

J. HOWARD ENGINEERING

8105 Edgewater Drive, #209

Oakland, CA 94621

Contrs. Lic. No.

503495

SUBMITTAL TRANSMITTAL

TO: City of Oakland

250 Frank H Ogawa Plaza, Ste 4314
Oakland, CA 94612

Attn: Wezlon Miles

Tel: (510) 238-5238

Fax: (510) 238-6633

Date: October 26, 2015

Job No.: OAK05

Submittal #: **4.0**

Project: SS Rehab of 17th, 21st, 27th St, Inyo St, & 25th Ave

Subject: HDPE Pipe

Gentlemen,

We are enclosing the following submittal information for review and approval in accordance with the contract documents. Please return two (2) approved/marked sets for our records.

No.	Copies	Ref Spec/Dwg	Description	Source
1	1	500-1.6.3	HDPE Pipe	WL Plastics

Notes:

Review Action (check one):

☐ 1 -No Exceptions Noted

☐ 2 -Make Corections Noted

☐ 3 -Revise & Resubmit

☐ 4 -Not Acceptable -Resubmit

PLEASE DIRECT ANY QUESTIONS REGARDING THIS SUBMITTAL TO:

Ron H. Zelaya, P.E.

Phone (510) 303-9591

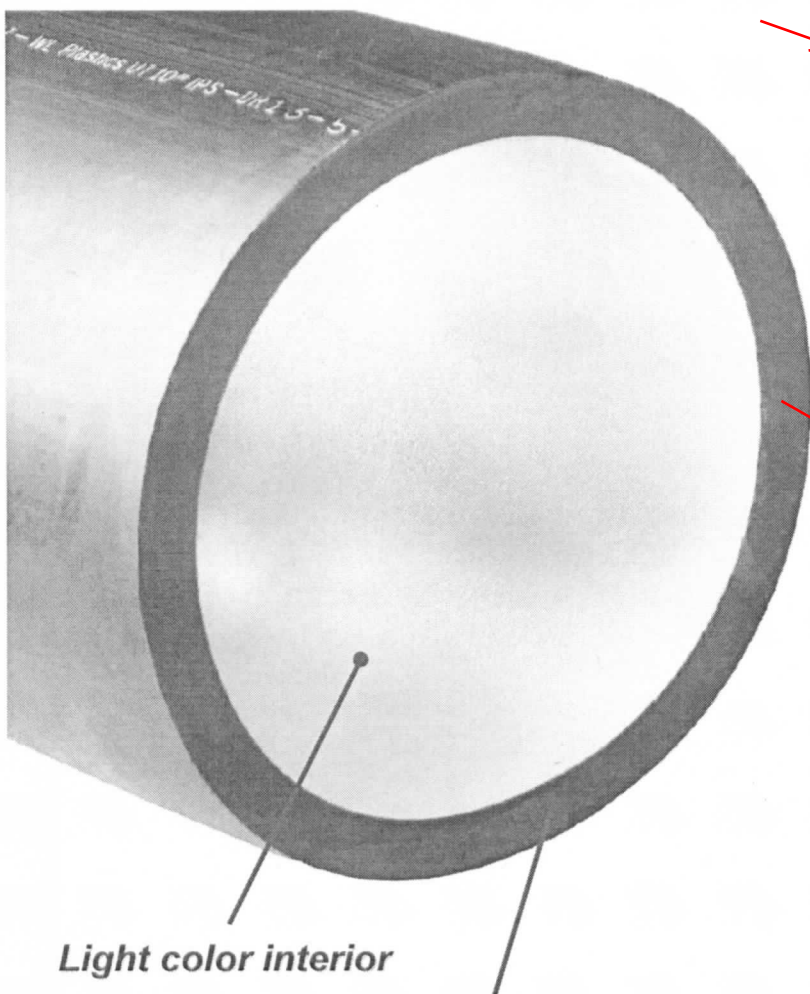
ronzelaya@sbcglobal.net

Cc:

J. HOWARD ENGINEERING

By: R. Zelaya

Camcore™ Polyethylene Pipe for Sewer or Wastewater



Light color interior

Black PE Pipe
Pressure-Rated – UV Protected
PE3608/PE3408 or PE4710

- ◆ Enhances video inspection and lateral tap locating with a light color interior surface
- ◆ Interior colors – light gray (standard), white, light green, lavender
- ◆ UV protected black pipe for outdoor storage, or long-term surface or above grade service
- ◆ **PE3608/PE3408 or PE4710**
- ◆ Fully pressure-rated for force main applications
- ◆ Install by direct burial, sliplining, insertion renewal, pipe bursting, horizontal directional drilling, plowing, planting, surface, suspended, marine
- ◆ IPS 6 through 18; DIPS 6 through 16
- ◆ 40 ft or 50 ft lengths
- ◆ Meets ASTM F714, ASTM D3035, AWWA C906*
- ◆ “No-Leak” heat fusion joints
- ◆ OD color stripes also available

* AWWA C906 – PE3608/PE3408 only.



ISO 9001:2008 Certified



WL106A PE3608^A PIPE COMPOUND



Typical Physical Properties for WL Plastics PE3608^A Pipe Compound

- WL Plastics HDPE PE3608^A pipe is manufactured from pressure rated polyethylene compound that meets or exceeds ASTM D 3350 requirements and Cell Classification PE345464C, and meets or exceeds material designation codes PE3608^A and PE3408^A.
- WL Plastics HDPE pipe materials are listed by PPI in TR-4 with HDB ratings at 73°F and 140°F, and HDS ratings for water 73°F.
- For potable water service, WL Plastics HDPE black polyethylene compounds are certified to NSF-61.

Physical Property	Test Method	Typical Value ¹
Cell Classification (black compound)	ASTM D3350	PE345464C
Melt Index (190/2.16)	ASTM. D1238	0.1 g/10 min
High Load Melt Index ² (190/21.6)	ASTM. D1238	4 – 20 g/10 min
Density with 2% minimum carbon black	ASTM. D792	0.955 g/cm ³
Tensile strength at yield (2 in/min)	ASTM. D638	>3000 psi
Tensile elongation (2 in/min)	ASTM. D638	>700%
Flexural modulus	ASTM. D790	110,000 < 160,000 psi
SCG Resistance, PENT (80°C, 2.4 MPa)	ASTM. F1473	>100 h
Thermal stability	ASTM. D3350	>428°F (>220°C)
Brittleness temperature	ASTM. D746	<-103°F (<-75°C)
Thermal expansion coefficient	ASTM. D696	9 x 10 ⁻⁵ in/in/°F
HDB ³ at 73°F (23°C)	D2837/PPI TR-3	1600 psi (11.0 MPa)
HDB ³ at 140°F (60°C)	D2837/PPI TR-3	800 psi (5.5 MPa)
HDS ³ at 73°F (23°C)	D2837/PPI TR-3	800 psi (5.5 MPa)
HDS at 140°F (60°C)	D2837/PPI TR-3	400 psi (2.8 MPa)

Contact WL Plastics Customer Service for availability. (1) Typical values determined from laboratory tests of resin plaques and specimens prepared in accordance with industry standard test methods. Values determined on samples taken from pipe may vary. The typical values presented herein are for PE3608 polyethylene pipe compounds (resin) but do not constitute engineering properties for pipe. (2) Overall range of HLMI values for all compounds from all WL Plastics compound suppliers; HLMI variation for an individual compound will be well within the overall range. (3) Listed HDB and HDS ratings are published by the Plastics Pipe Institute in PPI TR-4 by the compound manufacturer (independent listing) and by WL Plastics (dependent listing) in accordance with ASTM D 2837 and PPI TR-3. Compound supplier codes for WL Plastics PPI dependent listings are D (Dow); E (Lyondell Basell); S (Ineos); T (Total); C (Chevron-Phillips).

^A WL Plastics manufactures PE3608/PE3408 HDPE piping products using PE4710 compounds. See WL106B for additional information.

This publication is intended for use as a piping system guide. It should not be used in place of a professional engineer's judgment or advice and it is not intended as installation instructions. The information in this publication does not constitute a guarantee or warranty for piping installations and cannot be guaranteed because the conditions of use are beyond our control. The user of this information assumes all risk associated with its use. WL Plastics Corporation has made every reasonable effort to ensure accuracy, but the information in this publication may not be complete, especially for special or unusual applications. Changes to this publication may occur from time to time without notice. Contact WL Plastics Corporation to determine if you have the most current edition. Publication duplication permitted.



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WL102 – IPS PIPE SIZES AND RATINGS

PE4710 PE3608/PE3408		PR ^B , psi	335	320	250	200	160	140	125	110	100	80	65
		PC ^B , psi	265	255	200	160	130	110	100	90	80	65	50
IPS SIZE ^A	AVG OD, in	DR	7	7.3	9	11	13.5	15.5	17	19	21	26	32.5
3/4	1.050	Min wall, in	0.150	0.144	0.117	0.095							
		Avg ID ^C , in	0.732	0.745	0.803	0.848							
		Weight, lb/ft	0.187	0.177	0.148	0.124							
1	1.315	Min wall, in	0.188	0.180	0.146	0.120							
		Avg ID ^C , in	0.917	0.933	1.005	1.062							
		Weight, lb/ft	0.288	0.278	0.232	0.195							
1 1/4	1.660	Min wall, in	0.237	0.227	0.184	0.151							
		Avg ID ^C , in	1.157	1.178	1.269	1.340							
		Weight, lb/ft	0.459	0.442	0.369	0.310							
1 1/2	1.900	Min wall, in	0.271	0.260	0.211	0.173							
		Avg ID ^C , in	1.325	1.348	1.452	1.534							
		Weight, lb/ft	0.600	0.580	0.485	0.406							
2	2.375	Min wall, in	0.339	0.325	0.264	0.216	0.176	0.153	0.140				
		Avg ID ^C , in	1.656	1.685	1.816	1.917	2.002	2.050	2.079				
		Weight, lb/ft	0.939	0.906	0.758	0.634	0.526	0.462	0.425				
2 1/2	2.875	Min wall, in	0.411	0.394	0.319	0.261	0.213	0.185	0.169				
		Avg ID ^C , in	2.004	2.040	2.198	2.321	2.424	2.482	2.516				
		Weight, lb/ft	1.377	1.329	1.109	0.928	0.771	0.677	0.622				
3	3.500	Min wall, in	0.500	0.479	0.389	0.318	0.259	0.226	0.206	0.184	0.167		
		Avg ID ^C , in	2.440	2.484	2.676	2.825	2.950	3.021	3.064	3.109	3.147		
		Weight, lb/ft	2.040	1.968	1.646	1.376	1.141	1.006	0.923	0.830	0.757		
→ 4	4.500	Min wall, in	0.643	0.616	0.500	0.409	0.333	0.290	0.265	0.237	0.214	0.173	0.138
		Avg ID ^C , in	3.137	3.193	3.440	3.633	3.793	3.885	3.939	3.998	4.046	4.133	4.206
		Weight, lb/ft	3.372	3.253	2.720	2.275	1.887	1.660	1.526	1.374	1.247	1.018	0.819
5	5.563	Min wall, in	0.795	0.762	0.618	0.506	0.412	0.359	0.327	0.293	0.265	0.214	0.171
		Avg ID ^C , in	3.878	3.947	4.253	4.491	4.689	4.802	4.869	4.942	5.001	5.109	5.200
		Weight, lb/ft	5.154	4.975	4.156	3.479	2.886	2.540	2.328	2.100	1.909	1.557	1.254
→ 6	6.625	Min wall, in	0.946	0.908	0.736	0.602	0.491	0.427	0.390	0.349	0.315	0.255	0.204
		Avg ID ^C , in	4.619	4.701	5.064	5.348	5.585	5.719	5.799	5.886	5.956	6.085	6.193
		Weight, lb/ft	7.305	7.059	5.894	4.930	4.095	3.599	3.307	2.978	2.703	2.209	1.781
→ 8	8.625	Min wall, in	1.232	1.182	0.958	0.784	0.639	0.556	0.507	0.454	0.411	0.332	0.265
		Avg ID ^C , in	6.013	6.120	6.593	6.963	7.271	7.445	7.549	7.663	7.754	7.922	8.062
		Weight, lb/ft	12.385	11.963	9.988	8.359	6.939	6.100	5.597	5.044	4.591	3.744	3.012
→ 10	10.750	Min wall, in	1.536	1.473	1.194	0.977	0.796	0.694	0.632	0.566	0.512	0.413	0.331
		Avg ID ^C , in	7.494	7.628	8.218	8.678	9.062	9.280	9.409	9.551	9.665	9.873	10.049
		Weight, lb/ft	19.245	18.581	15.515	12.983	10.774	9.490	8.695	7.838	7.128	5.805	4.689
12	12.750	Min wall, in	1.821	1.747	1.417	1.159	0.944	0.823	0.750	0.671	0.607	0.490	0.392
		Avg ID ^C , in	8.889	9.047	9.747	10.293	10.748	11.006	11.160	11.327	11.463	11.710	11.918
		Weight, lb/ft	27.062	26.138	21.837	18.267	15.155	13.348	12.238	11.021	10.023	8.169	6.587
→ 14	14.000	Min wall, in	2.000	1.918	1.556	1.273	1.037	0.903	0.824	0.737	0.667	0.538	0.431
		Avg ID ^C , in	9.760	9.934	10.702	11.302	11.801	12.085	12.254	12.438	12.587	12.858	13.087
		Weight, lb/ft	32.635	31.511	26.329	22.030	18.279	16.082	14.763	13.292	12.093	9.848	7.952

PE4710		PR ^B , psi	335	320	250	200	160	140	125	110	100	80	65
PE3608/PE3408		PC ^B , psi	265	255	200	160	130	110	100	90	80	65	50
IPS SIZE ^A	AVG OD, in	DR	7	7.3	9	11	13.5	15.5	17	19	21	26	32.5
→ 16	16.000	Min wall, in	2.286	2.192	1.778	1.455	1.185	1.032	0.941	0.842	0.762	0.615	0.492
		Avg ID ^C , in	11.154	11.353	12.231	12.916	13.487	13.812	14.005	14.215	14.385	14.695	14.956
		Weight, lb/ft	42.629	41.157	34.384	28.777	23.872	21.005	19.269	17.355	15.789	12.866	10.375
→ 18	18.000	Min wall, in	2.571	2.466	2.000	1.636	1.333	1.161	1.059	0.947	0.857	0.692	0.554
		Avg ID ^C , in	12.549	12.773	13.760	14.531	15.173	15.538	15.755	15.992	16.183	16.532	16.826
		Weight, lb/ft	53.940	52.089	43.513	36.403	30.210	26.584	24.395	21.959	19.977	16.286	13.142
20	20.000	Min wall, in	2.857	2.740	2.222	1.818	1.481	1.290	1.176	1.053	0.952	0.769	0.615
		Avg ID ^C , in	13.943	14.192	15.289	16.145	16.859	17.265	17.506	17.768	17.981	18.369	18.695
		Weight, lb/ft	66.599	64.307	53.715	44.947	37.294	32.820	30.102	27.129	24.658	20.109	16.211
→ 22	22.000	Min wall, in	3.143	3.014	2.444	2.000	1.630	1.419	1.294	1.158	1.048	0.846	0.677
		Avg ID ^C , in	15.337	15.611	16.818	17.760	18.545	18.991	19.256	19.545	19.779	20.206	20.565
		Weight, lb/ft	80.591	77.812	64.991	54.391	45.149	39.712	36.433	32.818	29.858	24.335	19.629
→ 24	24.000	Min wall, in	3.429	3.288	2.667	2.182	1.778	1.548	1.412	1.263	1.143	0.923	0.738
		Avg ID ^C , in	16.731	17.030	18.347	19.375	20.231	20.717	21.007	21.322	21.577	22.043	22.434
		Weight, lb/ft	95.916	92.603	77.365	64.735	53.726	47.260	43.369	39.049	35.525	28.963	23.344
26	26.000	Min wall, in		3.562	2.889	2.364	1.926	1.677	1.529	1.368	1.238	1.000	0.800
		Avg ID ^C , in		18.449	19.876	20.989	21.917	22.444	22.758	23.099	23.375	23.880	24.304
		Weight, lb/ft		110.769	92.535	77.440	64.261	56.532	51.856	46.701	42.486	34.648	27.940
→ 28	28.000	Min wall, in			3.111	2.545	2.074	1.806	1.647	1.474	1.333	1.077	0.862
		Avg ID ^C , in			21.404	22.604	23.603	24.170	24.508	24.876	25.173	25.717	26.174
		Weight, lb/ft			107.312	89.785	74.522	65.563	60.154	54.189	49.266	40.187	32.421
30	30.000	Min wall, in			3.333	2.727	2.222	1.935	1.765	1.579	1.429	1.154	0.923
		Avg ID ^C , in			22.933	24.218	25.289	25.897	26.259	26.653	26.971	27.554	28.043
		Weight, lb/ft			123.183	103.076	85.543	75.264	69.068	62.196	56.585	46.135	37.196
32	32.000	Min wall, in			3.556	2.909	2.370	2.065	1.882	1.684	1.524	1.231	0.985
		Avg ID ^C , in			24.462	25.833	26.975	27.623	28.009	28.429	28.770	29.391	29.913
		Weight, lb/ft			140.183	117.285	97.324	85.672	78.557	70.755	64.370	52.494	42.340
34	34.000	Min wall, in				3.091	2.519	2.194	2.000	1.789	1.619	1.308	1.046
		Avg ID ^C , in				27.447	28.661	29.350	29.760	30.206	30.568	31.228	31.782
		Weight, lb/ft				132.411	109.905	96.714	88.700	79.865	72.657	59.264	47.773
36	36.000	Min wall, in				3.273	2.667	2.323	2.118	1.895	1.714	1.385	1.108
		Avg ID ^C , in				29.062	30.347	31.076	31.511	31.983	32.366	33.065	33.652
		Weight, lb/ft				148.454	123.208	108.424	99.457	89.571	81.446	66.444	53.581
42	42.000	Min wall, in					3.111	2.710	2.471	2.211	2.000	1.615	1.292
		Avg ID ^C , in					35.404	36.255	36.762	37.314	37.760	38.575	39.260
		Weight, lb/ft					167.675	147.568	135.372	121.925	110.874	90.393	72.893
48	48.000	Min wall, in						3.097	2.824	2.526	2.286	1.846	1.477
		Avg ID ^C , in						41.435	42.014	42.644	43.154	44.086	44.869
		Weight, lb/ft						192.774	176.813	159.198	144.833	118.082	95.233
54	54.000	Min wall, in							3.176	2.842	2.571	2.077	1.662
		Avg ID ^C , in							47.266	47.975	48.549	49.597	50.478
		Weight, lb/ft							223.713	201.502	183.253	149.464	120.556

CONTACT WL PLASTICS PLANT CUSTOMER SERVICE TO CONFIRM AVAILABILITY AND FOR SIZES AND DR'S NOT SHOWN. **A.** Sizes below IPS 4 per ASTM D3035; Sizes IPS 4 and larger per ASTM F714. See WL106B Pipe Compound and WL116 Pipe Standards. **B.** Pressure Rating (PR) and pressure class (PC) for water at 73°F. Ratings will vary for other fluids and temperatures. See WL118 Pressure Rating. **C.** Calculated Avg ID = Avg OD - (2.12 x min wall), and is for estimating fluid flow. Pipe ID is approximate, not a specification dimension. **D.** All dimensions in inches. **E.** NSF-61 Certification for potable water service available on request. **F.** See WL101 and WL124 for fusion, mechanical and electrofusion joining information. **G.** The information in this publication does not constitute a guarantee or warranty for piping installations and cannot be guaranteed because the conditions of use are beyond our control. See WL125 Terms and Conditions of Sale. The user of this information assumes all risk associated with its use. Changes to this publication may occur from time to time without notice. Contact WL Plastics Corporation to determine if you have the most current edition. Copying without change permitted.



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