 4-6 mils DFT	Series 69 @4-6 mils DFT	670 HS @4-8 mils DFT
Finish Coat	134 Carbonthane @ 2-3 mils DFT	Series 73 @ 2-3 mils DFT	990 UHS @ 2-3 mils DFT

(DFT = Dry film thickness)

From the following approved list, use the semi-gloss top coat color that corresponds with the application or as directed by the City.

Approved Finish Coat Colors:

	<u>Carboline</u>	<u>Tnemec</u>	<u>Dunn Edwards</u>
Backflow Prevention Device	Blue	Blue	Blue
Fire Line Assemblies	Red 5555	Safety Red SC09	71007 Safety Red

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Fire Hydrant	Yellow 6666	Bright Yellow SC02	71039 Yellow
Guard Post	Yellow 6666	Bright Yellow SC02	71039 Yellow
Air Vents Type I	Yellow 6666	Bright Yellow SC02	71039 Yellow
Air Release Valve Cover	Yellow 6666	Bright Yellow SC02	71039 Yellow
Water Sampling Station	Blue	Blue	Blue

All exposed Ductile Iron Pipe installations in vaults shall be uncoated shop primed and field epoxy coated with amine cured epoxy with a solids content of at least 80 percent by volume 12 Mils Dft, and shall be suitable for long-term immersion service in potable water. The coating material shall be listed in the NSF International as in compliance with NSF Standards 61 - Drinking water system components - Health effects. All buried DIP Pipe shall be in accordance with AWWA C151 and SBMWD Specifications.

2-15 ACCESS TO MANUFACTURING AND TEST FACILITIES

The SBMWD shall at all times have access to the manufacturing and test facilities, and the right to inspect the work, and materials. The manufacturer shall furnish the SBMWD with reasonable facility access for obtaining such information as necessary to assess the progress of the work, and the character and quality of materials used. When requested by the SBMWD, the manufacturer shall submit a certificate of compliance that the product meets the requirements of these specifications.

2-16 PIPE CASING

2-16.01 STEEL CASING

The pipe casing shall be laid true to line and grade with no bends or changes in grade for the full casing length. The casing material used shall be a minimum of one-quarter (1/4) inch thick steel (design calculations must be submitted by the

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engineer) and conform to ASTM A283, Grade B, C, or D. All joints shall be welded. Interior joints shall be ground to a smooth finish. All welding shall be performed in accordance with AWWA C206, "AWWA Standard for Field Welding of Steel Water Pipe". Coatings for steel casings are not required. Other casing materials may be utilized for applications other than boring when approved by SBMWD.

2-16.02 PIPE SPACERS

The pipe shall be symmetrically supported about its centerline inside the casing at each joint end with a SBMWD approved polyethylene spacer, sized, and designed per manufacturer recommendations.

2-16.03 CASING END CAPS

The casing ends shall be sealed in a manner acceptable to SBMWD per Standard Drawing W6.17. The annular space between the pipe and the casing shall be filled with air-blown sand.

2-17 WATER QUALITY SAMPLING STAND

2-17.01 SAMPLING STAND

The sampling stand shall be aluminum, 44-inch in height, rain shield, side guards, and tamper proof screws. The opening shall be 8-inch by 8-inch with a removable sample tray. The stand shall be powder-coated light blue and shall have the SBMWD's logo affixed to the front of the stand. The sample stand shall be Model W-98-983 by American Machine and conveyor or approved equal.