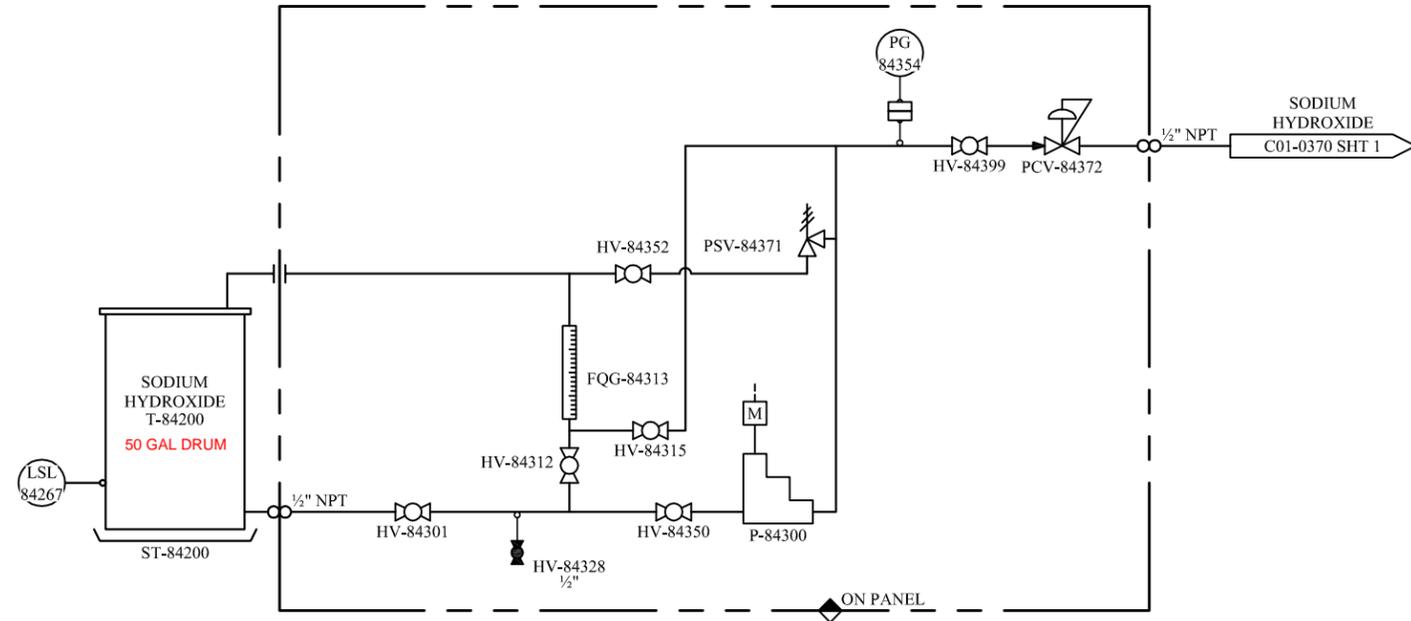


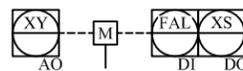
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07/03/2014



SODIUM HYDROXIDE DOSING SYSTEM

MF CONTAINER
BY H2O INNOVATION
(SHIPPED ASSEMBLED)



TYPICAL PUMP MOTOR

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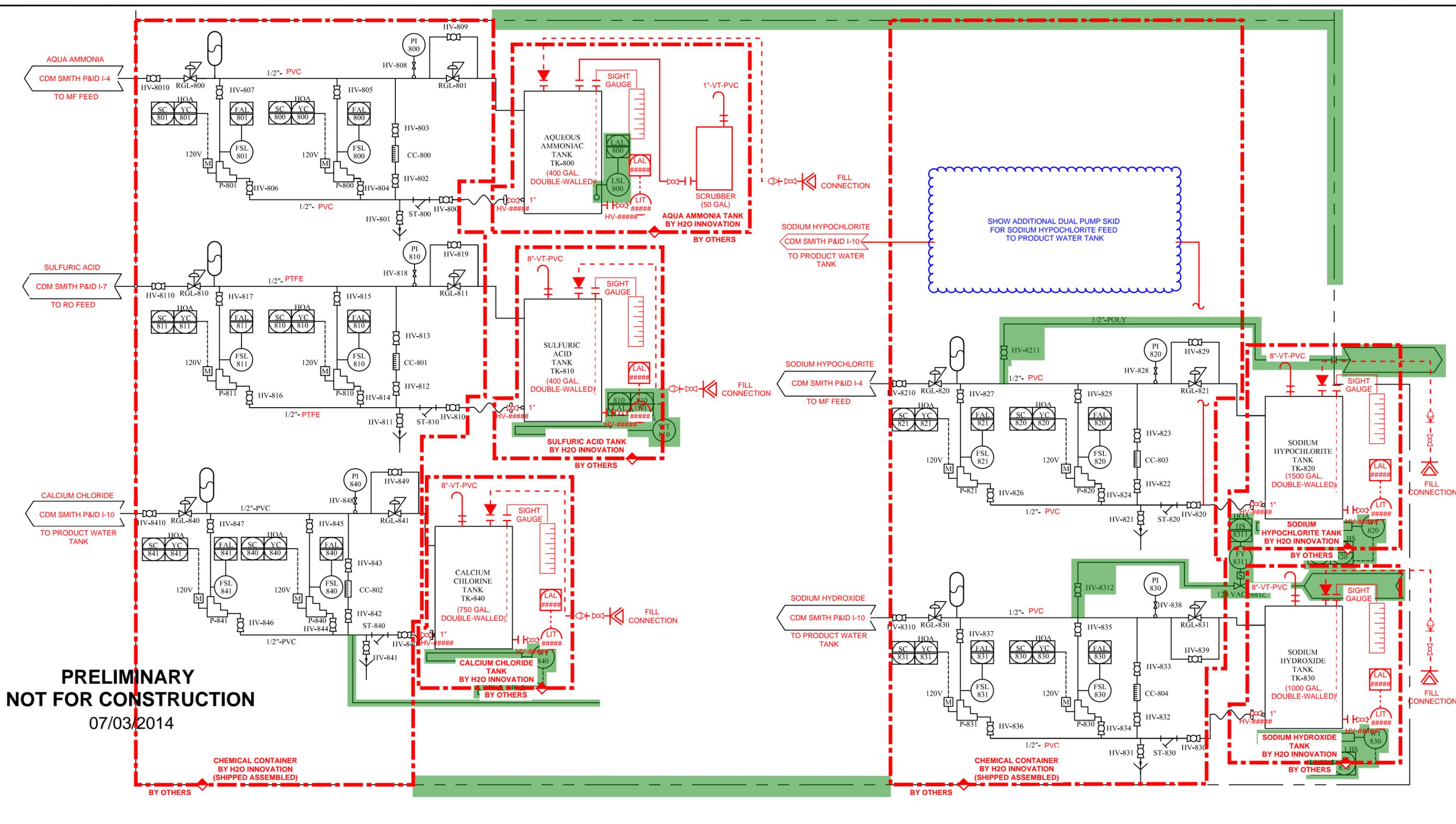


UNLESS NOTED OTHERWISE
INTERPRETATION: ANS1 Y14.5
TOLERANCES: FRACTIONS: 1/16", 1/8", 1/4", 3/8", 1/2", 3/4", 1" DECIMALS: 0.001, 0.002, 0.003, 0.004, 0.005, 0.006, 0.007, 0.008, 0.009, 0.010 ANGLES: 0.001, 0.002, 0.003, 0.004, 0.005, 0.006, 0.007, 0.008, 0.009, 0.010 HOLE SIZES: 1/16", 1/8", 1/4", 3/8", 1/2", 3/4", 1" HOLE CENTERS: 1/16", 1/8", 1/4", 3/8", 1/2", 3/4", 1"
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DISTRICT EMERGENCY**

SUPPLY PROJECT

TITLE: MF CLEANING CHEMICALS PROCESS & INSTRUMENTATION DIAGRAM		
SCALE: N/A	DRAWING NUMBER: O-14024-C01-0800	REVISION A
SHEET: 2 of 2		



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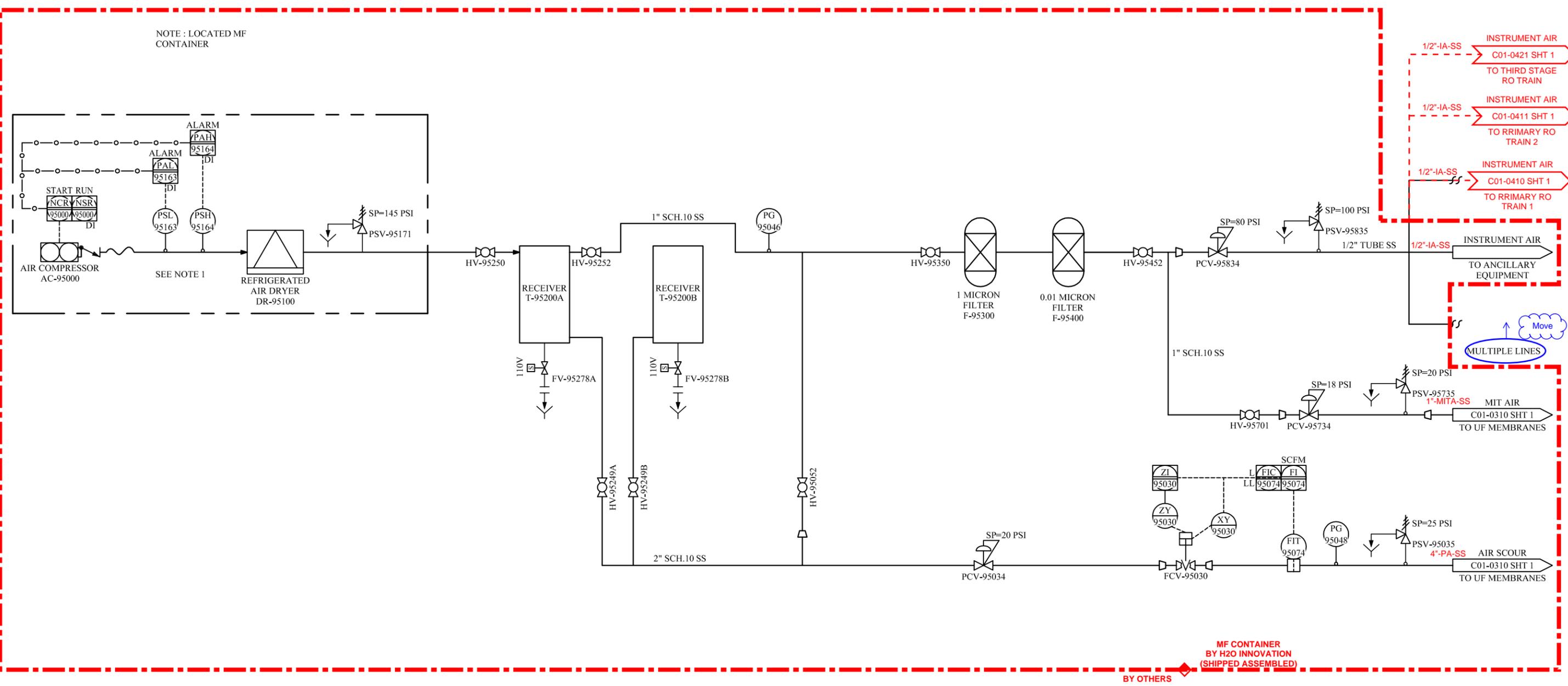
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REV	DATE						
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**CAMBRIA COMMUNITY SERVICES
DISTRICT EMERGENCY**
SUPPLY PROJECT

TITLE: BULK CHEMICAL SYSTEMS PROCESS & INSTRUMENTATION DIAGRAM		FILE: O-14024-C01-0410
DRAWN BY: M.B	CHECKED: M.B	DATE: 2014-06-12
ENGINEER: M.B	APPROVED:	SHEET: 1 OF 1
DRAWING NUMBER: O-14024-C01-0810		SCALE: N.T.S.
REVISION A		

NOTE : LOCATED MF CONTAINER



NOTES:
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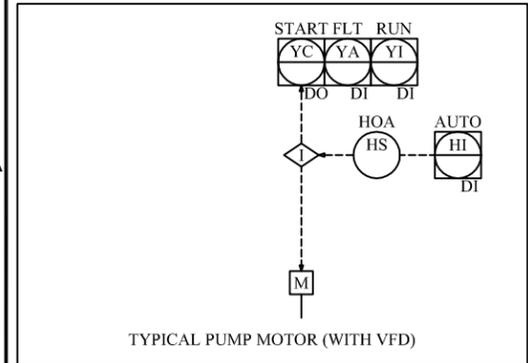
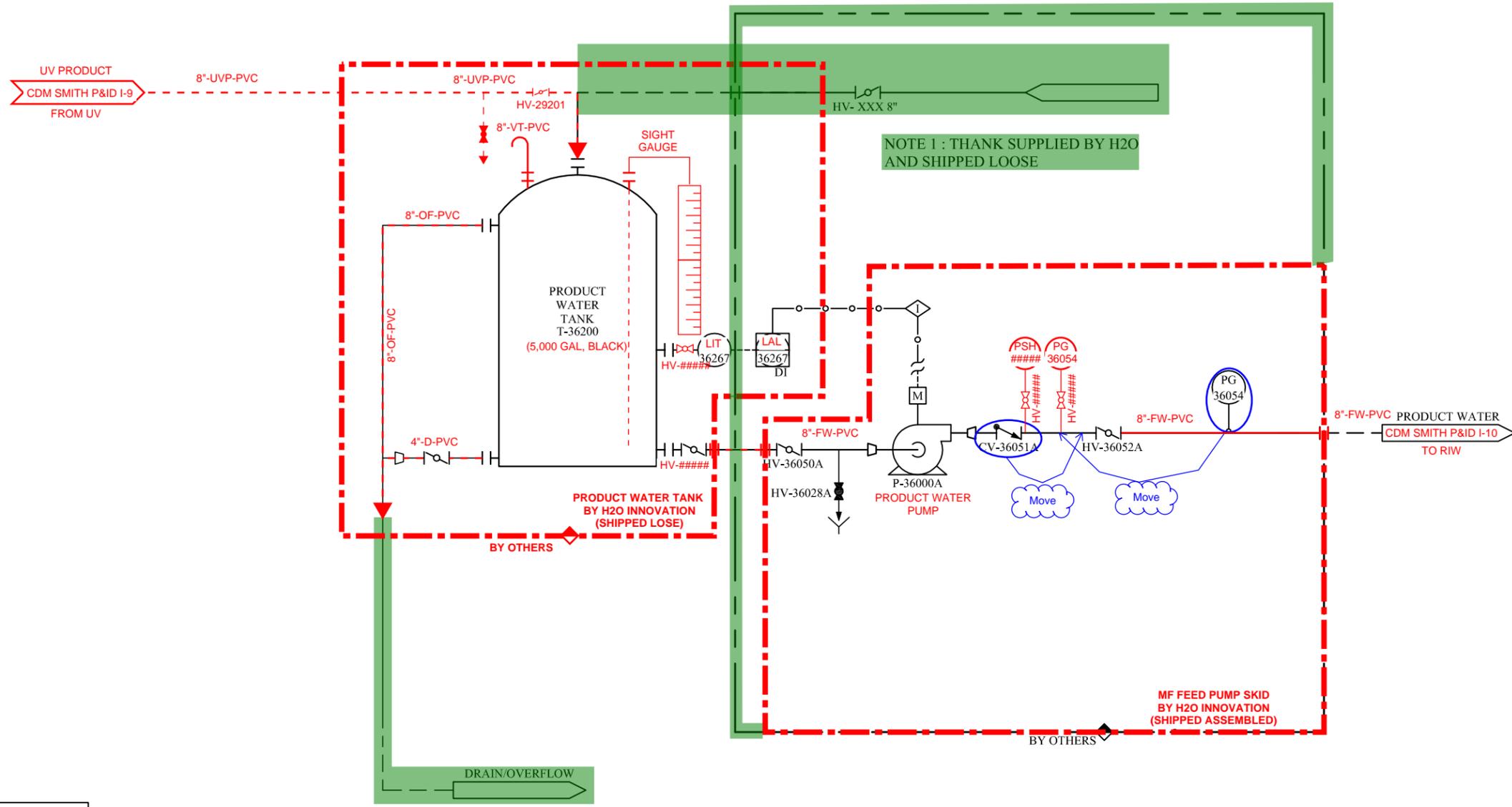
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 ANGLES: 15°, 30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°
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CAMBRIA COMMUNITY SERVICES
DISTRICT EMERGENCY WATER
 SUPPLY PROJECT

TITLE: AIR COMPRESSOR SYSTEM - AIR SCOUR & MIT AS SEPARATE LINES PROCESS & INSTRUMENTATION DIAGRAM		
SCALE: N/A	DRAWING NUMBER: P14761-C01-0950	REVISION A
SHEET: 1 of 1		

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ANGLES: 15°, 30°, 45°, 60°, 75°, 90°, 105°, 120°, 135°, 150°, 165°, 180°
HOLE SIZES: 1/16", 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1"
HOLE CENTERS: 1/16", 1/8", 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1"
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**CAMBRIA COMMUNITY SERVICES
DISTRICT EMERGENCY WATER
SUPPLY PROJECT**

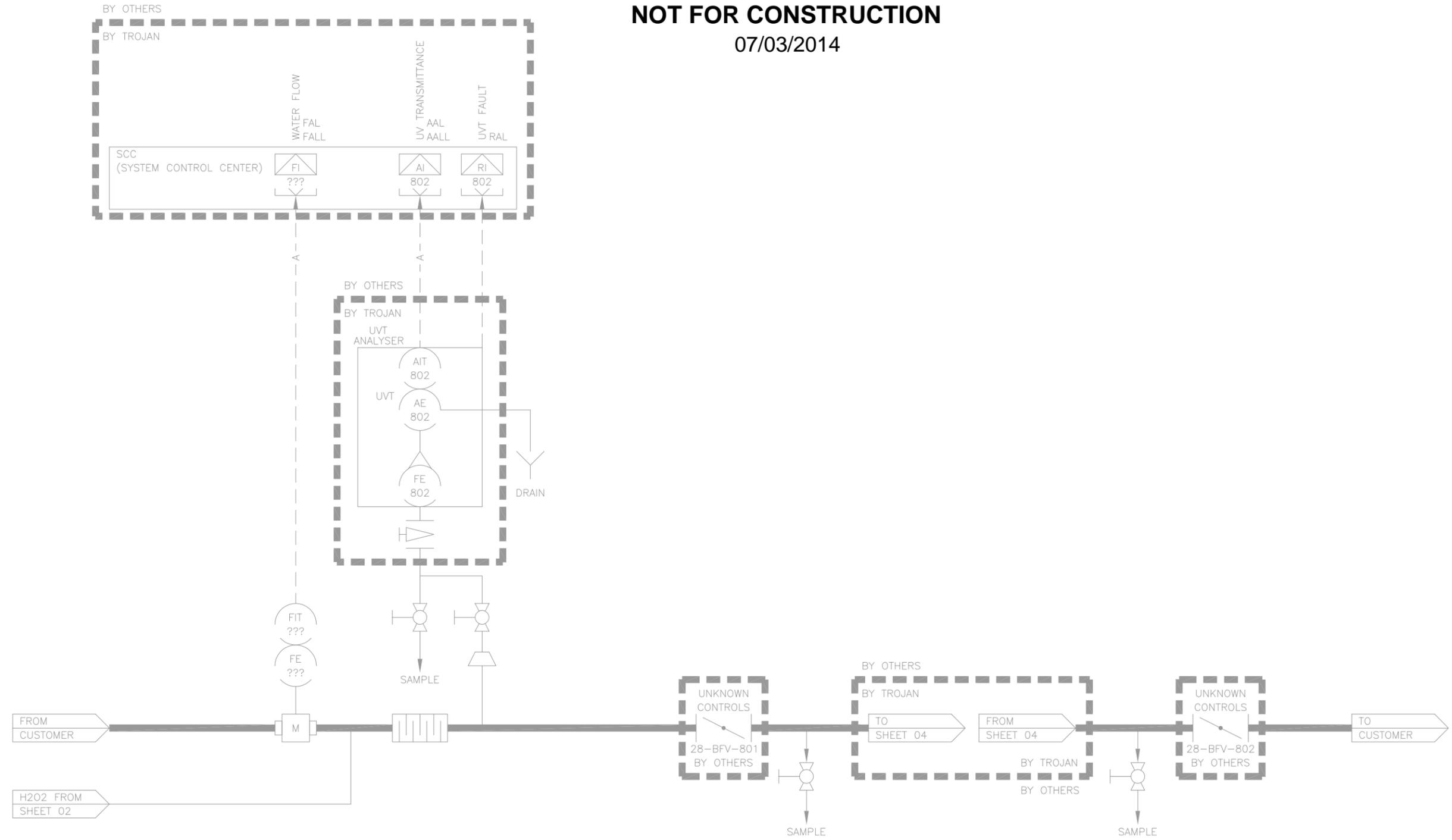
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PROCESS & INSTRUMENTATION DIAGRAM		
SCALE: N/A	DRAWING NUMBER: O-14024-C01-0990	REVISION: A
SHEET: 1 of 1		

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**VENDOR PACKAGE
TROJAN SUPPLY**

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07/03/2014**

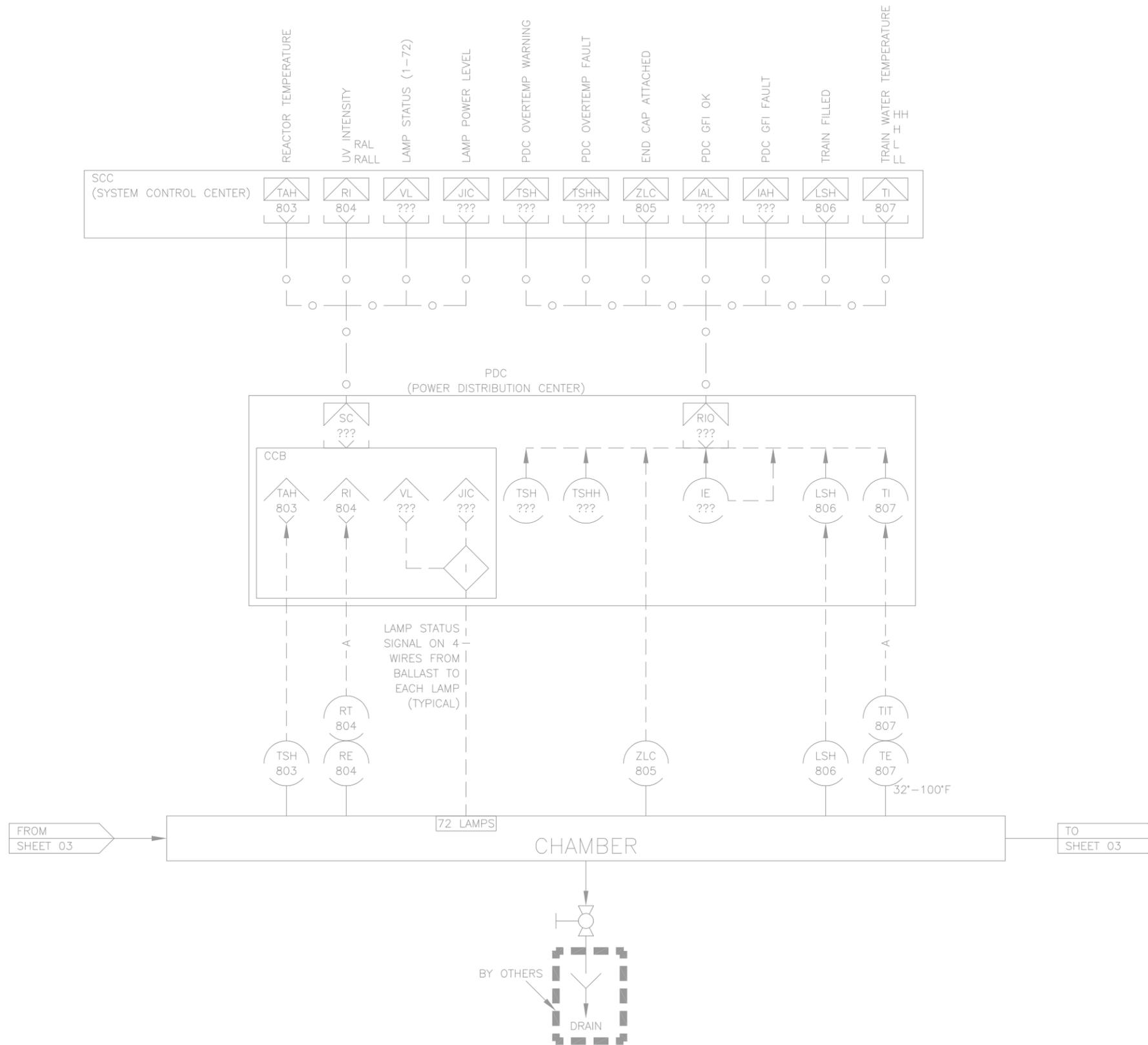


- NOTES
 1. TROJAN SUPPLY IS LIMITED TO THE UV TREATMENT TRAINS
 2. SUPPLY OF ALL OTHER EQUIPMENT IS BY THE CONTRACTOR

	DESCRIPTION P&ID, DEMO SAN DIEGO CA SYSTEM LAYOUT	
	REVISIONS 0 0.5 1.0 1.0" ON ORIGINAL DWG SCALE: NTS	REVISOR HHH CHECKED BY MTB APPROVED BY HHH APPROVAL DATE 2011-01-14

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TROJAN UV

DESCRIPTION: P&ID, DEMO SAN DIEGO CA TRAIN LAYOUT

SCALE: 1.0" ON ORIGINAL DWG (NTS)

REVISED BY: HHG	DWG NO.:	REV:
CHECKED BY: MTB	932277	B
APPROVED BY: HHG	APPROVAL DATE: 2011-01-14	SHEET 04 OF 04

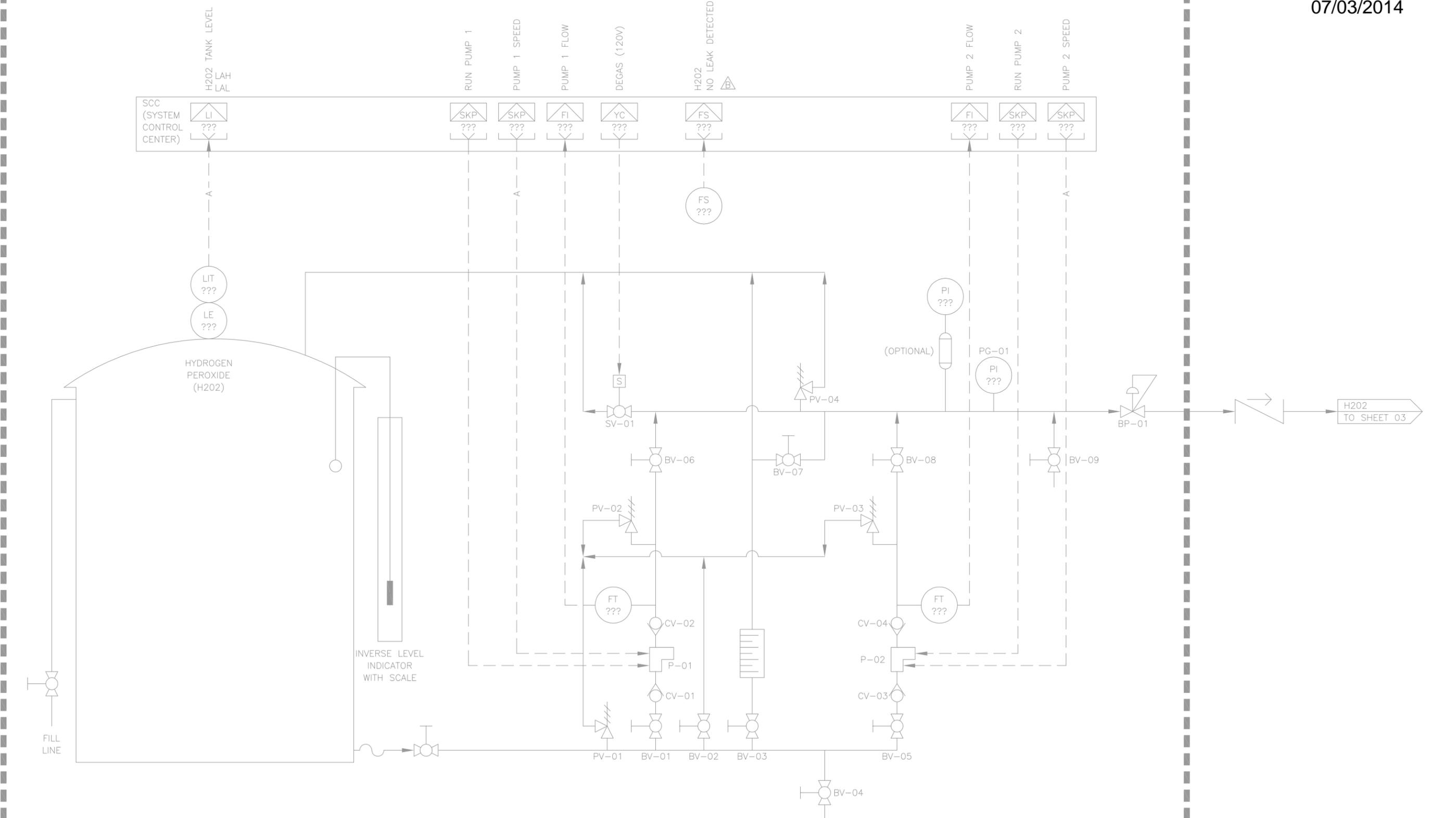
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BY OTHERS
 BY TROJAN

BY TROJAN
 BY OTHERS



		DESCRIPTION	
		P&ID, DEMO SAN DIEGO CA SYSTEM LAYOUT	
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<small>SCALE: NTS</small>	<small>APPROVAL DATE</small> 2011-01-14	<small>SHEET</small> 02 <small>OF</small> 04	<small>1</small>

Appendix B
Equipment Information

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**CAMBRIA EMERGENCY WATER SUPPLY PROJECT
SUPPLEMENTAL INFORMATION TABLE OF CONTENTS**

6/12/2014

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02-HDPE Yard and Conveyance Piping-CL-06-09-14-V001
11-Geosynthetic Clay Liner-Mfr Cutsheet-EHS-060714-v001
11-HDPE Drain Layer-Mfr Cutsheet-EHS-060914-v001
11-HDPE Liner-Mfr Cutsheet-EHS-060914-v001
11-Pumps Design Criteria-HH-06-09-14-V001
11-Tanks Design Criteria-HH-06-09-14-V001
11-Influent and Product Water Tanks Cutsheet-EY-061114-V001
11-Break Tank Cutsheet-EY-061114-V001
11-AA SHC SA and HPO Tanks Cutsheet-EY-061114-V001
11-CC Tank Cutsheet-EY-061114-V001
11-SH Tank Cutsheet-EY-061114-V001
11-UF System Design Criteria-HH-06-09-14-V001
11-UF Container Arrangement-HH-060914-V001
11-RO System Design Criteria-HH-06-09-14-V001
11-Primary RO Container #1 Arrangement-HH-060914-V001
11-Primary RO Container #2 Arrangement-HH-060914-V001
11-UV System Design Criteria-HH-06-09-14-V001
11-UV Arrangement-HH-060914-V001
11-Evaporator Design Criteria-HH-06-09-14-V001
11-SMI Super Polecat Evaporator-HH-06-11-14-V001
11-A Sound Fighter LSE Noise Barrier Wall-HH-061114-V001
11-Sound Wall Enclosure Layout-HH-061114-V001
13-Control Room Arrangement-HH-060914-V001
15-Chemical Tubing HDPE-CL-06-09-14-V001
15-Chemical Tubing PVC-CL-06-09-14-V001
15-Double Containment Chemical Piping-CL-060914-V001
15-PVC Yard Piping-CL-06-09-14-V001



BLUE BRUTE™

MEETS AWWA C900



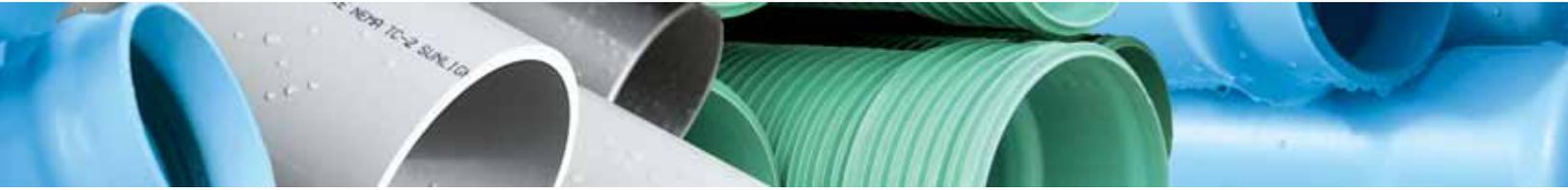
*Building essentials
for a better tomorrow™*



BLUE BRUTE™

PVC C.I.O.D. Distribution Pipe
DR 25/DR18/DR14

*Pressure Class 165, 235 and 305 psi
Ring-Tite™ Joints 4"-12"*



BLUE BRUTE™

CONTENTS

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02	SURGE DESIGN	5
03	SHORT FORM SPECIFICATION	6
04	DIMENSIONS AND WEIGHTS	8
05	FLOW/FRICTION CHARTS	9
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08	WARRANTY	16

01

PRODUCT DESCRIPTION

AWWA C900 BLUE BRUTE™

FOR USE IN DISTRIBUTION, MUNICIPAL WATER SYSTEMS AND OTHER SERVICES

DESCRIPTION

JM Eagle's Blue Brute™ pipe, produced in blue or white, conforms to the AWWA C900 specification, with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139. Blue Brute™ water pipe has the long-term hydrostatic strength to meet the high safety requirements commonly needed by municipal water systems. This pipe conforms to AWWA C900-07 Pressure Class 165 psi (DR 25), 235 psi (DR 18), 305 psi (DR 14); for sizes 4"-12" in diameter.

Note: Please contact JM Eagle™ Sales Department for availability and locations.

LONG LAYING LENGTHS

The standard laying length of Blue Brute™ PVC pipe is 20 feet. This means that more ground can be covered during installation while eliminating the cost of unnecessary joints.

LISTING STANDARDS ANSI/NSF STANDARD 61, UL 1285, FM APPROVAL

See Short Form Specification.



APPLICATIONS

These products are typically used for distribution pipelines of potable water. However, this pipe may be used for gravity sewer, force main, and water reclamation projects.

PURPLE RECLAIM AND GREEN SEWER FORCE MAIN

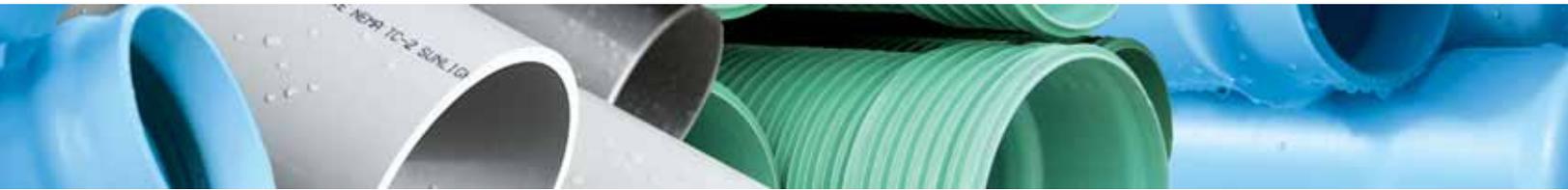
JM Eagle™ also manufactures this pipe in purple, specifically for reclaimed water systems and green for sewer force main applications. This pipe is made to the same requirements as our standard products. The only difference is that the pigment used is purple or green. These products will not be marked with UL or NSF listing marks. Additionally, the purple pipe will be marked: "Reclaimed Water... Do Not Drink" and the green pipe will be marked "Forced Sewer."

* For lengths of 14 feet, Non-Hydrotested DR 18 Sewer Pipe is available upon request.

QUALITY CONTROL

Without exception, each length of pipe is hydrostatically tested and subject to inspection by our quality control inspectors throughout every step of the manufacturing process. JM Eagle's Quality Management System is ISO 9001:2000 registered.* Copies of the registration certificates are available on our website at www.jmeagle.com.

* JM Eagle™ is in the process of obtaining the ISO 9001-2000 registration of Quality Management System for all locations.



CORROSION RESISTANCE

Blue Brute™ PVC pipe is unaffected by electrolytic or galvanic corrosion, or any known corrosive soil or water conditions. You don't have to worry about tuberculation, or the need for costly lining, wrapping, coating, or cathodic protection.

FLOW CAPACITY

This PVC water pipe has a smooth interior that stays smooth over long years of service with virtually no loss in carrying capacity. Its coefficient of flow is $C = 150$ (Hazen & Williams) the best available in common use water systems. This capacity often allows savings in pumping costs as well as savings on the size of pipe required.

SAVE IN HANDLING COSTS

Blue Brute™ PVC pipe is designed for installed-cost savings. Most sizes can be handled manually, so there is no need for costly installation equipment. Use the backhoe for excavating and backfilling only. Dig more trench, lay pipe faster, and save more in cost per foot installed.

FIELD CUTTING AND BEVELING

Blue Brute™ pipe can be field cut with a power saw or ordinary handsaw. This eliminates the need to invest in costly cutting equipment. The pipe can also be beveled without the use of any expensive or complicated machinery.

LIGHT WEIGHT

A 20 foot length of 8" DR 18 Blue Brute™ water pipe weighs approximately 184 pounds. Installers prefer it because it goes into the ground quickly—thus saving on installation costs.

SERVICE LIFE

Because it is nonmetallic, the pipe does not lose strength due to either potable water corrosion or external galvanic soil conditions.

INSTALLATION

This product should be installed in accordance with JM Eagle™ Publication JME-03B, "Blue Brute™, Big Blue™ and Ultra Blue™ (C900/C905/C909) Installation Guide" and "Pressure Pipe Tapping Guide."





PRODUCT DESCRIPTION

AWWA C900 BLUE BRUTE™

(CONTINUED)

CAST IRON O.D.

Available in 4", 6", 8", 10", and 12" trade sizes, this pipe can be connected directly into cast/ductile iron fittings and pipe. Connections to products with other O.D. regimens can be done using commonly available adapters or transition gaskets. Dimensions should be checked for use with butterfly valves.



RING-TITE™ JOINTS WITH LOCKED-IN GASKETS

JM Eagle's Ring-Tite™ joint can be assembled quickly. Seated in a deep groove, the flexible elastomeric Rieber® gasket provides a tight seal that protects the line from shock, vibration, earth movement and compensates for expansion and contraction of pipe lengths. There's no field mixing or application of cement. It's a simple push-together joint that remains tight under normal operating conditions.

The factory installed Rieber® gaskets provide a tight, flexible seal that resists rolling during installation. Special gasket types are available for use with certain chemical and petroleum products. Spigot pipe ends are supplied from the factory with bevels. The bell is an integral part of the pipe length with the same strength. Joints meet or exceed ASTM D3139 for joint tightness, including a 22 in. Hg vacuum for one hour, under deflection with no leakage.

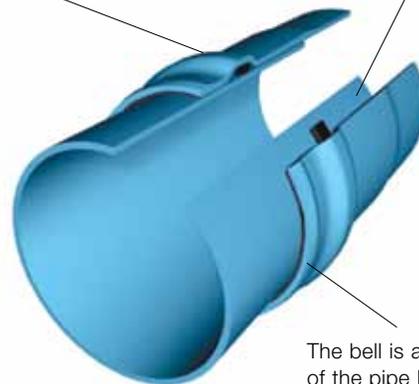
Note: Other types of gaskets may be provided. JM Eagle™ is in the process of converting all gasketed products to the Rieber® ring gasket.

* Rieber® is a registered trademark of TI Specialty Polymer Products Inc.

RING-TITE™ JOINT

Rieber® sealing ring provides tight, flexible seal.

Spigot pipe ends are supplied from the factory with bevels.



The bell is an integral part of the pipe length with the same strength.

ACCESSORIES

JM Eagle's Blue Brute™ PVC pipe is compatible with all the items required for smooth installation of distribution pipelines.



SURGE DESIGN

It is important to note that for the same conditions of interrupted flow, the surge pressures generated in pipe with high tensile moduli will be greater than the surges in low moduli (PVC) pipe of similar dimensions.

As the modulus of tensile elasticity for a piping material increases, the resultant pressure surge, or “water hammer”, caused by a change in flow velocity also increases. For example, an instantaneous 2 fps (0.6 mps) flow velocity change in an 8" water main will create surge pressures as shown in **Table 1** for different pipe materials. For all system designs, surge pressures should be examined with the pipe material in use.

TABLE 1

PRESSURE SURGES IN 8 IN. WATER MAIN

In Response to 2 fps (0.6 mps) Instantaneous Flow Velocity Change.

PIPE PRODUCT	PRESSURE SURGE	
	psi	kPa
Class 50 DI Pipe	100.0	689
Class 150 AC Pipe	88.7	611
165 psi (DR 25) PVC Pipe	29.4	202

Pressure surges in PVC pipe of different dimension ratios in response to a 1 fps (0.3 mps) instantaneous flow velocity change are shown in **Table 2**.

TABLE 2

DESIGN TABLE FOR PVC PIPE-PRESSURE SURGE VS. DIMENSION RATIO

In Response to 1 fps (0.3 mps) Instantaneous Flow Velocity Change.

DIMENSION RATIO	PRESSURE SURGE	
	psi	kPa
14	19.8	137
18	17.4	120
25	14.7	101

03

SHORT FORM SPECIFICATION

AWWA C900 BLUE BRUTE™

SCOPE

This specification designates general requirements for 4" through 12" C.I.O.D.'s pipe produced in blue or white unplasticized polyvinyl chloride (PVC) plastic pressure pipe with integral bell and spigot joints for the conveyance of water and other fluids. This pipe shall meet the requirements of AWWA Standard C900, "Polyvinyl Chloride (PVC) Water Distribution Pipe."

MATERIALS

All pipe shall be made from quality PVC resin, compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM D1784.

HYDROSTATIC PROOF TESTING

Each standard length of pipe is tested up to 400 psi for Pressure Class 165; 600 psi for Pressure Class 235; 800 psi for Pressure Class 305 for a minimum of 5 seconds. The integral bell shall be tested with the pipe.

STANDARD LAYING LENGTHS

Standard laying lengths are 20 feet for all sizes. Other lengths of 14 feet, Non-Hydrotested pipe is available upon request.

PIPE

Where specified as such, all pipe shall be suitable for use as pressure conduit. Provisions must be made for expansion and contraction at each joint with an elastomeric gasket. The bell shall consist of an integral wall section with a factory installed, solid cross section Rieber® or other elastomeric gasket, which meets the requirements of ASTM F477. The bell section shall be designed to be at least as hydrostatically strong as the pipe barrel and meet the requirements of AWWA C900. The joint design shall meet the requirements of ASTM D3139 under both pressure and 22 in. Hg vacuum. Sizes and dimensions shall be as shown in this specification.

Pipe installation and usage shall be in compliance with JM Eagle™ Publication JME-03B, "Blue Brute™, Big Blue™ and Ultra Blue™ C900/C905/C909 Installation Guide" and Uni-Bell® Publication UNI-PUB-08-07, "Tapping Guide for PVC Pressure Pipe."

QUICK BURST TEST

Randomly selected samples tested in accordance with AWWA C900 and UL 1285 shall withstand, without failure, the pressures listed below when applied for 60-70 seconds.

DR	PRESSURE CLASS (psi)		MINIMUM BURST PRESSURE AT 73°F (psi)
	AWWA C900-97/FM 1612	AWWA C900-07	
25	100	165	535
18	150	235	755
14	200	305	985

DROP IMPACT TEST

Pipe shall withstand, without failure using Tup "B" and Flat Rate Holder "B", at 73°F, a tup impact energy of 100 ft-lbf for all Pressure Class of 4"-12" trade sizes. There shall be no visible evidence of shattering or splitting when the energy is imposed.



TESTING REQUIREMENTS PER AWWA C900

TEST	PRESSURE CLASS C900-07		
	165 psi	235 psi	305 psi
LONG TERM PRESSURE TEST 1000 hours (psi)	350	500	650
EXTRUSION QUALITY OF PVC PIPE BY ACETONE IMMERSION TEST METHOD ASTM D2152	20 min	20 min	20 min
FLATTENING TEST Tests extrusion quality and ductility under slow loading conditions. (Flattening Capability)	40% of OD between the plates within 2 - 5 min	40% of OD between the plates within 2 - 5 min	40% of OD between the plates within 2 - 5 min
HYDROSTATIC PROOF TEST (each piece) (psi)	330	470	610

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

PROPERTY	AWWA C900 BLUE BRUTE™ PVC PIPE	ASTM TEST METHOD
Fiber Hoop Stress at 73° F Minimum Short Term Bursting Strength (psi) 1,000 Hour Strength (psi) min	6400 4200	D1599 D1598
Working Pressure Rating 73° F (% of rating at 73° F) 80° F (% of rating at 73° F) 100° F (% of rating at 73° F)	100% 88% 62%	
Chemical Resistance at 73° F Acids Salts - Bases	Excellent Excellent	
Physical Properties of Compound Std. Test Specimens Minimum Tensile Strength (psi) at 73° F	7000	D638
Thermal Expansion (in / 100 ft / 50° F Change)	2"	
Fire Resistance	Self Extinguishing	
Flame Spread	10	E162
Smoke Development	330	E84
Coefficient of Flow Hazen & Williams	C = 150	
Mannings N Value	N = 0.009	

* For data, sizes, or classes not reflected in these charts, please contact JM Eagle™ for assistance.

04



DIMENSIONS AND WEIGHTS

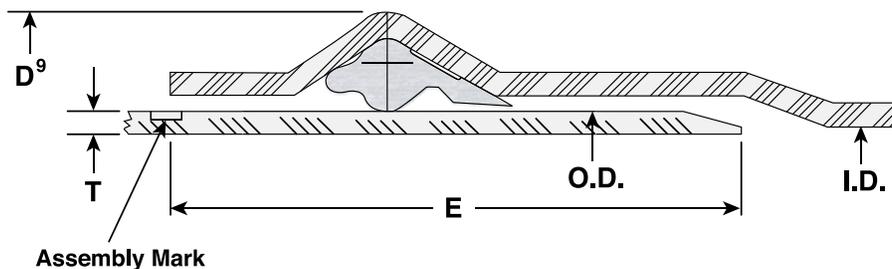
SUBMITTAL AND DATA SHEET

PIPE SIZE (IN)	AVERAGE O.D. (IN)	NOM. I.D. (IN)	MIN. T. (IN)	MIN. E (IN)	APPROX. D ⁹ (IN)	APPROX. WEIGHT (LBS/FT)
PRESSURE CLASS 165 psi (DR 25)						
4	4.80	4.39	0.192	5.25	5.57	1.9
6	6.90	6.31	0.276	6.40	8.00	3.9
8	9.05	8.28	0.362	7.05	10.50	6.7
10	11.10	10.16	0.444	8.20	12.88	10.1
12	13.20	12.08	0.528	8.80	15.31	14.4
PRESSURE CLASS 235 psi (DR 18)*						
4	4.80	4.23	0.267	5.25	5.87	2.6
6	6.90	6.09	0.383	6.40	8.43	5.3
8	9.05	7.98	0.503	7.05	11.06	9.2
10	11.10	9.79	0.617	8.20	13.57	13.9
12	13.20	11.65	0.733	8.80	16.13	19.7
PRESSURE CLASS 305 psi (DR 14)*						
4	4.80	4.07	0.343	5.25	6.17	3.2
6	6.90	5.86	0.493	6.40	8.87	6.7
8	9.05	7.68	0.646	7.05	11.63	11.6
10	11.10	9.42	0.793	8.20	14.27	17.6
12	13.20	11.20	0.943	8.80	16.97	25.1

Consult JM Eagle™ for CSA and other listing availability prior to shipment.

Note: *FM Approvals Pressure Class 150 psi for DR 18 and 200 psi for DR 14.

* Contact your JM Eagle™ sales representative for location availability.



I.D. : Inside Diameter

D⁹ : Bell Outside Diameter

O.D. : Outside Diameter

E : Distance between Assembly Mark to the end of spigot.

T : Wall Thickness

FLOW/FRICTION CHARTS

FLOW/FRICTION LOSS, BLUE BRUTE™ PVC PIPE

4" C.I.O.D. (AWWA C900) ACTUAL O.D. 4.80 INCH

FLOW (GAL/MIN)	DR 25 (165 psi)		DR 18 (235 psi)		DR 14 (305 psi)	
	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT
20	0.424	0.008	0.456	0.010	0.493	0.012
25	0.530	0.012	0.570	0.015	0.616	0.018
30	0.636	0.017	0.684	0.021	0.739	0.025
35	0.742	0.023	0.798	0.028	0.863	0.033
40	0.847	0.029	0.912	0.035	0.986	0.043
45	0.953	0.037	1.026	0.044	1.109	0.053
50	1.059	0.045	1.140	0.053	1.232	0.064
60	1.271	0.062	1.368	0.075	1.479	0.090
70	1.483	0.083	1.597	0.099	1.725	0.120
75	1.589	0.094	1.711	0.113	1.849	0.136
80	1.695	0.106	1.825	0.127	1.972	0.154
90	1.907	0.132	2.053	0.158	2.218	0.191
100	2.119	0.161	2.281	0.192	2.465	0.232
125	2.648	0.243	2.851	0.291	3.081	0.351
150	3.178	0.341	3.421	0.408	3.697	0.492
175	3.708	0.453	3.991	0.542	4.313	0.655
200	4.237	0.580	4.562	0.694	4.930	0.839
250	5.297	0.877	5.702	1.050	6.162	1.268
300	6.356	1.230	6.842	1.471	7.394	1.777
350	7.415	1.636	7.983	1.957	8.627	2.364
400	8.475	2.095	9.123	2.506	9.859	3.027
450	9.534	2.606	10.264	3.117	11.092	3.765
500	10.593	3.167	11.404	3.789	12.324	4.576
600	12.712	4.439	13.685	5.311	14.789	6.415
700	14.831	5.906	15.965	7.066	17.254	8.534

Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."



FLOW/FRICTION CHARTS

(CONTINUED)

FLOW/FRICTION LOSS, BLUE BRUTE™ PVC PIPE

6" C.I.O.D. (AWWA C900) ACTUAL O.D. 6.90 INCH

FLOW (GAL/MIN)	DR 25 (165 psi)		DR 18 (235psi)		DR 14 (305 psi)	
	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT
50	0.513	0.008	0.552	0.009	0.596	0.011
60	0.615	0.011	0.662	0.013	0.716	0.015
70	0.718	0.014	0.772	0.017	0.835	0.021
75	0.769	0.016	0.827	0.019	0.895	0.023
80	0.820	0.018	0.882	0.022	0.954	0.026
90	0.923	0.023	0.993	0.027	1.073	0.033
100	1.025	0.027	1.103	0.033	1.193	0.040
125	1.282	0.042	1.379	0.050	1.491	0.060
150	1.538	0.058	1.655	0.070	1.789	0.084
175	1.794	0.078	1.930	0.093	2.087	0.112
200	2.051	0.099	2.206	0.119	2.385	0.143
250	2.563	0.150	2.758	0.179	2.982	0.217
300	3.076	0.210	3.309	0.251	3.578	0.304
350	3.589	0.280	3.861	0.334	4.175	0.404
400	4.101	0.358	4.412	0.428	4.771	0.518
450	4.614	0.446	4.964	0.533	5.367	0.644
500	5.126	0.542	5.516	0.647	5.964	0.783
600	6.152	0.759	6.619	0.907	7.156	1.097
700	7.177	1.010	7.722	1.207	8.349	1.460
800	8.202	1.294	8.825	1.546	9.542	1.869
1000	10.253	1.956	11.031	2.337	11.927	2.826

Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."



FLOW/FRICTION LOSS, BLUE BRUTE™ PVC PIPE

8" C.I.O.D. (AWWA C900) ACTUAL O.D. 9.05 INCH

FLOW (GAL/MIN)	DR 25 (165 psi)		DR 18 (235 psi)		DR 14 (305 psi)	
	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT
100	0.596	0.007	0.641	0.009	0.693	0.011
125	0.745	0.011	0.802	0.013	0.866	0.016
150	0.894	0.016	0.962	0.019	1.040	0.022
200	1.192	0.027	1.283	0.032	1.386	0.038
250	1.490	0.040	1.604	0.048	1.733	0.058
300	1.788	0.056	1.924	0.067	2.079	0.081
350	2.086	0.075	2.245	0.089	2.426	0.108
400	2.384	0.096	2.566	0.115	2.772	0.138
450	2.682	0.119	2.887	0.142	3.119	0.172
500	2.980	0.145	3.207	0.173	3.466	0.209
600	3.576	0.203	3.849	0.243	4.159	0.293
700	4.172	0.270	4.490	0.323	4.852	0.390
800	4.768	0.346	5.132	0.413	5.545	0.499
1000	5.960	0.523	6.415	0.625	6.931	0.754
1200	7.152	0.732	7.698	0.876	8.317	1.057
1400	8.344	0.975	8.981	1.165	9.704	1.407
1600	9.536	1.248	10.264	1.492	11.090	1.802
2000	11.920	1.887	12.829	2.256	13.862	2.724

Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."



FLOW/FRICTION CHARTS

(CONTINUED)

FLOW/FRICTION LOSS, BLUE BRUTE™ PVC PIPE

10" C.I.O.D. (AWWA C900) ACTUAL O.D. 11.10 INCH

FLOW (GAL/MIN)	DR 25 (165 psi)		DR 18 (235 psi)		DR 14 (305 psi)	
	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT
175	0.693	0.008	0.746	0.009	0.807	0.011
200	0.792	0.010	0.853	0.012	0.922	0.014
250	0.990	0.015	1.066	0.018	1.152	0.021
300	1.189	0.021	1.279	0.025	1.383	0.030
350	1.387	0.028	1.492	0.033	1.613	0.040
400	1.585	0.035	1.706	0.042	1.843	0.051
450	1.783	0.044	1.919	0.053	2.074	0.064
500	1.981	0.054	2.132	0.064	2.304	0.077
600	2.377	0.075	2.559	0.090	2.765	0.109
700	2.773	0.100	2.985	0.120	3.226	0.144
800	3.169	0.128	3.411	0.153	3.687	0.185
1000	3.962	0.194	4.264	0.231	4.609	0.280
1200	4.754	0.271	5.117	0.324	5.530	0.392
1400	5.547	0.361	5.970	0.432	6.452	0.521
1600	6.339	0.462	6.823	0.553	7.374	0.668
2000	7.924	0.699	8.528	0.835	9.217	1.009
2500	9.905	1.056	10.661	1.263	11.522	1.526
3000	11.886	1.480	12.793	1.770	13.826	2.139

Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."



FLOW/FRICTION LOSS, BLUE BRUTE™ PVC PIPE

12" C.I.O.D. (AWWA C900) ACTUAL O.D. 13.20 INCH

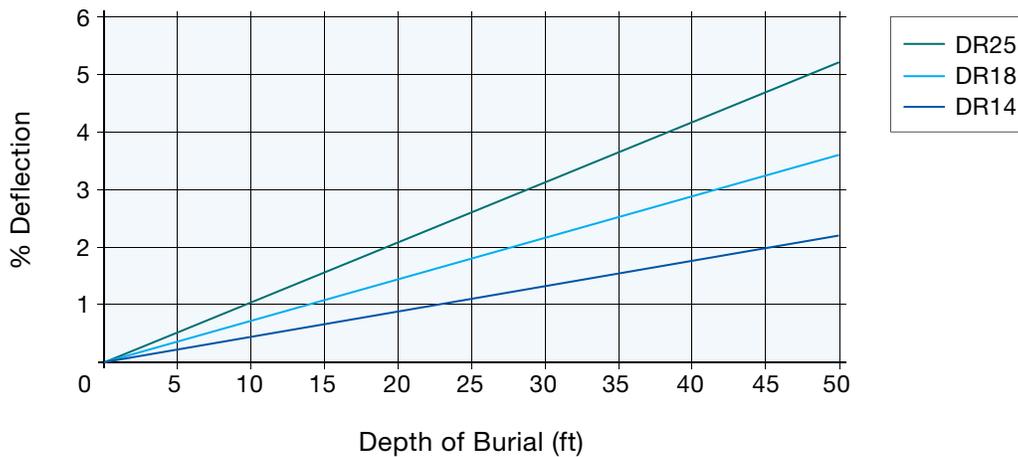
FLOW (GAL/MIN)	DR 25 (165 psi)		DR 18 (235 psi)		DR 14 (305 psi)	
	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT	VELOCITY FT/S	PRESSURE DROP psi/100 FT
300	0.840	0.009	0.904	0.011	0.978	0.013
350	0.981	0.012	1.055	0.014	1.141	0.017
400	1.121	0.015	1.206	0.018	1.304	0.022
450	1.261	0.019	1.357	0.023	1.467	0.027
500	1.401	0.023	1.507	0.028	1.629	0.033
600	1.681	0.032	1.809	0.039	1.955	0.047
700	1.961	0.043	2.110	0.051	2.281	0.062
800	2.241	0.055	2.412	0.066	2.607	0.080
1000	2.802	0.083	3.015	0.100	3.259	0.120
1200	3.362	0.117	3.617	0.140	3.911	0.169
1400	3.922	0.155	4.220	0.186	4.563	0.224
1600	4.482	0.199	4.823	0.238	5.214	0.287
2000	5.603	0.301	6.029	0.359	6.518	0.434
2500	7.004	0.455	7.536	0.543	8.147	0.657
3000	8.405	0.637	9.044	0.761	9.777	0.920
3500	9.805	0.848	10.551	1.013	11.406	1.225
4000	11.206	1.085	12.058	1.297	13.036	1.568
4500	12.607	1.350	13.565	1.613	14.665	1.950

Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."

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DEFLECTION CHART

Blue Brute™ Deflection By Depth of Burial :: †



:: Deflections computed using a unit weight of backfill at 120 lbs/cft and assume no internal pressure or live load.

:: Pipe embedment used in calculations is Class 1, 2, 3, or 4, as defined in ASTM D2321 with appropriate compaction to achieve an $E' = 1000$ psi.

† Based on calculation methods and design tables set forth by the Uni-Bell® PVC Pipe Association, "Handbook of PVC Pipe Design and Construction."

SHORT FORM INSTALLATION GUIDE/ WARNING

This information is furnished in order to provide a brief review of the installation requirements for JM Eagle™ Blue Brute™ PVC pipe. It is not intended to serve as or replace the function of the FULL VERSION product installation guide available upon request.

1. Check to see that the gasket is properly seated in the bell groove, and that the bell and spigot are clean before assembly.
2. Apply the approved lubricant supplied with the pipe to the spigot end of the pipe, paying particular attention to the bevel. The coating should be equivalent to a brush coat of enamel paint.
3. Assemble the joint only to and not over the stop mark provided on the spigot end.
4. If undue resistance to insertion of the spigot is encountered, or the assembly mark does not reach the flush position, disassemble the joint and check the position of the rubber gasket, and remove any debris.
5. Curvature of the pipe shall be accomplished through longitudinal bending of the pipe barrel in accordance with the following table. Deflection of the joint is not allowed and may cause leakage.

PIPE SIZE (IN)	RADIUS (FT)
4	100
6	150
8	200
10	250
12	300

6. Prior to backfilling, check to see that the assembly mark is flush with the end of the bell.
7. All taps performed on JM Eagle's pressure products, shall be in accordance with Uni-Bell® Publication UNI-PUB-08-07, "Tapping Guide for PVC Pressure Pipe."

WARNING: RUPTURE HAZARD

IMPROPER INSTALLATION OR MISUSE OF TAPPING TOOLS MAY CAUSE PIPES UNDER HIGH PRESSURE TO RUPTURE AND RESULT IN HIGH VELOCITY AIRBORNE FRAGMENTATION LEADING TO SERIOUS INJURIES AND/OR DEATH.

BEFORE AND DURING INSTALLATION, ALWAYS:

- Consult and follow the FULL VERSION of the product installation guide
- Closely follow job specifications
- Use protective gear and equipment

BEFORE AND DURING TAPPING, ALWAYS:

- Consult and follow Uni-Bell® Publication UNI-PUB-08-07, "Tapping Guide for PVC Pressure Pipe."
- Use the correct tapping tools
- Bleed air from pipes at high spot before tapping
- Use protective gear and equipment

Please contact JM Eagle™ Product Assurance at (800) 621-4404 to obtain FULL VERSION of the appropriate installation guide or for further assistance.

08



LIMITED WARRANTY

1. PERIODS AND SCOPE OF COVERAGE

JM Eagle™ warrants that the pipe products certified to the standards of the American Water Works Association (AWWA) for water distribution, transmission and force sewer mains including C900, C905, C909, C901 and C906 products manufactured by JM Eagle™ (each a “Product” and collectively, the “Products”)* are manufactured in accordance with the following AWWA, ASTM, ANSI/NSF, and UL standards as follows: (1) AWWA C900 and ASTM 1784 cell class 12454; Gaskets meet ASTM F477; Joints meet ASTM D3139; ANSI/NSF-61, UL 1285 for the C900, (2) AWWA C905 and ASTM 1784 cell class 12454; Gaskets meet ASTM F477; Joints meet ASTM D3139; ANSI/NSF-61, UL 1285 for C905, (3) AWWAC909 and UL 1285; Gaskets meet ASTM F477; Joints meet ASTM D3139 for C909 and (4) AWWA C901/906, ASTM D2239, ASTM D2737, ASTM D3035, F714, cell class per ASTM D3350, PPI listed material (TR-4) PE3408/3608 & PE4710, ASNI/NSF-14 for C901 and C906. JM Eagle™ warrants that each of these Products manufactured by JM Eagle™ leaves our plant free from defects in workmanship and materials. These Products as manufactured by JM Eagle™ are backed by our unprecedented fifty (50) year Limited Warranty. This Limited Warranty provides that Products manufactured by JM Eagle™ meet the above stated quality standards published by the AWWA, ASTM International (ASTM), American National Standards Institute/NSF International (ANSI/NSF), and Underwriters Laboratories (UL).

If any Product is determined within fifty (50) years from the date of invoice by JM Eagle™ to be defective because it failed to meet the above stated standards, JM Eagle™ will then provide replacement product of the same type, size and quantity of the product and pay for the costs directly related to its replacement*** or issue credits, offsets or a combination thereof for the wholesale purchase price of the defective product.

JM Eagle™ also warrants that the design of our Products are independently tested and/or certified by AWWA, NSF and UL to meet their respective standards and that our plants manufacturing the Products are already certified or in process of being certified to ISO 9001 certification** as part of our program to develop manufacturing processes that consistently produce high quality plastic pipe.

JM Eagle™ quality control programs encompass three critical aspects of the manufacturing process: the incoming raw material, pipe production, and the finished goods.

2. EXCLUSIONS FROM COVERAGE AND EXCLUSIVE REMEDY:

Products manufactured by JM Eagle™ are marked with JM Eagle, PW Eagle or US Poly stencil markings. This limited warranty excludes any Product not manufactured by JM Eagle™, even if it is sold by JM Eagle™, and also excludes defects or failures caused after shipment by:

- improper installation (including, without limitation, misalignment),
- use in improper applications or conditions or in conjunction with improper materials (including, without limitation, improper lubricants, pastes, solvents or sealants),
- contact with aggressive chemical agents, freezing or overheating of liquids in the Product, or unusual pressure surges or pulsation,
- vibration,
- temperature shocking,
- U.V. degradation,
- failure to adhere to JM Eagle™’s instructions concerning the proper handling, installation, testing and use of the Product,
- failure to adhere to applicable standards set forth by local laws, codes, or regulations and the applicable industry standards, or
- any other improper activities not listed above or damage caused by the fault or negligence of anyone other than JM Eagle™.



THE WARRANTIES IN THIS LIMITED WARRANTY ARE THE ONLY WARRANTIES APPLICABLE TO THE PRODUCTS. THERE ARE NO OTHER WARRANTIES, REPRESENTATIONS OR CONDITIONS OF ANY KIND, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS SUPPLIED HEREUNDER INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED AND JM EAGLE™ SHALL NOT BE LIABLE IN THIS RESPECT NOTWITHSTANDING JM EAGLE'S™ ACTUAL KNOWLEDGE OF THE PRODUCT'S INTENDED USE OR ANY ADVICE OR REPRESENTATIONS THAT MAY HAVE BEEN RENDERED BY JM EAGLE™ CONCERNING THE DESIGN, MANUFACTURE, FABRICATION, SALE, USE, INSTALLATION OR PROVISION OF THE PRODUCTS. NO STATEMENT, CONDUCT OR DESCRIPTION BY JM EAGLE™ OR ITS REPRESENTATIVES, IN ADDITION TO OR BEYOND THIS LIMITED WARRANTY, SHALL CONSTITUTE A WARRANTY.

BUYER AGREES THAT ITS SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THIS LIMITED WARRANTY, AND THE SOLE AND EXCLUSIVE OBLIGATION OF JM EAGLE™ IN RESPECT OF ANY CLAIMS FOR BREACH OF THIS LIMITED WARRANTY, SHALL BE (1) THE REPLACEMENT OF THE SAME TYPE, SIZE AND LIKE QUANTITY OF NON-DEFECTIVE PRODUCT, AT THE ORIGINAL POINT OF DELIVERY AND COSTS RELATED TO ITS REPLACEMENT***, OR (2) CREDITS, OFFSETS, OR A COMBINATION THEREOF, FOR THE WHOLESALE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. IN NO EVENT SHALL JM EAGLE™ BE LIABLE FOR LOST PROFITS, LOSS OF GOODWILL, LOSS OF BUSINESS OPPORTUNITIES, DAMAGE TO REPUTATION, SPECIAL DAMAGES, INDIRECT DAMAGES, DELAY DAMAGES, PUNITIVE DAMAGES, EXEMPLARY DAMAGES, CONSEQUENTIAL DAMAGES OR INCIDENTAL DAMAGES.

3. REQUIREMENTS FOR MAKING CLAIMS:

Every claim for breach under this warranty shall be void unless it is made in writing to JM Eagle™ and postmarked within five business (5) days of the date the defect was discovered or in the exercise of ordinary care should have been discovered and, in any event, the claim must also be made within fifty (50) years of the date of the JM Eagle™ invoice. As noted above, Products manufactured by JM Eagle™ are marked with a JM Eagle, PW Eagle or US Polystencil. This limited warranty excludes any Product not manufactured by JM Eagle™, even if it is sold by JM Eagle™ .

Any claim for breach of warranty must be sent to:

PRODUCT ASSURANCE DEPARTMENT
JM EAGLE
5200 W. CENTURY BOULEVARD
LOS ANGELES, CA, 90045

For questions regarding claims, the Product Assurance Department may be also contacted at 1-800-621-4404 or JMWebSupport1@jmeagle.com.

No claim under this limited warranty will be valid unless (1) proof of purchase with the date thereof as well as a description of the alleged defect in reasonable detail is presented to the satisfaction of JM Eagle™, (2) written permission and/or a Return Goods Authorization (RGA) is obtained from JM Eagle™, (3) JM Eagle™ is given a meaningful and reasonable opportunity to inspect the allegedly defective Product and its installation at the site and (4) at JM Eagle™'s request, representative samples of the allegedly defective Product are returned to JM Eagle™ in accordance with JM Eagle™'s instructions.

* Products covered by this Limited Warranty include similar PW Eagle and US Poly products manufactured by JM Eagle after July 1, 2007.

** JM Eagle's Conroe Texas plant in the process of obtaining ISO 9001 certification. The other plants are already certified to ISO 9001.

*** Replacement costs shall be reasonable and based on industry standard cost parameters such as those listed in the RS Means Assemblies Cost Data Book.



EXTENDED WARRANTY

NOTICE OF RETROACTIVE EXTENSION OF LIMITED WARRANTY

Pipe certified to the standards of the American Water Works Association (AWWA) for water distribution, transmission and force sewer mains including C900, C905, C909, C901 and C906 products manufactured by JM Eagle™ (hereinafter “Products”)* are now backed by our unprecedented fifty (50) year limited warranty. (See www.jmeagle.com for full details). JM Eagle™ is proud to announce that it is so confident in the quality of its products, that effective April 1, 2010, it will retroactively extend similar warranty protection for Product manufacturing defect failures. For any Products manufactured by JM Eagle™ and purchased from JM Eagle™ since December 1, 1982, JM Eagle™ will retroactively extend fifty (50) year warranty protection for any manufacturing defect that causes failure on or after April 1, 2010. As set forth in detail below, to be eligible for this retroactive extension, the Products need only have been manufactured by JM Eagle™, contain the original stencil markings, have been purchased since December 1, 1982, and failed on or after April 1, 2010. The fifty (50) year retroactive extended warranty will begin to run on the date of invoice for purchase from JM Eagle™ and will expire fifty (50) years from that date.

EXTENDED RETROACTIVE LIMITED WARRANTY

1. PERIODS AND SCOPE OF COVERAGE

JM Eagle™ warrants through this retroactive extension of Limited Warranty that its pipe products certified to the standards of the American Water Works Association for water distribution, transmission and force sewer mains including C900, C905, C909, C901 and C906 products manufactured by JM Eagle™ (each a “Product” and collectively, the “Products”)* were manufactured in accordance with any of the following AWWA, ASTM, ANSI/NSF, and UL standards then in existence as follows: (1) AWWA C900 and ASTM 1784 cell class 12454; Gaskets meet ASTM F477; Joints meet ASTM D3139; ANSI/NSF-61, UL 1285 for the C900, (2) AWWA C905 and ASTM 1784 cell class 12454; Gaskets meet ASTM F477; Joints meet ASTM D3139; ANSI/NSF-61, UL 1285 for C905, (3) AWWA C909 and UL 1285; Gaskets meet ASTM F477; Joints meet ASTM D3139 for C909 and (4) AWWA C901/906, ASTM D2239, ASTM D2737, ASTM D3035, F714, cell class per ASTM D3350, PPI listed material (TR-4) PE3408/3608 & PE4710, ANSI/NSF-14 for C901 and C906. JM Eagle™ warrants that each of these Products manufactured by JM Eagle™ left our plant free from defects in workmanship and materials. These Products as manufactured by JM Eagle™ are retroactively backed by our extended, unprecedented fifty (50) year Limited Warranty. This Limited Warranty provides that Products manufactured by JM Eagle™ met the applicable then-existing quality standards stated above and that are published by the AWWA, ASTM International (ASTM), American National Standards Institute/ NSF International (ANSI/NSF) and Underwriters Laboratories (UL).

If any Product fails after April 1, 2010 and is determined within fifty (50) years from the date of invoice by JM Eagle™ to be defective because it failed to meet the above stated standards, JM Eagle™ will then provide replacement product of the same type, size and quantity of the product and costs related to this replacement** or issue credits, offsets or a combination thereof for the wholesale purchase price of the defective product.

2. EXCLUSIONS FROM COVERAGE AND EXCLUSIVE REMEDY:

Products manufactured by JM Eagle™ are marked with JM Eagle, PW Eagle or US Poly stencil markings. This limited warranty excludes any Product not manufactured by JM Eagle™, even if it is sold by JM Eagle™, and also excludes defects or failures caused after shipment by:

- improper installation (including, without limitation, misalignment),
- use in improper applications or conditions or in conjunction with improper materials (including, without limitation, improper lubricants, pastes, solvents or sealants),
- contact with aggressive chemical agents, freezing or overheating of liquids in the Product, or unusual pressure surges or pulsation,



- vibration,
- temperature shocking,
- U.V. degradation,
- failure to adhere to JM Eagle™'s instructions concerning the proper handling, installation, testing and use of the Product,
- failure to adhere to applicable standards set forth by local laws, codes, or regulations and the applicable industry standards, or
- any other improper activities not listed above or damage caused by the fault or negligence of anyone other than JM Eagle™ .

THE WARRANTIES IN THIS LIMITED WARRANTY ARE THE ONLY WARRANTIES APPLICABLE TO THE PRODUCTS. THERE ARE NO OTHER WARRANTIES, REPRESENTATIONS OR CONDITIONS OF ANY KIND, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS SUPPLIED HEREUNDER INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ALL SUCH WARRANTIES ARE HEREBY SPECIFICALLY DISCLAIMED AND JM EAGLE™ SHALL NOT BE LIABLE IN THIS RESPECT NOTWITHSTANDING JM EAGLE™'S ACTUAL KNOWLEDGE OF THE PRODUCT'S INTENDED USE OR ANY ADVICE OR REPRESENTATIONS THAT MAY HAVE BEEN RENDERED BY JM EAGLE™ CONCERNING THE DESIGN, MANUFACTURE, FABRICATION, SALE, USE, INSTALLATION OR PROVISION OF THE PRODUCTS. NO STATEMENT, CONDUCT OR DESCRIPTION BY JM EAGLE™ OR ITS REPRESENTATIVES, IN ADDITION TO OR BEYOND THIS LIMITED WARRANTY, SHALL CONSTITUTE A WARRANTY.

BUYER AGREES THAT ITS SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THIS LIMITED WARRANTY, AND THE SOLE AND EXCLUSIVE OBLIGATION OF JM EAGLE™ IN RESPECT OF ANY CLAIMS FOR BREACH OF THIS LIMITED WARRANTY, SHALL BE, (1) THE REPLACEMENT OF THE SAME TYPE, SIZE AND LIKE QUANTITY OF NON-DEFECTIVE PRODUCT, AT THE ORIGINAL POINT OF DELIVERY, AND COSTS DIRECTLY RELATED TO THIS REPLACEMENT***, OR (2) CREDITS, OFFSETS, OR A COMBINATION THEREOF, FOR THE WHOLESALE PURCHASE PRICE OF THE DEFECTIVE PRODUCT. IN NO EVENT SHALL JM EAGLE™ BE LIABLE FOR LOST PROFITS, LOSS OF GOODWILL, LOSS OF BUSINESS OPPORTUNITIES, DAMAGE TO REPUTATION, SPECIAL DAMAGES, INDIRECT DAMAGES, DELAY DAMAGES, PUNITIVE DAMAGES, EXEMPLARY DAMAGES, CONSEQUENTIAL DAMAGES OR INCIDENTAL DAMAGES.

3. REQUIREMENTS FOR MAKING CLAIMS:

Every claim for breach under this warranty shall be void unless it is made in writing to JM Eagle™ and postmarked within five business (5) days of the date the defect was discovered or in the exercise of ordinary care should have been discovered and, in any event, the claim must also be made within fifty (50) years of the date of the JM Eagle™ invoice. As noted above, Products manufactured by JM Eagle™ are marked with JM Eagle™, PW Eagle or US Poly stencils. This limited warranty excludes any Product not manufactured by JM Eagle™, even if it is sold by JM Eagle™ .

Any claim for breach of warranty must be sent to:

PRODUCT ASSURANCE DEPARTMENT
JM EAGLE
5200 W. CENTURY BOULEVARD
LOS ANGELES, CA, 90045

For questions regarding claims, the Product Assurance Department may be also contacted at 1-800-621-4404 or JMWebSupport1@jmeagle.com.

No claim under this limited warranty will be valid unless (1) proof of purchase with the date thereof as well as a description of the alleged defect in reasonable detail is presented to the satisfaction of JM Eagle™, (2) written permission and/or a Return Goods Authorization (RGA) is obtained from JM Eagle™, (3) JM Eagle™ is given a meaningful and reasonable opportunity to inspect the allegedly defective Product and its installation at the site and (4) at JM Eagle™'s request, representative samples of the allegedly defective Product are returned to JM Eagle™ in accordance with JM Eagle™'s instructions.

* Products covered by this Limited Warranty include similar PW Eagle and US Poly products manufactured by JM Eagle after July 1, 2007.
** JM Eagle's Conroe Texas plant in the process of obtaining ISO 9001 certification. The other plants are already certified to ISO 9001.
*** Replacement costs shall be reasonable and based on industry standard cost parameters such as those listed in the RS Means Assemblies Cost Data Book.



PLANT LOCATIONS

ADEL

2101 J-M Drive
Adel, Georgia 31620

BATCHELOR

2894 Marion Monk Road
Batchelor, Louisiana 70715

BUTNER

2602 West Lyon Station Road
Creedmoor, North Carolina 27522

CAMERON PARK

3500 Robin Lane
Cameron Park, California 95682

COLUMBIA

6500 North Brown Station Road
Columbia, Missouri 65202

CONROE

101 East Avenue M
Conroe, Texas 77301

FONTANA

10990 Hemlock Avenue
Fontana, California 92337

HASTINGS

146 North Maple Avenue
Hastings, Nebraska 68901

KINGMAN

4620 Olympic Way
Kingman, Arizona 86401

MAGNOLIA

2220 Duracrete Drive
Magnolia, Arkansas 71753

MCNARY

31240 Roxbury Road
Umatilla, Oregon 97882

MEADVILLE

15661 Delano Road
Cochranton, Pennsylvania 16314

PERRIS

23711 Rider Street
Perris, California 92570

PUEBLO

1742 E. Platteville Boulevard
Pueblo West, Colorado 81007

STOCKTON

1051 Sperry Road
Stockton, California 95206

SUNNYSIDE

1820 South First Street
Sunnyside, Washington 98944

TACOMA

2330 Port of Tacoma Road
Tacoma, Washington 98421

TULSA

4501 West 49th Street
Tulsa, Oklahoma 74107

VISALIA

8875 Avenue 304
Visalia, California 93291

WHARTON

10807 US 59 RD
Wharton, Texas 77488

WILTON

1314 W. Third Street
Wilton, Iowa 52778

MEXICO

PLASTICS TECHNOLOGY
DE MÉXICO S DE R.L. DE S.A.
Av. Montes Urales No. 8 y 10
Parque Industrial Opción, Carretera
57 Qro. -S.L.P. Km. 57.8
C.P. 37980 San José Iturbide,
Guanajuato México

** Our Mexico location is a joint
venture between JM Eagle™ and
Plastics Technology*

GLOBAL HEADQUARTERS

5200 West Century Boulevard
Los Angeles, California 90045

REGIONAL OFFICE

Nine Peach Tree Hill Road
Livingston, New Jersey 07039

JM Eagle

- THE LEADER IN PIPE INNOVATION
- THE HIGHEST LEVEL OF QUALITY
- THE LARGEST BREADTH OF PRODUCT
- THE WIDEST CAPACITY
- EXPRESS DELIVERY



PLANT LOCATIONS

Revised May 2010
JME-02A
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GLOBAL HEADQUARTERS:

5200 West Century Blvd
Los Angeles, CA 90045
T: 800.621.4404
F: 800.451.4170

www.JMEagle.com

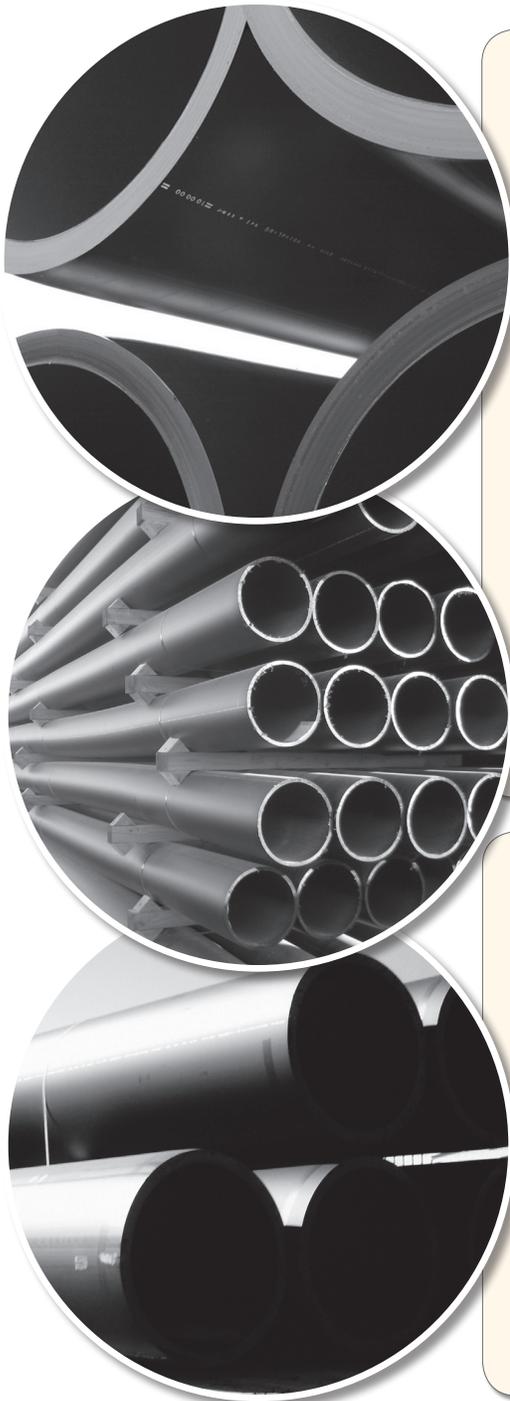
REGIONAL OFFICE:

Nine Peach Tree Hill Road
Livingston, NJ 07039
T: 973.535.1633
F: 973.533.4185



HDPE HI-PRO WATER & SEWER

MEETS AWWA C901/C906, ASTM D2239, ASTM D2737, ASTM D3035, ASTM F714, CELL CLASS PER ASTM D3350, PPI LISTED MATERIAL (TR-4) PE 3408/4710 AND ANSI/NSF-14.



APPLICATIONS

JM Eagle's Hi-Pro high-performance high-density polyethylene water pressure pipes are suitable for municipal and industrial transmission systems for potable water, sewer, drain, mining, irrigation and reclaimed water.

DESCRIPTION

JM Eagle's Hi-Pro high-density polyethylene water and sewer pipe is made from premium, highly engineered PE 4710 resin material for a maximum pressure rating to service today's municipal and industrial water needs.

Available in ½-inch to 63-inch diameters, the product's physical properties make it particularly well suited to open-trench, trenchless and slip-lining installations.

PE 4710 surpasses PE 3408 in the following high-performance designations:

- Density class 4 (0.947 – 0.955 g/cc) vs. density cell class 3 (> 0.940 – 0.947 g/cc).
- SCG (slow crack growth) cell class 7 per PENT value of 500 hours vs. SCG cell class 4 or PENT value of 10 hours.
- 1,000 psi HDS (hydrostatic design stress) vs. 800 psi HDS.

It is available in IPS (iron pipe size) and DIPS (ductile iron pipe size).

BENEFITS

JM Eagle's Hi-Pro HDPE pipe for water and sewer is manufactured from superior PE 4710 resin material for greater performance and an extended life expectancy.

- Its high-strength walls give it the highest PE pressure rating, outstanding resistance to slow crack growth and increased resistance to rapid crack propagation.
- The increased working stress rating of high-performance PE 4710 resin material allows use of a larger inside diameter (thinner wall) for a given operating pressure, making it a superior choice over steel or ductile iron pipe, especially for the large-diameter pipe sizes.
- The larger inside diameter of JM Eagle Hi-Pro pipe not only improves system capability and flow, but it also lowers the cost of the pipe and its handling and installation, making it a more cost-effective choice over the same competing products.



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POLYETHYLENE WATER & SEWER

SUBMITTAL AND DATA SHEET

HDPE IRON PIPE SIZE (I.P.S.) PRESSURE PIPE

ANSI/NSF-61, 14 LISTED

PE 4710		DR 7 (335 psi)			DR 9 (250 psi)			DR 11 (200 psi)		
PE 3408/3608		DR 7 (265 psi)			DR 9 (200 psi)			DR 11 (160 psi)		
PIPE SIZE	AVG. O.D.	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
1/2	0.840	0.120	0.586	0.12	0.093	0.643	0.10	0.076	0.679	0.08
3/4	1.050	0.150	0.732	0.18	0.117	0.802	0.15	0.095	0.849	0.12
1	1.315	0.188	0.916	0.29	0.146	1.005	0.23	0.120	1.061	0.20
1-1/4	1.660	0.237	1.158	0.46	0.184	1.270	0.37	0.151	1.340	0.31
1-1/2	1.900	0.271	1.325	0.60	0.211	1.453	0.49	0.173	1.533	0.41
2	2.375	0.339	1.656	0.94	0.264	1.815	0.76	0.216	1.917	0.64
3	3.500	0.500	2.440	2.05	0.389	2.675	1.66	0.318	2.826	1.39
4	4.500	0.643	3.137	3.39	0.500	3.440	2.74	0.409	3.633	2.29
5-3/8	5.375	0.768	3.747	3.75	0.597	4.109	4.11	0.489	4.338	4.34
5	5.563	0.795	3.878	5.17	0.618	4.253	4.18	0.506	4.490	3.51
6	6.625	0.946	4.619	7.33	0.736	5.065	5.93	0.602	5.349	4.97
7	7.125	0.976	5.056	8.20	0.792	5.446	6.86	0.648	5.751	5.75
8	8.625	1.232	6.013	12.43	0.958	6.594	10.05	0.784	6.963	8.43
10	10.750	1.536	7.494	19.32	1.194	8.219	15.61	0.977	8.679	13.09
12	12.750	1.821	8.889	27.16	1.417	9.746	21.97	1.159	10.293	18.41
14	14.000	2.000	9.760	32.76	1.556	10.107	26.50	1.273	11.301	22.20
16	16.000	2.286	11.154	42.79	1.778	12.231	34.60	1.455	12.915	29.00
18	18.000	2.571	12.549	54.14	2.000	13.760	43.79	1.636	14.532	36.69
20	20.000	2.857	13.943	66.85	2.222	15.289	54.05	1.818	16.146	45.30
22	22.000	3.143	15.337	80.89	2.444	16.819	65.40	2.000	17.76	54.82
24	24.000	3.429	16.732	96.27	2.667	18.346	77.85	2.182	19.374	65.24
26	26.000	—	—	—	2.889	19.875	91.36	2.364	20.988	76.57
28	28.000	—	—	—	3.111	21.405	105.95	2.545	22.605	88.78
30	30.000	—	—	—	3.333	22.934	121.62	2.727	24.219	101.92
32	32.000	—	—	—	—	—	—	2.909	25.833	115.97
34	34.000	—	—	—	—	—	—	3.091	27.447	130.93
36	36.000	—	—	—	—	—	—	3.273	29.061	146.80

I.D. : Inside Diameter
O.D. : Outside Diameter
T. : Wall Thickness

* For data, sizes, or classes not reflected in these charts, please contact JM Eagle™ for assistance.



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HDPE IRON PIPE SIZE (I.P.S.) PRESSURE PIPE (continued)

ANSI/NSF-61, 14 LISTED

PE 4710		DR 13.5 (160 psi)			DR 17 (125 psi)			DR 19 (112 psi)		
PE 3408/3608		DR 13.5 (128 psi)			DR 17 (100 psi)			DR 19 (90 psi)		
PIPE SIZE	AVG. O.D.	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
1/2	0.840	—	—	—	—	—	—	—	—	—
3/4	1.050	0.078	0.885	0.10	—	—	—	—	—	—
1	1.315	0.097	1.109	0.16	—	—	—	—	—	—
1-1/4	1.660	0.123	1.399	0.26	—	—	—	—	—	—
1-1/2	1.900	0.141	1.601	0.34	—	—	—	—	—	—
2	2.375	0.176	2.002	0.53	0.140	2.078	0.43	—	—	—
3	3.500	0.259	2.951	1.15	0.206	3.063	0.93	0.184	3.110	0.84
4	4.500	0.333	3.794	1.90	0.265	3.938	1.54	0.237	3.998	1.39
5-3/8	5.375	0.398	4.531	4.53	0.316	4.705	2.20	0.283	4.775	1.98
5	5.563	0.412	4.690	2.91	0.327	4.870	2.35	0.293	4.942	2.12
6	6.625	0.491	5.584	4.13	0.390	5.798	3.34	0.349	5.885	3.01
7	7.125	0.528	6.006	4.78	0.419	6.237	3.86	0.375	6.330	3.48
8	8.625	0.639	7.270	7.00	0.507	7.550	5.65	0.454	7.663	5.10
10	10.750	0.796	9.062	10.87	0.632	9.410	8.87	0.566	9.550	7.92
12	12.750	0.944	10.749	15.29	0.750	11.160	12.36	0.671	11.327	11.14
14	14.000	1.037	11.802	18.45	0.824	12.253	14.91	0.737	12.438	13.43
16	16.000	1.185	13.488	24.09	0.941	14.005	19.46	0.842	14.215	17.54
18	18.000	1.333	15.174	30.48	1.059	15.755	24.64	0.947	15.992	22.20
20	20.000	1.481	16.860	37.63	1.176	17.507	30.41	1.053	17.768	27.41
22	22.000	1.630	18.544	45.56	1.294	19.257	36.80	1.158	19.545	33.16
24	24.000	1.778	20.231	54.21	1.412	21.007	43.81	1.263	21.322	39.47
26	26.000	1.926	21.917	63.62	1.529	22.759	51.39	1.368	23.100	46.32
28	28.000	2.074	23.603	73.78	1.647	24.508	59.62	1.474	24.875	53.72
30	30.000	2.222	25.289	84.69	1.765	26.258	68.45	1.579	26.653	61.66
32	32.000	2.370	26.976	96.35	1.882	28.010	77.86	1.684	28.430	70.16
34	34.000	2.519	28.660	108.81	2.000	29.760	87.91	1.790	30.205	79.20
36	36.000	2.667	30.346	121.98	2.118	31.510	98.57	1.895	31.983	88.80
42	42.000	—	—	—	2.471	36.761	134.16	2.211	37.314	120.86
48	48.000	—	—	—	2.824	42.013	175.23	2.526	42.644	157.86
54	54.000	—	—	—	3.177	47.265	221.71	2.842	47.975	199.79
63	63.000	—	—	—	—	—	—	—	—	—

* For data, sizes, or classes not reflected in these charts, please contact JM Eagle™ for assistance.



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HDPE IRON PIPE SIZE (I.P.S.) PRESSURE PIPE (continued)

ANSI/NSF-61, 14 LISTED

PE 4710		DR 21 (100 psi)			DR 26 (80 psi)			DR 32.5 (63 psi)		
PE 3408/3608		DR 21 (80 psi)			DR 26 (64 psi)			DR 32.5 (50 psi)		
PIPE SIZE	AVG. O.D.	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
3	3.500	0.167	3.146	0.77	0.135	3.214	0.63	0.108	3.271	0.50
4	4.500	0.214	4.046	1.26	0.173	4.133	1.03	0.138	4.207	0.83
5-3/8	5.375	0.256	4.832	1.80	0.207	4.936	1.47	0.165	5.025	1.18
5	5.563	0.265	5.001	1.93	0.214	5.109	1.57	0.171	5.200	1.27
6	6.625	0.315	5.957	2.73	0.255	6.084	2.23	0.204	6.193	1.80
7	7.125	0.339	6.406	3.16	0.274	6.544	2.58	0.219	6.661	2.08
8	8.625	0.411	7.754	4.64	0.332	7.921	3.79	0.265	8.063	3.05
10	10.750	0.512	9.665	7.21	0.413	9.874	5.87	0.331	10.048	4.75
12	12.750	0.607	11.463	10.13	0.490	11.711	8.26	0.392	11.919	6.67
14	14.000	0.667	12.586	12.22	0.538	12.859	9.96	0.431	13.086	8.05
16	16.000	0.762	14.385	15.96	0.615	14.696	13.01	0.492	14.957	10.50
18	18.000	0.857	16.183	20.20	0.692	16.533	16.47	0.554	16.826	13.30
20	20.000	0.952	17.982	24.93	0.769	18.370	20.34	0.615	18.696	16.41
22	22.000	1.048	19.778	30.18	0.846	20.206	24.61	0.677	20.565	19.86
24	24.000	1.143	21.577	35.19	0.923	22.043	29.30	0.738	22.435	23.62
26	26.000	1.238	23.375	42.14	1.000	23.880	34.39	0.800	24.304	27.74
28	28.000	1.333	25.174	48.86	1.077	25.717	39.88	0.862	26.173	32.19
30	30.000	1.429	26.971	56.12	1.154	27.554	45.79	0.923	28.043	36.93
32	32.000	1.542	28.730	63.84	1.231	29.390	52.10	0.985	29.912	42.04
34	34.000	1.619	30.568	72.06	1.308	31.227	58.81	1.046	31.782	47.43
36	36.000	1.714	32.366	80.78	1.385	33.064	65.94	1.108	33.651	53.20
42	42.000	2.000	37.760	109.97	1.615	38.576	89.71	1.292	39.261	72.37
48	48.000	2.286	43.154	143.65	1.846	44.086	117.18	1.477	44.869	94.56
54	54.000	2.571	48.549	181.75	2.077	49.597	148.33	1.662	50.477	119.70
63	63.000	3.000	56.640	247.42	2.423	57.863	201.88	1.938	58.891	162.84

* For custom DR, perforated pipe, please contact JM Eagle™ PE sales at (800) 621-4404 for availability.

* All dimensions are in inches unless noted otherwise.

I.D. : Inside Diameter
O.D. : Outside Diameter
T. : Wall Thickness



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JM EAGLE™ HDPE DUCTILE IRON PIPE SIZE (D.I.P.S.) PRESSURE PIPE (continued)

ANSI/NSF-61, 14 LISTED

PE 4710		DR 21 (100 psi)			DR 26 (80 psi)			DR 32.5 (63 psi)		
PE 3408/3608		DR 21 (80 psi)			DR 26 (64 psi)			DR 32.5 (50 psi)		
PIPE SIZE	AVG. O.D.	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
4	4.800	0.229	4.315	1.44	0.185	4.408	1.17	0.148	4.486	0.95
6	6.900	0.329	6.203	2.97	0.265	6.338	2.42	0.212	6.451	1.95
8	9.050	0.431	8.136	5.11	0.348	8.312	4.17	0.278	8.461	3.36
10	11.100	0.529	9.979	7.69	0.427	10.195	6.27	0.342	10.375	5.06
12	13.200	0.629	11.867	10.87	0.508	12.123	8.87	0.406	12.339	7.15
14	15.300	0.729	13.755	14.60	0.588	14.053	11.90	0.471	14.301	9.61
16	17.400	0.829	15.643	18.88	0.669	15.982	15.39	0.536	16.264	12.44
18	19.500	0.929	17.531	23.71	0.750	17.910	19.34	0.600	18.228	15.60
20	21.600	1.029	19.419	29.10	0.831	19.838	23.74	0.665	20.190	19.16
24	25.800	1.229	23.195	41.51	0.992	23.697	33.85	0.794	24.117	27.32
30	32.000	1.524	28.769	63.84	1.231	29.390	52.10	0.985	29.912	42.04
36	38.300	1.824	34.433	91.45	1.473	35.177	74.61	1.179	35.801	60.18
42	44.500	2.119	40.008	123.44	1.712	40.871	100.75	1.370	41.596	81.25
48	50.800	2.419	45.672	160.87	1.954	46.658	131.28	1.563	47.486	105.90
54	57.100	2.719	51.336	203.25	2.196	52.444	165.83	1.757	53.375	133.81

* For custom DR, perforated pipe, please contact JM Eagle™ PE sales at (800) 621-4404 for availability.

* All dimensions are in inches unless noted otherwise.

COPPER TUBING SIZES (C.T.S.) PRESSURE PIPE ASTM D2737

ANSI/NSF-61, 14 LISTED

PE 4710		DR 7 (335 psi)			DR 9 (250 psi)			DR 11 (200 psi)		
PE 3408/3608		DR 7 (265 psi)			DR 9 (200 psi)			DR 11 (160 psi)		
PIPE SIZE	AVG. O.D.	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
1/2	0.625	0.090	0.434	0.07	0.069	0.479	0.05	0.062	0.494	0.05
3/4	0.875	0.125	0.610	0.13	0.097	0.669	0.10	0.080	0.705	0.09
1	1.125	0.160	0.786	0.21	0.125	0.860	0.17	0.102	0.909	0.14
1-1/4	1.375	0.196	0.959	0.32	0.153	1.051	0.26	0.125	1.110	0.21
1-1/2	1.625	0.232	1.133	0.44	0.181	1.241	0.36	0.148	1.311	0.30
2	2.125	0.304	1.481	0.76	0.236	1.625	0.61	0.193	1.716	0.51



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POLYETHYLENE WATER & SEWER

SUBMITTAL AND DATA SHEET

S.I.D.R. PRESSURE PIPE ASTM D2239

ANSI/NSF-61, 14 LISTED

PE 4710		DR 7 (335 psi)			DR 9 (250 psi)			DR 11.5 (190 psi)		
PE 3408/3608		DR 7 (200 psi)			DR 9 (160 psi)			DR 11.5 (125 psi)		
PIPE SIZE	AVG. I.D.	MIN. T.	AVG. O.D.	WEIGHT LB/FT	MIN. T.	AVG. O.D.	WEIGHT LB/FT	MIN. T.	AVG. I.D.	WEIGHT LB/FT
½	0.622	0.089	0.800	0.09	0.069	0.760	0.07	0.060	0.742	0.06
¾	0.824	0.118	1.060	0.15	0.092	1.008	0.12	0.072	0.968	0.09
1	1.049	0.150	1.349	0.25	0.117	1.283	0.19	0.091	1.231	0.14
1¼	1.380	0.197	1.774	0.43	0.153	1.686	0.33	0.120	1.620	0.25
1½	1.610	0.230	2.070	0.59	0.179	1.968	0.44	0.140	1.890	0.34
2	2.067	0.295	2.657	0.97	0.230	2.527	0.73	0.180	2.427	0.56
2½	2.469	—	—	—	—	—	—	0.215	2.899	0.80
3	3.068	—	—	—	—	—	—	0.267	3.602	1.23
4	4.026	—	—	—	—	—	—	0.350	4.726	2.12
6	6.065	—	—	—	—	—	—	0.527	7.119	4.81

PE 4710		DR 15 (144 psi)			DR 19 (112 psi)		
PE 3408/3608		DR 15 (100 psi)			DR 19 (80 psi)		
PIPE SIZE	AVG. I.D.	MIN. T.	AVG. O.D.	WEIGHT LB/FT	MIN. T.	AVG. O.D.	WEIGHT LB/FT
½	0.622	0.060	0.742	0.06	0.060	0.742	0.06
¾	0.824	0.060	0.944	0.07	0.060	0.944	0.07
1	1.049	0.070	1.189	0.11	0.060	1.169	0.09
1¼	1.380	0.092	1.564	0.19	0.073	1.526	0.15
1½	1.610	0.107	1.824	0.25	0.085	1.780	0.20
2	2.067	0.138	2.343	0.42	0.109	2.285	0.33
2½	2.469	0.165	2.799	0.60	0.130	2.729	0.47
3	3.068	0.205	3.478	0.93	0.161	3.390	0.72
4	4.026	0.268	4.562	1.59	0.212	4.450	1.24
6	6.065	0.404	6.873	3.62	0.319	6.703	2.82

I.D. : Inside Diameter
O.D. : Outside Diameter
T. : Wall Thickness

* For data, sizes, or classes not reflected in these charts, please contact JM Eagle™ for assistance.



Building essentials
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POLYETHYLENE WATER & SEWER

SUBMITTAL AND DATA SHEET

GEO-FLO HDPE GEOTHERMAL PIPE AND TUBING

Geo-flo HDPE Geothermal Pipe and tubing is produced to ASTM D3035 for smaller diameters and ASTM F714 for sizes 3” through 12”.

ANSI/NSF-61, 14 LISTED

NOMINAL PIPE SIZE (IN)	AVERAGE O.D. (IN)	APPROX. I.D. (IN)	MIN. WALL THICKNESS (IN)	APPROX. WEIGHT (LBS/FT)
HDPE SDR 7 - P.R. 265 psi				
¾	1.050	0.730	0.150	0.18
1	1.315	0.910	0.188	0.28
1¼	1.660	1.150	0.237	0.45
1½	1.900	1.320	0.271	0.59
2	2.375	1.650	0.339	0.92
HDPE SDR 9 - P.R. 200 psi				
¾	1.050	0.800	0.117	0.15
1	1.315	1.000	0.146	0.23
1¼	1.660	1.270	0.184	0.36
1½	1.900	1.450	0.211	0.48
2	2.375	1.810	0.264	0.75
3	3.500	2.670	0.389	1.62
4	4.500	3.450	0.500	2.67
6	6.625	5.030	0.736	5.79
8	8.625	6.593	0.958	10.05
10	10.750	8.218	1.194	15.61
12	12.750	9.747	1.417	21.97
HDPE SDR 11 - P.R. 160 psi				
¾	1.050	0.850	0.095	0.12
1	1.315	1.060	0.120	0.19
1¼	1.660	1.340	0.151	0.30
1½	1.900	1.530	0.173	0.40
2	2.375	1.910	0.216	0.62
3	3.500	2.820	0.318	1.35
4	4.500	3.640	0.409	2.24
6	6.625	5.360	0.602	4.85
8	8.625	6.960	0.784	8.42
10	10.750	8.680	0.977	13.09
12	12.750	10.290	1.159	18.41



Building essentials
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POLYETHYLENE WATER & SEWER

SUBMITTAL AND DATA SHEET

REFERENCE STANDARDS

ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D746	Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials
ASTM D1238	Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D1505	Standard Test Method for Density of Plastics by the Density-Gradient Technique
ASTM D2239	Standard Specification for Polyethylene (PE) Plastic Pipe (S.I.D.R.-PR) Based on Controlled Inside Diameter
ASTM D2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM D2737	Standard Specification for Polyethylene (PE) Plastic Tubing
ASTM D2774	Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
ASTM D3035	Standard Specifications for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
ASTM D3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Material
ASTM F412	Standard Terminology Relating to Plastic Piping Systems
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (S.D.R.-PR) Based on Outside Diameter
ASTM F1473	Standard Test Method for Notch Tensile to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins
AWWA C901	Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. Through 3 in. For Water Service
AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 63 in., For Water Distribution and Transmission
NSF Standard 014	Plastics Piping System Components and Related Materials
NSF Standard 061	Drinking Water System Components - Health Effects

GSE GundSeal Geosynthetic Clay Liner (Smooth HDPE)

GSE GundSeal geosynthetic clay liner (GCL) is a composite liner system that consists of a high quality sodium bentonite adhered to a smooth high density polyethylene (HDPE) geomembrane with a spun-bonded geotextile to protect the bentonite during installation. This one product composite liner system combines the low permeability of an HDPE geomembrane with the self-seaming characteristics of bentonite clay. The intimate contact of the bentonite with the geomembrane provides the best leak protection in the industry.



AT THE CORE:

A composite liner system that combines the low permeability of an HDPE geomembrane with the self-seaming characteristics of bentonite clay to provide the best leak protection in the industry.

Product Specifications

Tested Property	Test Method	Frequency	Minimum Average Value					
			15 mil	20 mil	30 mil	40 mil	60 mil	80 mil
Finished GCL Property								
Bentonite Coating ⁽¹⁾ , lb/ft ²	ASTM D 5993	1/40,000 ft ²	> 0.75					
Effective Hydraulic Conductivity, cm/sec	ASTM D 5887/E96	periodically	< 4 x 10 ⁻¹²					
Bentonite Moisture Content	ASTM D 2216	1/40,000 ft ²	25% Typical					
GCL Tensile Strength ⁽³⁾ , lb/in	ASTM D 6768	1/200,000 ft ²	20	42	63	84	130	173
Geomembrane Property⁽²⁾								
Thickness, mil Lowest individual reading	ASTM D 5199	1/100,000 ft ²	15.0 13.5	20 18	30 27	40 36	60 54	80 72
Density, g/cm ³	ASTM D 1505	1/200,000 ft ²	0.94	0.94	0.94	0.94	0.94	0.94
Tensile Properties Tensile Break Strength, lb/in Elongation at Break, %	ASTM D 6693 ASTM D 6693	1/200,000 ft ² 1/200,000 ft ²	44 500	76 500	114 700	152 700	228 700	304 700
Puncture Resistance, lb	ASTM D 4833	1/200,000 ft ²	20	36	54	72	108	144
Sodium Bentonite Property								
Hydraulic Flux: Bentonite, m ³ /m ² /sec	ASTM D 5887	periodically	≤ 1 x 10 ⁻⁸					
Hydraulic Conductivity, cm/sec	ASTM D 5887	periodically	≤ 5 x 10 ⁻⁹					
Swell Index, ml/2 g	ASTM D 5890	1/60,000 lb	≥ 24					
Fluid Loss, ml	ASTM D 5891	1/60,000 lb	≤ 18					
TYPICAL ROLL DIMENSIONS								
Roll Width ⁽⁴⁾ , ft			17.5	17.5	17.5	17.5	17.5	17.5
Roll Length ⁽⁴⁾ , ft			200	200	200	180	180	150
Roll Area, ft ²			3,500	3,500	3,500	3,150	3,150	2,625
Roll Weight, lb			4,200	4,200	4,200	4,200	4,200	4,200

NOTES:

- ⁽¹⁾0% moisture content.
- ⁽²⁾See specific GSE HD geomembrane product data sheet for additional information.
- ⁽³⁾4 in wide sample, 12 in/min. Values are representative of the geomembrane tensile yield strength.
- ⁽⁴⁾Roll lengths and widths have a tolerance of ± 1%.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.



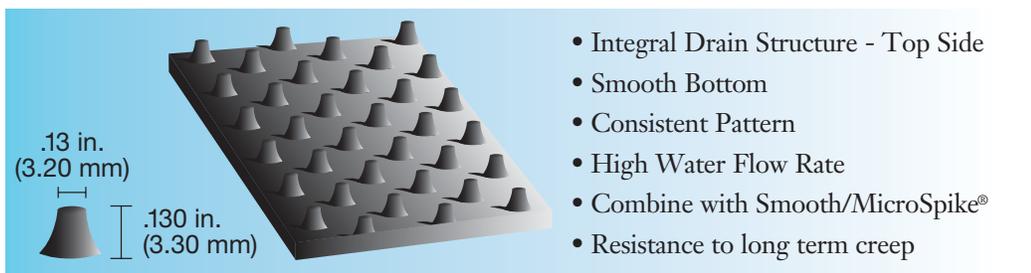
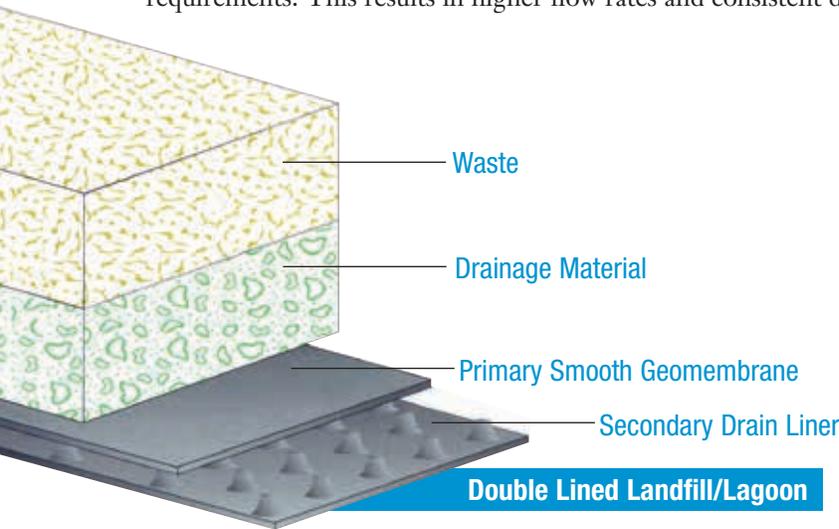
[DURABILITY RUNS DEEP] For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.



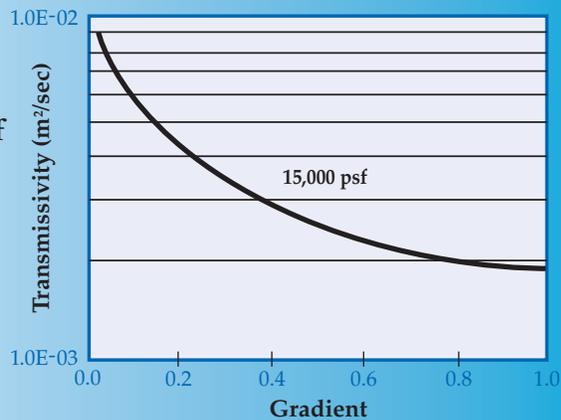
Drain Liner® Geomembrane

Applications for HDPE and LLDPE Agru Drain Liner include single or double lined projects where containment and leak detection are critical such as landfills, waste ponds/lagoons, mining heap leach pads and process ponds. Using Drain Liner in place of a geonet and geomembrane results in significant cost savings in material and installation.

Agru America's structured geomembranes are manufactured on state-of-the-art manufacturing equipment using a flat cast extrusion manufacturing process as opposed to blown film extrusion. Agru America uses only the highest grade of HDPE and LLDPE resins manufactured in North America. The flat cast process results in a consistent core thickness which corresponds to higher tensile strength values than traditional textured materials. It also gives consistent structuring as the material production rollers are embossed with the appropriate pattern for the structured liner requirements. This results in higher flow rates and consistent drain capacity.



Drain Liner/Smooth HDPE
Transmissivity under 15,000 psf
Normal stress
ASTM D4716



11-HDPE Drain Layer-Mfr Cutsheet-EHS-060914-v001

The in-plane drainage capacity of the drain liner used as either a primary or secondary liner is always higher than a conventional geonet due to the structure of the studs and stud spacing which results in a more laminar (less turbulent) flow and a constant bi-directional flow over time and minimal reduction due to creep. Additionally, the drain liner allows flow at very low gradients due again to the stud spacing and integral design.

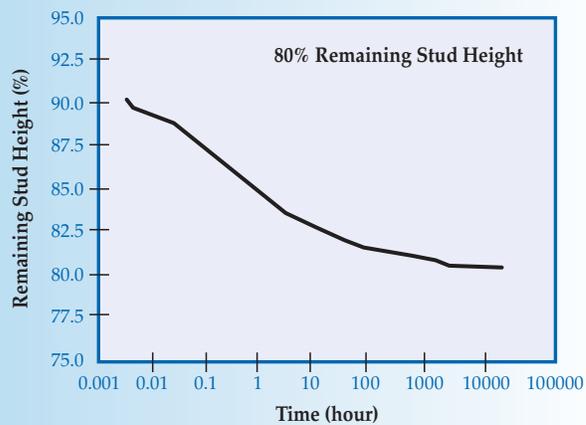
Detection of potential leaks is faster with a drain liner structure than with a conventional geonet which forms an indirect flow path due to the net structure. Also, reduction factors for the potential of chemical or biological clogging are less for a stud or drain liner structure due to the fact that the studs do not form intermediate dams or inhibit water flow.

Drain Liner 10,000 hour Creep

Testing under 15,000 psf

Normal stress

ASTM D5262



Thus, the Drain Liner is a synthetic drainage media which has decided advantages over conventional geonets:

- Installed in one layer as an integral drain with the primary or secondary liner (depending on installation)
 - Installation time cut dramatically
 - Cost effective lagoon solution-significantly reduced material and installations costs
 - Less CQA cost
 - Better consistency
 - Bi-directional Flow.
- Higher flow rates than a conventional geonet
- Minimal reduction for creep (80% retention under 15,000 psf loading)
- Less impact by chemical/biological clogging
- Faster response time for leak detection
- Studs totally integrated with the liner-single production process
- No waste due to cutting and fitting of geonet sections or discard of end of rolls
- Excellent fluid barrier
- Manufactured in the most modern plant meeting stringent quality control standards

When engineers specify AGRU Drain Liner or any other Agru product, the client not only gets a superior material with higher performance but also substantial cost savings.

The Best Protection for Your Future!



High Density Polyethylene Smooth Liner®

Product Data

Property	Test Method	Values				
Thickness (min. ave.), mil (mm)	ASTM D5199*	30 (.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Thickness (lowest indiv.), mil (mm)	ASTM D5199*	27 (.68)	36 (.90)	54 (1.35)	72 (1.80)	90 (2.25)
*The thickness values may be changed due to project specifications (i.e., absolute minimum thickness)						
Density, g/cc, minimum	ASTM D792, Method B	0.94	0.94	0.94	0.94	0.94
Tensile Properties (ave. both directions)	ASTM D6693, Type IV					
Strength @ Yield (min. ave.), lb/in width (N/mm)	2 in/minute	66 (11.6)	88 (15.4)	132 (23.1)	176 (30.8)	220 (38.5)
Elongation @ Yield (min. ave.), % (GL=1.3in)	5 specimens in each direction	13	13	13	13	13
Strength @ Break (min. ave.), lb/in width (N/mm)		120 (21)	160 (28)	240 (42)	320 (56)	400 (70)
Elongation @ Break (min. ave.), % (GL=2.0in)		700	700	700	700	700
Tear Resistance (min. ave.), lbs. (N)	ASTM D1004	23 (102)	30 (133)	45 (200)	60 (267)	72 (320)
Puncture Resistance (min. ave.), lbs. (N)	ASTM D4833	60 (267)	80 (356)	120 (534)	160 (712)	190 (845)
Carbon Black Content (range in %)	ASTM D4218	2 - 3	2 - 3	2 - 3	2 - 3	2 - 3
Carbon Black Dispersion (Category)	ASTM D5596	Only near spherical agglomerates for 10 views: 9 views in Cat. 1 or 2, and 1 view in Cat. 3				
Stress Crack Resistance (Single Point NCTL), hours	ASTM D5397, Appendix	300	300	300	300	300
Oxidative Induction Time, minutes	ASTM D3895, 200°C, 1 atm O ₂	≥140	≥140	≥140	≥140	≥140
Melt Flow Index, g/10 minutes	ASTM D1238, 190°C, 2.16kg	≤1.0	≤1.0	≤1.0	≤1.0	≤1.0
Oven Aging	ASTM D5721	80	80	80	80	80
with HP OIT, (% retained after 90 days)	ASTM D5885, 150°C, 500psi O ₂					
UV Resistance	ASTM D7238	20hr. Cycle @ 75°C/4 hr. dark condensation @ 60°C				
with HP OIT, (% retained after 1600 hours)	ASTM D5885, 150°C, 500psi O ₂	50	50	50	50	50

Agru America's geomembranes are certified to pass Low Temp. Brittleness via ASTM D746 (-80°C), and Dimensional Stability via ASTM D1204 (±2% @ 100°C).

These product specifications meet or exceed GRI's GM13

Supply Information (Standard Roll Dimensions)

Thickness		Width		Length		Area (approx.)		Weight (average)	
mil	mm	ft	m	ft	m	ft ²	m ²	lbs	kg
30	.75	23	7	1,040	316.99	23,920	2,222	3,900	1,770
40	1.0	23	7	835	254.51	19,205	1,784	3,900	1,770
60	1.5	23	7	540	164.59	12,420	1,154	3,900	1,770
80	2.0	23	7	415	126.49	9,545	887	3,900	1,770
100	2.5	23	7	335	102.109	7,705	716	3,900	1,770

Notes:

All rolls are supplied with two slings. All rolls are wound on a 6 inch core. Special lengths are available on request. All roll lengths and widths have a tolerance of ±1%
*The weight values may change due to project specifications (i.e. absolute minimum thickness or special roll lengths) or shipping requirements (i.e. international containerized shipments).

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable; however, it is the users responsibility to determine the suitability for their own use of the products described herein. Since the actual use by others is beyond our control, no guarantee or warranty of any kind, expressed or implied, is made by Agru America as to the effects of such use or the results to be obtained, nor does Agru America assume any liability in connection herewith. Any statement made herein may not be absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein is to be construed as permission or as a recommendation to infringe any patent.

11-Pumps Design Criteria-HH-06-09-14-V001

Client: **CCSD**
Project: **Emergency Water Supply System**
Detail: **Pumps**

Job No.:
Checked By:
Date Checked:

Computed By: **Hoon Hyung**
Date: **6/9/2014**
Page No.: --

MF Feed Pump

No. of Duty Pumps	1	
No. of Standby Pumps (Shelf Spare)	1	
Pump Type	Horizontal Centrifugal	
Flow per Pump	669	gpm
Head	45	psi
Motor HP	40	hp
VFD	Yes	
Pump Material	CS or CI	

RO Feed Supply Pump

No. of Duty Pumps	1	
No. of Standby Pumps (Installed)	1	
Pump Type	Horizontal Centrifugal	
Flow per Pump	529	gpm
Head	30	psi
Motor HP	15	hp
VFD	No	
Pump Material	CS or CI	

LIW Injection Pump (Optional)

No. of Duty Pumps	1	
No. of Standby Pumps (Shelf Spare)	0	
Pump Type	Horizontal Centrifugal	
Flow per Pump	100	gpm
Head	30	psi
Motor HP	5	hp
VFD	No	
Pump Material	CS or CI	

Product Water Pump

No. of Duty Pumps	1	
No. of Standby Pumps (Shelf Spare)	1	
Pump Type	Horizontal Centrifugal	
Flow per Pump	484	gpm
Head	30	psi
Motor HP	15	hp
VFD	Yes	
Pump Material	CS or CI	