

TABLE C403.2.8 PIPE INSULATION THICKNESS							
FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (IN BTU-INCH PER HOUR PER SQUARE FOOT PER °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (IN INCHES)				
			<1 TO 1	1 TO 1.5	1.5 TO 4	4 TO 8	8 AND LARGER
SPACE HEATING, HOT WATER (STEAM, STEAM CONDENSATE & HOT WATER) AND SERVICE WATER HEATING SYSTEMS							
ABOVE 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.31	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.22 - 0.28	100	1.0	1.5	1.5	1.5	1.5
SPACE COOLING SYSTEMS (CHILLED WATER, REFRIGERANT AND BRINE)							
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
BELOW 40	0.20 - 0.26	50	1.0	1.5	1.5	1.5	1.5

LOW PRESSURE NATURAL GAS PIPE SIZING TABLE								
IFGC-2012 TABLE 402.4(2)								
MAXIMUM DELIVERY CAPACITY OF SCHEDULE 40 METALLIC PIPE CARRYING NATURAL GAS OF 0.60 SPECIFIC GRAVITY BASED ON A PRESSURE DROP OF 0.5" WATER COLUMN, GAS PRESSURE LESS THAN 2 PSI								
PIPE SIZE IN INCHES								
NOMINAL ID	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3
LENGTH (FT)	CAPACITY IN CUBIC FEET OF GAS PER HOUR							
10	172	360	678	1,390	2,090	4,020	6,400	11,300
20	118	247	466	957	1,430	2,760	4,400	7,780
30	95	199	374	768	1,150	2,220	3,530	6,250
40	81	170	320	657	985	1,900	3,020	5,350
50	72	151	284	583	873	1,680	2,680	4,740
60	65	137	257	528	791	1,520	2,430	4,290
70	60	126	237	486	728	1,400	2,230	3,950
80	56	117	220	452	677	1,300	2,080	3,670
90	52	110	207	424	635	1,220	1,950	3,450
100	50	104	195	400	600	1,160	1,840	3,260
125	44	92	173	355	532	1,020	1,630	2,890
150	40	83	157	322	482	928	1,480	2,610
175	37	77	144	296	443	854	1,360	2,410
200	34	71	134	275	412	794	1,270	2,240
250	30	63	119	244	366	704	1,120	1,980
300	27	57	108	221	331	638	1,020	1,800
350	25	53	99	203	305	587	935	1,650
400	23	49	92	189	283	546	870	1,540

- ALL GAS PIPING DOWNSTREAM OF PRESSURE REGULATOR SHALL BE SIZED PER 2012 IFGC TABLE 402.4(2).
- GAS METERS TO BE ACCESSIBLE. INSTALL AUTOMATIC EARTHQUAKE SHUT-OFF VALVE & REGULATOR AS REQUIRED.
- GAS SHUT-OFF VALVES & PRESSURE REGULATORS TO BE EASILY ACCESSIBLE.
- GAS METER LOCATIONS VARY. PLUMBING CONTRACTOR TO COORDINATE GAS PIPE ROUTING FROM GAS METERS TO ANY STEP-DOWN PRESSURE REGULATORS.

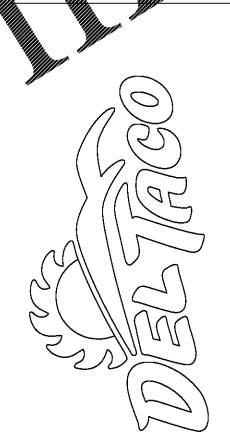
- ### PLUMBING SPECIFICATIONS
- PART 1: GENERAL**
- 1.1 SCOPE
- SANITARY SOIL, WASTE AND VENT.
 - DOMESTIC HOT AND COLD WATER.
 - ALL PLUMBING FIXTURES, VALVES, TRAPS, CLEANOUTS, ETC AS REQUIRED FOR A COMPLETE INSTALLATION.
 - CONNECTION TO EXISTING SANITARY SEWER, VENT AND DOMESTIC COLD WATER LINES AS REQUIRED.
- 1.2 REFERENCED PUBLICATIONS
- THE SELECTION AND DESIGN OF THE PLUMBING SYSTEMS FOR THIS PROJECT SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED EDITION, FOLLOWING REFERENCE STANDARDS AND REFER TO PIPE MATERIAL SCHEDULES.
- ANSI/ASME B16.22 WROUGHT COPPER AND BRONZE SOLDER-JOINT PRESSURE FITTINGS.
 - ANSI/ASME B16.29 WROUGHT COPPER AND WROUGHT COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS - DWV.
 - ANSI/ASTM A47 MALLEABLE IRON CASTINGS.
 - ASTM A74 CAST IRON SOIL PIPE AND FITTINGS.
 - ASTM B88 SEAMLESS COPPER WATER TUBE.
 - ASTM B306 COPPER DRAINAGE TUBE - DWV.
 - ASTM C564 RUBBER GASKETS FOR CAST IRON SOIL PIPE AND FITTINGS.
 - AWWA C601 STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTE WATER.
 - CISPI 301 CAST IRON SOIL PIPE AND FITTINGS FOR HUBLESS CAST IRON SANITARY SYSTEMS.
 - CISPI 310 JOINTS FOR HUBLESS CAST IRON SANITARY SYSTEMS.
 - FED SPEC. WW-V-368(1) VALVE, BALL.
 - MSS SP-80 BRONZE GATE, GLOBE, ANGLE AND CHECK VALVE.
- 1.3 APPLICABLE CODES
- 2012 INTERNATIONAL BUILDING CODE.
 - 2012 INTERNATIONAL PLUMBING CODE.
 - 2012 INTERNATIONAL FIRE CODE.
 - 2012 INTERNATIONAL MECHANICAL CODE.
 - 2009 INTERNATIONAL ENERGY CONSERVATION CODE.
- 1.4 PERMITS AND INSPECTIONS
- UNLESS OTHERWISE DISTINCTLY HEREINAFTER SPECIFIED, THIS CONTRACTOR SHALL APPLY AND PAY FOR ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ANY AUTHORITY HAVING JURISDICTION.
- 1.5 SURVEY OF SITE
- BEFORE SUBMITTING PROPOSALS FOR THIS WORK, EACH BIDDER SHALL BE FAMILIAR WITH PLANS AND SPECIFICATIONS AND SHALL HAVE EXAMINED THE PREMISES AND UNDERSTOOD THE CONDITIONS UNDER WHICH HE/SHE WILL BE OBLIGED TO OPERATE IN PERFORMING THIS CONTRACT. NO ALLOWANCE WILL BE MADE SUBSEQUENTLY IN THE CONNECTIONS ON BEHALF OF THE CONTRACTOR FOR ANY ERROR THROUGH NEGLIGENCE ON HIS/HER PART.
- 1.6 MATERIAL AND WORKMANSHIP
- GENERAL IN CONFORMITY WITH LOCAL BUILDING CODE AND LEGALLY CONSTITUTED BODIES HAVING JURISDICTION.
 - MATERIALS SHALL BE NEW AND IN PERFECT CONDITION. MATERIAL FOR SIMILAR USES SHALL BE OF SAME TYPE AND MANUFACTURER.
 - WORKMANSHIP: BEST STANDARD PRACTICE OF THE TRADE.
 - WORK IN FINISHED SPACES: TRIM, FITTING AND PIPE SHALL BE CHROMIUM PLATED.
 - BEFORE STARTING WORK, CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING LINES AFFECTED BY THE CONTRACT.

- 1.7 SUBMITTALS
- SUBMITTALS ARE REQUIRED ON EVERY ITEM AND SHALL BE FURNISHED WHETHER OR NOT IT IS THE SPECIFIED ITEM.
 - SIX (6) BOUND COPIES OF EACH SHOP DRAWING, INDICATING PROPOSED LAYOUT, MATERIAL LISTS AND/OR PLATES OR BROCHURES OF MATERIALS AND EQUIPMENT SPECIFIED HEREIN SHALL BE PREPARED AND SUBMITTED TO THE ENGINEER FOR REVIEW WITHIN FIFTEEN (15) DAYS AFTER AWARD OF CONTRACT. NO WORK INDICATED ON ANY ONE SHOP DRAWING SHALL BE STARTED UNTIL SUCH DRAWING HAVE BEEN REVIEWED AND APPROVED BY THE ENGINEER.
 - RECORD DRAWINGS: TWO (2) COMPLETE SETS OF "AS-BUILTS" AND SIX (6) SETS OF OPERATING INSTRUCTIONS SHALL BE RETURNED TO THE OWNER.
- 1.8 GUARANTEE
- ALL MATERIALS PROVIDED AND INSTALLED UNDER THESE SECTION SHALL BE GUARANTEED IN ACCORDANCE WITH THE GENERAL CONDITIONS. SHOULD ANY TROUBLE OR MALFUNCTIONS DEVELOP DURING THIS PERIOD DUE TO DEFECTIVE MATERIALS OR FAULTY WORKMANSHIP, THE CONTRACTOR WILL BE HELD LIABLE AND SHALL FURNISH LABOR, MATERIALS AND EQUIPMENT NECESSARY TO CORRECT THE TROUBLE OR MALFUNCTION AT NO COST. ALL DEFECTIVE MATERIALS OR INFERIOR WORKMANSHIP NOTICED DURING THE TIME OF INSTALLATION SHALL BE CORRECTED IMMEDIATELY TO THE ENTIRE SATISFACTION OF THE ARCHITECT AND OWNER. THE GUARANTEE SHALL BE A WRITTEN ONE YEAR TERM.
- PART 2: MATERIALS**
- 2.1 PIPE AND FITTINGS
- SANITARY WASTE AND VENT: NO-HUB SERVICE WEIGHT CAST IRON SOILPIPE AND FITTINGS ASTM (A74) WITH APMO LISTED COUPLINGS.
 - DOMESTIC COLD WATER: ASTM B88, TYPE L, HARD DRAWN COPPER TUBING, FITTINGS: ANSI/ASME B16.22C, WROUGHT COPPER.
 - PLUMBING CONTRACTOR TO FOLLOW CBCO 1220, CPC 301, 701.
- 2.2 PIPE HANGERS AND SUPPORT
- SWIVEL LOOP HANGERS: 1/2" HANGER COUPLER NO. 101 FOR COPPER TUBING.
 - PIPE ISOLATION: 1" X 1" CUR STRUT AND HANGER COVER, 83, ISOLATOR COUPLER NO. 101.
 - CLEVIS HANGER: 1/2" X 1/2" HANGER COUPLER NO. 405 FOR CAST IRON PIPE.
 - PROVIDE CLAMPS, HANGER RODS AND ATTACHMENTS AS REQUIRED.
- 2.3 INSULATION
- ALL HOT AND CONDENSATE PIPE SHALL BE INSULATED PER TITLE 24 REQUIREMENTS. INSULATION SHALL HAVE A FLAME SPREAD NOT TO EXCEED 25. REFER TO PIPE SCHEDULE AND TABLE 120.3-A PIPE INSULATION THICKNESS SCHEDULE.
- 2.4 PLUMBING FIXTURES AND ACCESSORIES
- GENERAL: PROVIDE ALL FIXTURES WITH ANGLE STOPS ON WATER SERVICES. CHROME PLATE ALL EXPOSED METAL ITEMS. PROVIDE SUPPORTS FOR FIXTURES.
 - PLUMBING FIXTURES: SEE PLUMBING FIXTURE SCHEDULE.
- PART 3: INSTALLATION AND TESTING**
- 3.0 INSTALLATION
- PROVIDE A COMPLETE DWV, SANITARY, DOMESTIC COLD AND HOT WATER SYSTEM INSTALLATION FOR THE PLUMBING FIXTURES.
 - INSTALL WATER HAMMER ARRESTERS PER PDI WH-201 IN THE DOMESTIC WATER PIPING SYSTEM.
 - SELECTION AND FABRICATION OF PIPE HANGERS AND SUPPORTS SHALL CONFORM TO MSS SP-58.
 - PROVIDE LOOSE KEY STOPS AND SUPPLIES FOR LAVATORIES. CONSTRUCT PIPE LINES OF FULL LENGTH SECTIONS OF PIPE SPECIFIED. SHORT SECTIONS ALLOWED ONLY WHEN RUN REQUIRES LESS THAN ONE FULL LENGTH OF PIPE.

- MAKE UP JOINTS WITH INSIDE SMOOTH AND UNOBSTRUCTED. THOROUGHLY REAM CUT PIPE ENDS TO REMOVE ALL BURRS. INSPECT PIPE AND FITTINGS AND REMOVE OBSTRUCTIONS PRIOR TO FABRICATIONS. REMAKE LEAKY CONNECTIONS WITH NEW MATERIALS. THE USE OF THREAD CEMENT OR CAULKING TO MAKE JOINTS TIGHT IS PROHIBITED.
 - CONCEAL PIPING IN FINISHED PORTIONS OF BUILDING. PIPING TO CLEAR STRUCTURAL MEMBERS AND OBSTRUCTIONS.
 - MAKE PLATED, POLISHED OR ENAMELED CONNECTIONS WITH SPECIAL CARE. ALLOW NO TOOL MARKS OR THREADS TO SHOW.
 - INSTALL HORIZONTAL SANITARY AND DRAINAGE PIPING TO A UNIFORM GRADE OF 1/4 INCH PER FOOT MINIMUM.
 - IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE AN ADEQUATE PIPE SUSPENSION SYSTEM IN ACCORDANCE WITH RECOGNIZED ENGINEERING PRACTICES. USING, WHERE POSSIBLE, STANDARD COMMERCIALY ACCEPTED PIPE HANGERS AND ACCESSORIES. ALL PIPE HANGERS AND SUPPORTS SHALL CONFORM TO THE LATEST REQUIREMENTS OF THE ANSI CODE FOR BUILDING SERVICE PIPING, B31.9. WHERE THERMAL MOVEMENT IN THE PIPE LINE WILL OCCUR, THE PIPE HANGER ASSEMBLY MUST BE CAPABLE OF SUPPORTING THE LINE IN ALL OPERATING CONDITIONS.
 - AIR CHAMBERS 24 INCHES LONG SHALL BE INSTALLED AT THE APPLY TO EACH PLUMBING FIXTURE. PIPE SIZES LARGE THAN 1/2" THE FIXTURE SUPPLY UNLESS A WATER HAMMER ARRESTER IS PROVIDED FOR THE HEADER.
- 3.1 STERILIZATION
- STERILIZATION SYSTEMS WITH CHLORINE BEFORE ACCEPTED FOR OPERATION. CONTRACTOR SHALL FURNISH SHUT-OFF VALVE AND OPERATOR STOP OR OTHER MEANS OF STOPPING CHLORINE.
- THE MINIMUM DOSE OF CHLORINE SHALL BE 50 PARTS PER MILLION. ALLOWING TO BE FOLLOWED. ALLOW A CONTACT PERIOD OF NOT LESS THAN 30 MIN. AND THEN FLUSH SYSTEM WITH CLEAN WATER UNTIL THE RESIDUAL CONTENT IS NOT GREATER THAN 0.5 PARTS PER MILLION. FLUSH ENTIRE SYSTEM INCLUDING ALL FIXTURE OUTLETS, DEAD ENDS, AND OTHER POINTS WHERE DEAD WATER TENDS TO COLLECT. OPEN AND CLOSE ALL VALVES SEVERAL TIMES DURING CONTACT PERIOD.
 - FURNISH TWO COPIES OF A CERTIFICATE OF PERFORMANCE OF COMPLETE STERILIZATION TO THE ARCHITECT BEFORE FINAL INSPECTION OF THE WORK. THIS SHALL BE PERFORMED UNDER THE SUPERVISION OF AND CERTIFIED BY A CHEMICAL ENGINEER REGISTERED IN THE STATE OF CALIFORNIA.
- ALL WATER PIPING SHALL BE THOROUGHLY FLUSHED PRIOR TO THE STERILIZATION. ALL STRAINERS, AERATORS, FLOW CONTROL DEVICES SHALL BE REMOVED PRIOR TO FLUSHING THE SYSTEM AND REINSTALLED AFTER THE FLUSHING IS COMPLETE. EVERY WATER OUTLET, HOT AND COLD SHALL BE OPENED AND FLUSHED WITH WATER UNTIL CLEAR. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY VALVES AND FITTINGS FOR THE STERILIZATION. STERILIZE PER APPROVED FEDERAL AND/OR AWWA PROCEDURES STD C65-1-86.
- 3.2 TESTS
- DOMESTIC WATER SYSTEM: TEST PIPING HYDROSTATICALLY AND PROVE TIGHT UNDER A WATER PRESSURE NOT LESS THAN THE WORKING PRESSURE NOT LESS THAN THE WORKING PRESSURE UNDER WHICH IT IS TO BE USED.
 - SANITARY, WASTE AND VENT SYSTEM: PERFORM A HYDROSTATIC TEST ON SYSTEM EQUAL TO NOT LESS THAN TEN FEET OF WATER FOR A PERIOD OF NOT LESS THAN 15 MINUTES (UPC SECTION 712.2).
 - PLUMBING FIXTURES SHALL BE FILLED WITH WATER AND CHECKED FOR LEAKS AND RETARDED DRAINAGE FLOW. FAUCET AERATORS SHALL BE REMOVED AND CLEANED THOROUGHLY.

SERVICE	LOCATION	MATERIAL
DOMESTIC WATER	COLD WATER	TYPE 'L' HARD DRAWN COPPER TUBING ASTM B88, WITH WROUGHT COPPER SWEAT FITTINGS, ANSI B16.22. WITH 1" THICK MANVILLE MICRO-LOK HP INSULATION, LEAD FREE SOLDER, AND 8 FT/S MAX. VELOCITY.
	BELOW GRADE	TYPE 'K' SOFT ANNEALED COPPER ENCASED WITHIN A MINIMUM OF 10 MIL POLYETHYLENE PLASTIC SLEEVE SEALED WATER TIGHT WITH POLYVINYL CHLORIDE TAPE.
	HOT WATER	TYPE 'L' HARD DRAWN COPPER TUBING ASTM B88, WITH WROUGHT COPPER SWEAT FITTINGS, ANSI B16.22. WITH 1" THICK MANVILLE MICRO-LOK HP INSULATION, LEAD FREE SOLDER, AND 5 FT/S MAX. VELOCITY.
SANITARY WASTE	ABOVE FLOOR	NO-HUB CAST IRON PIPE AND FITTINGS, ASPHALTUM COATED, ASTM A-888 OR ASTM A-74 WITH HUSKY SD-4000 HEAVY DUTY 4 BAND STAINLESS STEEL COUPLINGS. ALTERNATE MATERIAL: PVC SCHEDULE 40 CONFORMING TO ASTM D2665 WHERE SPECIFICALLY PERMITTED BY A.H.J.
	BELOW GRADE	NO-HUB CAST IRON PIPE AND FITTINGS, ASPHALTUM COATED, ASTM A-888 OR ASTM A-74 WITH HUSKY SD-4000 HEAVY DUTY 4 BAND STAINLESS STEEL COUPLINGS. ALTERNATE MATERIAL: PVC SCHEDULE 40 CONFORMING TO ASTM D2665 WHERE SPECIFICALLY PERMITTED BY A.H.J.
SANITARY VENT	ABOVE FLOOR	NO-HUB CAST IRON PIPE AND FITTINGS, ASPHALTUM COATED, ASTM A-888 OR ASTM A-74 WITH ANACO STANDARD DUTY 2 BAND STAINLESS STEEL COUPLINGS, CISPI-310 AND ASTM C-564. ALTERNATE MATERIAL: PVC SCHEDULE 40 CONFORMING TO ASTM D2665 WHERE SPECIFICALLY PERMITTED BY A.H.J.
	BELOW GRADE	NO-HUB CAST IRON PIPE AND FITTINGS, ASPHALTUM COATED, ASTM A-888 OR ASTM A-74 WITH ANACO STANDARD DUTY 2 BAND STAINLESS STEEL COUPLINGS, CISPI-310 AND ASTM C-564. ALTERNATE MATERIAL: PVC SCHEDULE 40 CONFORMING TO ASTM D2665 WHERE SPECIFICALLY PERMITTED BY A.H.J.
CONDENSATE / INDIRECT WASTE DRAIN	WITHIN BUILDING	TYPE 'L' HARD DRAWN COPPER TUBING ASTM B88, WITH WROUGHT COPPER SWEAT FITTINGS, ANSI B16.22. WITH 1" THICK MANVILLE MICRO-LOK HP INSULATION.
CORROSION PROTECTION	BELOW GRADE	ALL METALLIC PIPING SHALL BE ENCASED WITH 10 MIL MINIMUM POLYETHYLENE PLASTIC SLEEVE. ALL FITTINGS, VALVES, ETC. THAT ARE NOT ABLE TO BE ENCASED WITHIN SLEEVE SHALL BE PROVIDED A HEAVY COAT OF "HENRY'S" OIL BASE ROOF MASTIC OVER ENTIRE SURFACE AND WRAPPED ENTIRE COMPONENT BY 10 MIL FERIGUSON POLYETHYLENE WRAP WITH OVERLAPPED 50% OF THE CIRCUMFERENCE. SECURE ENDS AND SEAMS BY 3M SCOTCH, 10 MIL, 2" WIDE PIPE WRAP SEALING TAPE.
NATURAL GAS	WITHIN BUILDING	BLACK STEEL SCHEDULE 40. PROVIDE WEATHER PROOF COATING ON ALL EXPOSED GAS PIPING IN ORDER TO PROTECT FROM CORROSION.

- LEAD FREE ORDINANCE**
- ALL MATERIALS, DEVICES, SOLDER, FLUX, ETC. INSTALLED IN THE DOMESTIC HOT AND COLD WATER SYSTEMS SHALL COMPLY WITH 2012 INTERNATIONAL PLUMBING CODE SECTION 605.2.



DO NOT SCALE DRAWINGS CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS - NOTIFY ARCHITECT OF ANY DISCREPANCIES PRIOR TO BEGINNING CONSTRUCTION



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NO | REVISION

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