

PLUMBING DEMO NOTES

- PROJECT CONDITIONS
  - THE CONTRACTOR SHALL COMPLETELY FAMILIARIZE THEMSELF WITH ALL EXISTING BUILDING AND SITE CONDITIONS AND LIMITATIONS WHICH MAY HAVE A BEARING ON THE OPERATIONS HEREIN SPECIFIED. AND SHALL INCLUDE ALL WORK REQUIRED TO COMPLETE THE PROJECT AS SHOWN ON THE DRAWINGS. NO EXTRA COMPENSATION WILL BE ALLOWED FOR UNFORESEEN CONDITIONS THAT CAN BE DETERMINED FROM A CAREFUL EXAMINATION OF THE SITE AND AREAS TO BE RENOVATED.
  - ITEMS OF VALUE WHICH ARE NOT INDICATED TO BE RETURNED TO THE OWNER, SHALL BECOME THE PROPERTY OF THE CONTRACTOR. STORAGE OR SALE OF ITEMS ON THE PROJECT SITE IS PROHIBITED.
  - PROTECTION: ENSURE THE SAFE PASSAGE OF PERSONS IN AND AROUND THE BUILDING DURING DEMOLITION. PREVENT INJURY TO PERSONS AND DAMAGE TO PROPERTY. PROVIDE ADEQUATE SHORING AND BRACING TO PREVENT COLLAPSE. IMMEDIATELY REPAIR DAMAGED PROPERTY TO THE CONDITION BEFORE BEING DAMAGED. TAKE EFFECTIVE MEASURES TO PREVENT DUST MIGRATION. KEEP UTILITIES IN SERVICE AND PROTECT FROM DAMAGE. DO NOT INTERRUPT UTILITIES SERVING USED AREAS WITHOUT FIRST OBTAINING PERMISSION.
  - UTILITIES: MAINTAIN ALL UTILITIES EXCEPT THOSE REQUIRING REMOVAL OR RELOCATION. KEEP UTILITIES IN SERVICE AND PROTECT FROM DAMAGE. DO NOT INTERRUPT UTILITIES SERVING USED AREAS WITHOUT FIRST OBTAINING PERMISSION FROM THE OWNER. PROVIDE TEMPORARY SERVICES AS REQUIRED. COORDINATE ALL WORK WITH OWNER.
  - ALL WORK MUST BE COORDINATED WITH OWNER PRIOR TO ANY COMMENCEMENT OF WORK.
- SCOPE OF WORK
  - PERFORM WORK AND PROVIDE MATERIAL AND EQUIPMENT AS SHOWN ON DRAWINGS AND AS SPECIFIED IN THIS SECTION OF SPECIFICATIONS. GIVE NOTICES, FILE PLANS, OBTAIN PERMITS FROM AUTHORITIES THAT HAVE JURISDICTION AS REQUIRED TO 'PERFORM WORK' IN ACCORDANCE WITH ALL LEGAL REQUIREMENTS AND WITH SPECIFICATIONS AND DRAWINGS.
- REGULATORS REQUIREMENTS
  - STRICTLY COMPLY WITH APPLICABLE CODES, REGULATIONS AND REQUIREMENTS OF AUTHORITY HAVING JURISDICTION.
- HANDLING OF MATERIALS
  - REMOVE ALL MATERIAL DEBRIS FROM THE SITE AS IT ACCUMULATES. DO NOT STORE, SELL, BURN, OR OTHERWISE DISPOSE OF DEBRIS ON SITE. REMOVE ALL MATERIALS IN SUCH MANNER AS TO PREVENT SPILLAGE. KEEP ALL PAVEMENTS AND AREAS ADJACENT TO AND LEADING FROM THE SITE, CLEAN AND FREE OF MUD, DIRT, AND DEBRIS AT ALL TIMES.
- TRANSFER OF RESPONSIBILITY AND DISPOSITION OF MATERIALS
  - UPON RECEIPT OF NOTICE TO PROCEED WITH THE WORK, THE TITLE TO ALL MATERIALS FOR DEMOLITION SHALL BE VESTED IN THE CONTRACTOR WHEREUPON THE OWNER WILL NOT BE RESPONSIBLE FOR THE CONDITION, LOSS, OR DAMAGE TO SAID PROPERTY. ALL SUCH ITEMS SHALL BE REMOVED FROM THE OWNER'S PROPERTY.
- CLEAN-UP AND REPAIR
  - UPON COMPLETION OF DEMOLITION WORK, REMOVE TOOLS, EQUIPMENT AND DEMOLISHED MATERIALS FROM SITE. REMOVE PROTECTION AND LEAVE INTERIOR AREAS BROOM CLEAN.
  - REPAIR DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED. RETURN STRUCTURES AND SURFACES TO EXISTING CONDITION PRIOR TO COMMENCEMENT OF SELECTIVE DEMOLITION WORK. REPAIR ADJACENT CONSTRUCTION OR SURFACES SOILED OR DAMAGED BY SELECTIVE DEMOLITION WORK.

PLUMBING GENERAL NOTES

- GENERAL NOTES, SYMBOLS LIST AND DETAILS ARE APPLICABLE TO ALL PLUMBING DRAWINGS.
- DRAWINGS ARE DIAGRAMMATIC DETERMINE LOCATIONS OF SYSTEMS AND COMPONENTS IN FIELD.
- DIMENSIONS SHOWN ON PLAN ARE HORIZONTAL. DIMENSIONS IN ELEVATION ARE VERTICAL.
- DETERMINE EXACT LOCATIONS OF EXISTING UTILITIES IN FIELD, WHETHER OR NOT SHOWN ON DRAWINGS. EXERCISE CAUTION AND IDENTIFY LOCATIONS OF UNMARKED UTILITY LINES AS NECESSARY TO PERFORM THIS WORK.
- ALL PLUMBING WORK SHALL BE IN ACCORDANCE WITH THE MASSACHUSETTS STATE PLUMBING CODE AND APPLICABLE LOCAL CODES.
- IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO COORDINATE THE WORK WITH THAT OF ALL OTHER TRADES, INCLUDING BUT NOT LIMITED TO, ELECTRICAL, HVAC, PROCESS PIPING, SPRINKLER, STRUCTURAL AND GENERAL ARCHITECTURE.
- ANY INTERFERENCE SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE, AND SHALL BE RESOLVED PRIOR TO THE INSTALLATION OF THE WORK.
- ALL PIPING PENETRATING CEILINGS AND WALLS SHALL BE INSTALLED WITH ESCUTCHEONS AT THE PENETRATION. ALL PIPING PENETRATING EXTERIOR WALLS AND ROOFS SHALL BE FLASHED IN AN APPROVED MANNER AND SHALL BE SEALED WEATHERTIGHT. PIPING PENETRATING FIRE RATED ASSEMBLIES SHALL BE PROVIDED WITH FIRE RATED SEALS AS REQUIRED BY LOCAL CODE AUTHORITY.
- MANUFACTURER'S MODEL NUMBERS ARE SPECIFIED SOLELY TO ESTABLISH STANDARD OF QUALITY FOR PERFORMANCE AND MATERIALS.
- INSTALLATION SHALL ADHERE TO MANUFACTURER'S RECOMMENDATIONS.
- PROVIDE ACCESS PANELS TO SYSTEM COMPONENTS THAT ARE CONCEALED AND REQUIRE PERIODIC SERVICE.
- TOPS OF ALL FLOOR DRAINS SHALL BE SET FLUSH WITH FINISHED FLOOR. ALL PIPING ABOVE GRADE SHALL BE PROPERLY SUPPORTED BY THE BUILDING STRUCTURE AND SHALL NOT REST ON CEILING STRUCTURE OR COMPONENTS.
- ALL PLUMBING EQUIPMENT, PIPING, INSULATION, ETC., INSTALLED IN HVAC PLENUM SPACES SHALL MEET ALL CODE REQUIREMENTS FOR SMOKE AND COMBUSTIBILITY.
- PROVIDE SHUTOFF VALVES ON ALL BRANCH PIPING AND ON ALL SUPPLIES TO INDIVIDUAL FIXTURES AND EQUIPMENT. PROVIDE BALL VALVES ON ALL WATER MAIN BRANCHES IN CORRIDORS AND WHERE INDICATED ON DRAWINGS.
- PROVIDE CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING.
- PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.
- PROVIDE GAUGE FITTINGS AND THERMOMETER WELLS AT HOT WATER SUPPLY AND RETURN BRANCHES AND AT PUMP INLETS AND OUTLETS.
- VERIFY EXACT SIZES, LOCATIONS, INVERTS AND ELEVATIONS PRIOR TO INSTALLING ANY PIPING. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS OF ALL FIXTURES AND EQUIPMENT.

### PIPING SYSTEMS

	ETR	LIGHT LINE INDICATES EXISTING PIPE TO REMAIN
	RE	REMOVE EXISTING
	CTE	CONNECT TO EXISTING
	C & C	CUT & CAP
	CW	COLD WATER
	HW	HOT WATER
	HWC	HOT WATER RECIRCULATION
	NCW	NON-POTABLE COLD WATER
	NHW	NON-POTABLE HOT WATER
	NHWC	NON-POTABLE HOT WATER RECIRCULATION
	TW	TEMPERED WATER
	TWR	TEMPERED WATER RECIRCULATION
	S or W	SOIL OR WASTE
	V	VENT
	RW	STORM/CONDUCTOR
	CWW	CLEAR WATER WASTE
	CWV	CLEAR WATER VENT
	LW	LABORATORY WASTE
	LV	LABORATORY VENT
	G	NATURAL GAS
	GTV	GAS TRAIN OR APPLIANCE OR REGULATOR VENT
	IW	INDIRECT WASTE
	UIW	INDIRECT WASTE BELOW FLOOR
	PD	PUMPED DISCHARGE
	LPD	LABORATORY WASTE PUMPED DISCHARGE
	CA	COMPRESSED AIR
	CO2	CARBON DIOXIDE (GASEOUS)
	CDA	CLEAN DRY (PROCESS) AIR
	IV	INERT GAS VENT
	N2	NITROGEN (GASEOUS)
	N2Q	PROCESS NITROGEN (GASEOUS)
	VAC	VACUUM
	VC	HOUSE VACUUM
	PWS	PURIFIED (USP) WATER SUPPLY
	PWR	PURIFIED (USP) WATER RETURN
	RO	REVERSE OSMOSIS DEIONIZED (PURE) WATER

### PLUMBING LEGEND

#### PIPING SPECIALTIES

	SOV	SHUT-OFF VALVE
	BV	BALANCING VALVE
	PRV	PRESSURE REDUCING VALVE
	SV	SOLENOID VALVE
	CV	CONTROL VALVE
	VIV	VALVE IN VERTICAL
	CV	CHECK VALVE
	DV	HOSE END DRAIN VALVE
	DV	DIAPHRAGM VALVE (NORMALLY OPEN)
	DV	DIAPHRAGM VALVE (NORMALLY CLOSED)
	BWV	BACKWATER VALVE
	W & T	WASTE & TRAP
	OED	OPEN END DRAIN W/TRAP
	CO	CLEANOUT PLUG
	FCO	FLUSH FLOOR CLEANOUT
	UNION	UNION
	SL	SLEEVE
		CAPPED PIPE
	SA'A'	WATER HAMMER ARRESTOR & TYPE
	TP	AUTOMATIC TRAP PRIMER
		STRAINER
	HB	HOSE BIBB
	ES	EMERGENCY SHOWER
	ESEW	EMERGENCY SHOWER EYEWASH COMBINATION UNIT
	EW	EYEWASH

#### PLUMBING ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
AIP	ABANDON IN PLACE
CFOI	CONTRACTOR FURNISHED/OWNER INSTALLED
CWVTR	CLEAR WATER VENT THRU ROOF
DF	DRINKING FOUNTAIN
EC	ELECTRICAL CONTRACTOR
EW	ELECTRIC WATER COOLER
F & I	FURNISH & INSTALL
FFE	FINISHED FLOOR ELEVATION
FPC	FIRE PROTECTION CONTRACTOR
GC	GENERAL CONTRACTOR
GTVTR	GAS TRAIN VENT THRU ROOF
HVAC	HVAC CONTRACTOR
HWCR	HOT WATER RECIRCULATION RISER
HWR	HOT WATER RISER
INV	INVERT
LAV	LAVATORY
LPC	LIMIT OF PLUMBING CONTRACT
LVS	LABORATORY VENT STACK
LVTR	LABORATORY VENT THRU ROOF
LWS	LABORATORY WASTE STACK
MSB	MOP SERVICE BASIN
NC	NORMALLY CLOSED
NIPC	NOT IN PLUMBING CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OFCI	OWNER FURNISHED/CONTRACTOR INSTALLED
OFI	OWNER FURNISHED & INSTALLED
PC	PLUMBING CONTRACTOR
S=01	SLOPE = 1/8" PER FOOT
S=02	SLOPE = 1/4" PER FOOT
S=04	SLOPE = 1/2" PER FOOT
SH	SHOWER
SK	SINK
SS	SOIL STACK
SSK	SERVICE SINK
TYP	TYPICAL
UR	URINAL
VS	VENT STACK
VTR	VENT THRU ROOF
WC	WATER CLOSET
WS	WASTE STACK

### MISCELLANEOUS

	ARROW INDICATES DIRECTION OF FLOW
	ARROW INDICATES DIRECTION OF SLOPE DOWN
	RISER DESIGNATION
	CAPPED CONNECTION - TOP DENOTES SIZE (IN.) BOTTOM DENOTES SERVICE TYPE
	DETAIL DESIGNATION - TOP DENOTES DETAIL NUM. BOTTOM DENOTES DETAIL DRAWING
	FD'A' FLOOR DRAIN & TYPE
	REDUCED PRESSURE BACKFLOW PREVENTER
	T THERMOMETER
	EXPANSION LOOP
	PRESSURE GAUGE WITH ISOLATION VALVE
	TEMPERATURE & PRESSURE RELIEF VALVE
	VACUUM RELIEF VALVE

INSULATION SHIELD SCHEDULE		
PIPE SIZE	DIM. A	GA. OF STEEL
UP TO 4"	12"	18
5" & 6"	18"	18
ABOVE 6"	24"	14

FIXTURE TRIM FITTINGS SCHEDULE						
SYMBOL	MANUFACTURER	SERVICE	INDEXING	BUTTON COLOR	LETTERING COLOR	REMARKS
T-1	ASAHI-AMERICA	PURE WATER	RODI	WHITE	BLACK	CUSTOM, EXPOSED ZERO STATIC VALVE. DROP CONTINUOUS LOOP ON UMBILICAL/WALL & EXTEND FAUCET TO DISCHARGE OVER SINK. FIELD ADJUST LENGTH AS NEEDED.

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Issued for  
Construction

No.	Description	Date

VERTEX  
PHARMACEUTICALS  
LEVEL 1 TABLET  
COATER SYSTEM

DRAWING NAME:  
**PLUMBING LEGEND & GENERAL NOTES**

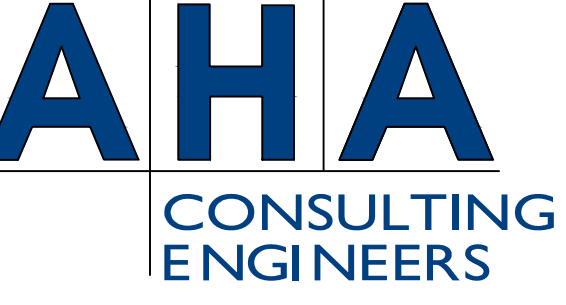
Project Number: M0684-003.00  
Date: 08/30/16  
Drawn By: C.P.C.  
Checked By: C.P.C.

P0.01

Scale: N/A

PLUMBING SPECIFICATIONS

1. GENERAL
A. BEFORE SUBMITTING BID, VISIT AND CAREFULLY EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT WORK OF THIS SECTION. NO EXTRA PAYMENT WILL BE ALLOWED FOR ADDITIONAL WORK CAUSED BY UNFAMILIARITY WITH SITE CONDITIONS THAT ARE VISIBLE OR READILY CONSTRUED BY EXPERIENCED OBSERVER.
B. PERFORM WORK AND PROVIDE MATERIAL AND EQUIPMENT FOR SYSTEMS SHOWN ON DRAWINGS AND AS SPECIFIED IN THIS SECTION. COMPLETELY COORDINATE WORK OF THIS SECTION WITH WORK OF OTHER SECTIONS AND PROVIDE COMPLETE AND FULLY FUNCTIONAL INSTALLATION. DRAWINGS AND SPECIFICATIONS FORM COMPLEMENTARY REQUIREMENTS, PROVIDE WORK SPECIFIED AND NOT SHOWN, AND WORK SHOWN AND NOT SPECIFIED AS THOUGH EXPRESSLY REQUIRED BY BOTH.
C. PERFORM WORK STRICTLY AS REQUIRED BY RULES, REGULATIONS, STANDARDS, CODES, ORDINANCES, AND LAWS OF LOCAL, STATE, AND FEDERAL GOVERNMENTS, AND OTHER AUTHORITIES THAT HAVE LAWFUL JURISDICTION.
D. MATERIALS AND EQUIPMENT SHALL BE LISTED BY UNDERWRITERS LABORATORIES (UL), AND APPROVED BY ASME AND AGA FOR INTENDED SERVICE.
E. ON JANUARY 4, 2014, THE 'REDUCTION OF LEAD IN DRINKING WATER ACT' BECOMES EFFECTIVE NATIONWIDE. THIS AMENDMENT TO THE 1974 SAFE DRINKING WATER ACT REDUCES THE ALLOWABLE LEAD CONTENT OF DRINKING WATER PIPES, PIPE FITTINGS AND OTHER PLUMBING FIXTURES. SPECIFICALLY, AS OF JANUARY 4, 2014, IT SHALL BE ILLEGAL TO INSTALL PIPES, PIPE FITTINGS, AND OTHER PLUMBING FIXTURES THAT ARE NOT 'LEAD FREE.' 'LEAD FREE' IS DEFINED AS RESTRICTING THE PERMISSIBLE LEVELS OF LEAD IN THE WETTED SURFACES OF PIPES, PIPE FITTINGS, OTHER PLUMBING FITTINGS AND FIXTURES TO A WEIGHTED AVERAGE OF NOT MORE THAN 0.25%. THIS NEW REQUIREMENT DOES NOT APPLY TO PIPES, PIPE FITTINGS, PLUMBING FITTINGS OR FIXTURES THAT ARE USED EXCLUSIVELY FOR NON-POTABLE SERVICES SUCH AS MANUFACTURING, INDUSTRIAL PROCESSING, IRRIGATION, OUTDOOR WATERING, OR ANY OTHER USES WHERE WATER IS NOT ANTICIPATED TO BE USED FOR HUMAN CONSUMPTION. THE LAW ALSO EXCLUDES TOILETS, BIDETS, URINALS, FILL VALVES, FLUSHOMETER VALVES, TUB FILLERS, SHOWER VALVES, SERVICE SADDLES, OR WATER DISTRIBUTION MAIN GATE VALVES THAT ARE 2 INCHES IN DIAMETER OR LARGER.
2. GUARANTEE
A. GUARANTEE WORK OF THIS SECTION IN WRITING FOR ONE YEAR FROM DATE OF OWNERS ACCEPTANCE OF CERTIFICATE OF SUBSTANTIAL COMPLETION. REPAIR OR REPLACE DEFECTIVE MATERIALS, EQUIPMENT, WORKMANSHIP AND INSTALLATION THAT DEVELOP WITHIN THIS PERIOD, PROMPTLY AND TO OWNER'S SATISFACTION AND CORRECT DAMAGE CAUSED IN MAKING NECESSARY REPAIRS AND REPLACEMENTS UNDER GUARANTEE WITHIN CONTRACT PRICE.
3. SCOPE OF WORK
A. PERFORM WORK AND PROVIDE MATERIAL AND EQUIPMENT AS SHOWN ON DRAWINGS AND AS SPECIFIED IN THIS SECTION OF SPECIFICATIONS. GIVE NOTICES, FILE PLANS, OBTAIN PERMITS FROM AUTHORITIES THAT HAVE JURISDICTION AS REQUIRED TO PERFORM WORK IN ACCORDANCE WITH ALL LEGAL REQUIREMENTS AND WITH SPECIFICATIONS AND DRAWINGS.
B. NEW SCOPE OF WORK SHALL INCLUDE BUT SHALL NOT BE LIMITED TO THE FOLLOWING:
- NEW HOT AND COLD (POTABLE & NON-POTABLE) WATER PIPING INCLUDING CONNECTIONS TO EXISTING SYSTEM
- NEW EMERGENCY (TEPID) WATER PIPING SYSTEM
- NEW REVERSE OSMOSIS DEIONIZED (RO) WATER PIPING SYSTEM
- NEW LABORATORY WASTE AND VENT PIPING INCLUDING CONNECTIONS TO EXISTING WASTE SYSTEM
- NEW PROCESS COMPRESSED AIR SYSTEM INCLUDING CONNECTIONS TO THE EXISTING SYSTEM
- NEW LABORATORY VACUUM PIPING INCLUDING CONNECTIONS TO THE EXISTING SYSTEM
- NEW PROCESS NITROGEN PIPING SYSTEM
- NEW VALVES
- NEW INSULATION
- FINAL CONNECTIONS TO OWNER RELOCATED EQUIPMENT, ETC.
4. SUBMITTALS
A. PROVIDE PRODUCT DATA FOR EQUIPMENT SPECIFIED OR SHOWN ON DRAWINGS PREPARED BY MANUFACTURERS, SUPPLIERS AND VENDORS COMPRISING:
- TESTING REPORT
- ALL CUT SHEETS OF THE FOLLOWING, BUT NOT LIMITED TO: FIXTURES, PIPE MATERIALS, ALL ASSOCIATED FITTINGS, INSULATION, HANGERS ETC.
5. PLUMBING FIXTURES AND TRIM
A. REFER TO ARCHITECTURAL AND PLUMBING DRAWINGS FOR QUANTITIES, LOCATIONS AND MOUNTING HEIGHTS OF FIXTURES PROVIDED UNDER THIS SECTION.
B. FIXTURE TRIM, TRAPS, FAUCETS, ESCUTCHEONS AND WASTE PIPES EXPOSED TO VIEW IN FINISHED SPACES SHALL BE I.P.S. BRASS WITH POLISHED CHROMIUM PLATING OVER NICKEL FINISH.
C. PRODUCT INSTALLATION SHALL ADHERE TO MANUFACTURER'S RECOMMENDATIONS.
6. PIPE MATERIALS
A. SERVICE: PROCESS AIR (CDA)
PIPE MATERIAL: SEAMLESS COPPER TUBE, MEDICAL GAS, HARD DRAWN TEMPER, TYPE L. ASTM B-819
FITTINGS: WROUGHT COPPER, SOLDER-JOINT. ASME B16.22 OR PRESS TO FIT FITTING BY NIBCO OR VIEGA
JOINTS: ANSINAWS AS6 BRASSING FILLER MATERIAL, BCUP SERIES, NO FLUX.
BALL VALVES: ALL BRONZE, 3 PIECE, FULL PORT, PTFE SEATS, STAINLESS STEEL BALL AND STEM, SOLDER END CONNECTIONS, 600 PSIG WOG.
NOTE - VALVES, FITTINGS, COMPONENTS, AND EACH LENGTH OF TUBE SHALL BE FACTORY CLEANED AND SUITABLE FOR MEDICAL OXYGEN SERVICE IN ACCORDANCE WITH CGA PAMPHLET G-4.1. THEY SHALL BE PERMANENTLY LABELLED AND DELIVERED PLUGGED, CAPPED, BAGGED, OR OTHERWISE SEALED. PLUG CAPS OR OTHER SEALS SHALL REMAIN IN PLACE UNTIL FINAL ASSEMBLY.
B. SERVICE: LABORATORY PIPING EXPOSED TO VIEW
ALL TUBING, FITTINGS, AND VALVES SHALL BE FACTORY CLEANED FOR OXYGEN SERVICE AND SEALED WITH END CAPS. 'CLEANED FOR SPECIAL SERVICE' CERTIFICATION SHALL BE PROVIDED FOR ALL TUBING, FITTINGS AND VALVES. ONLY SWAGELOK OR ENGINEERING APPROVE EQUAL COMPRESSION END FITTINGS ARE ACCEPTABLE ALL TUBE, VALVES, FITTINGS AND OTHER COMPONENTS SHALL BE CLEANED IN ACCORDANCE WITH THE PROVISIONS WITHIN THE COMPRESSED GAS PAMPHLET G-4.1 'CLEANING EQUIPMENT FOR OXYGEN SERVICE'. SUCH MATERIAL SHALL BE DELIVERED CAPPED OR PLUGGED.
TUBING DESIGN:
HIGH-QUALITY, FULLY ANNEALED, 316/316L, STAINLESS STEEL
BRIGHT ANNEALED TUBING, ASTM A269 OR A213, OR EQUIVALENT, HARDNESS NOT TO EXCEED 90 HRB OR 200 HV. TUBING TO BE FREE OF SCRATCHES CHEMICALLY CLEANED AND PASSIVATED TUBING SUITABLE FOR BENDING, POLISHED 25RA FINISH ID & MILL FINISH EXTERIOR, TUBING MAY BE BENT FOR ¼ TO 12" IN ORDER TO MINIMIZE THE USE OF COMPRESSION FITTINGS.
FITTING DESIGN:
COMPRESSION ENDS:
¾ O.D. THRU 1" O.D. ASME-BPE COMPLIANCE, 316 STAINLESS STEEL, DUO-FERRULE COMPRESSION ENDS, MILL FINISH INTERIOR AND EXTERIOR, CHEMICAL COMPOSITION AND ACCEPTANCE CRITERIA SHALL MEET ASME BPE-LATEST EDITION, CLEAN FOR OXYGEN SERVICE. SWAGELOK OR ENGINEER APPROVED EQUAL.
ALL TUBE FITTINGS WILL HAVE A GAUGEABLE SHOULDER TO CHECK FOR SUFFICIENT PULL-UP ON INITIAL INSTALLATION. THE GAUGEABLE SHOULDER WILL ALLOW A GAP INSPECTION GAUGE TO BE INSERTED BETWEEN THE HEX OF THE NUT AND HEX OF THE BODY SHOULDER. CONSISTENTLY, THE GAP INSPECTION GAUGE WILL NOT FIT BETWEEN THE NUT AND SHOULDER HEXES OF A SUFFICIENTLY TIGHTENED FITTING ON THE INITIAL INSTALLATION.
BALL VALVE DESIGN:
1¼" O.D. THRU 1" O.D.
ASME-BPE COMPLIANCE, STAINLESS STEEL, TYPE 316, BALL VALVE, 3-PIECE, SWING OUT BODY.
STAINLESS STEEL HANDLE WITH VINYL SLEEVE, PTFE SEAT & SEAL, MILL FINISH INTERIOR AND EXTERIOR, LIVE LOADED STEM PACKING, LEVER OPERATED W/LOCK-OUT HANDLE, DUO-FERRULE COMPRESSION ENDS. SWAGELOK 60 SERIES.
C. SERVICE: PURIFIED (USP) WATER
PIPE MATERIAL: POLYPURE NATURAL POLYPROPYLENE AS MANUFACTURED BY ASAHI/AMERICA, INC. IN ACCORDANCE WITH ASTM D 4101-96a AND DIN 16774.
FITTINGS: STANDARD BUTT FUSION POLYPURE FITTINGS AS MANUFACTURED BY ASAHI, 150 PSI.
UNIONS: SOCKET FUSION TRU-UNION TYPE AS MANUFACTURED BY ASAHI
BALL VALVES: TRU-UNION ASAHI TYPE 21
DIAPHRAGM VALVES: ASAHI TYPE 342/343 TWO-WAY/ZDL.
BACK PRESSURE VALVES: FRANK REGULATORS
CHECK VALVES: CLASS 150, BALL TYPE PROLINE PP WITH EPDM SEATS AS MANUFACTURED BY ASAHI, 150 PSI @ 73.4" F.
10. PIPE IDENTIFICATION
A. PROVIDE COLOR-CODED PIPE IDENTIFICATION MARKERS ON PIPING INSTALLED UNDER THIS SECTION. PIPE MARKERS SHALL BE SNAP-ON LAMINATED PLASTIC PROTECTED BY CLEAR ACRYLIC COATING. PIPE MARKERS SHALL BE APPLIED AFTER ARCHITECTURAL PAINTING WHERE SUCH IS REQUIRED.
B. PROVIDE ARROW MARKER WITH EACH PIPE CONTENT MARKER TO INDICATE DIRECTION OF FLOW. IF FLOW CAN BE IN EITHER DIRECTION, USE DOUBLE-HEADED ARROW MARKER.
C. PROVIDE PIPE MARKERS AT INTERVALS NO LONGER THAN 20'
11. VALVE TAGS
A. UPON COMPLETION OF WORK, ATTACH ENGRAVED LAMINATED BRASS TAGS TO ALL VALVES AND INSTRUMENTATION. TAGS SHALL HAVE BLACK CHARACTERS ON WHITE FACE, CONSECUTIVELY NUMBERED AND PREFIXED WITH LETTER P FOR GENERAL VALVES.
B. TAGS SHALL BE AT LEAST 1.25" DIAMETER WITH NUMERALS AT LEAST 3/8" HIGH AND ATTACHED BY S HOOKS AND CHAINS.
12. INSULATION
A. INSULATION SHALL BE BY OWENS-CORNING, CERTAIN-TEED OR MANVILLE.
B. INSULATION, JACKETS AND ADHESIVES SHALL BE FLAME RETARDANT AND SHALL HAVE ASTM E-84 FIRE HAZARD RATINGS OF 25 FLAME SPREAD, 50 SMOKE DEVELOPED AND 50 FUEL CONTRIBUTED.
C. HOT WATER PIPING SHALL BE INSULATED WITH HEAVY DENSITY FIBERGLASS WITH SELF-SEALING LAP AND ALL SERVICE JACKET, FITTINGS AND VALVES SHALL BE INSULATED WITH TWO LAYERS BLANKET INSULATION WITH PVC COVERS. INSULATION SHALL BE RATED FOR MAXIMUM OPERATING TEMPERATURE OF 460°F. INSULATION THICKNESS SHALL BE 1".
D. COLD WATER, EMERGENCY TEPID WATER & CONDENSATE PIPING, VALVES AND FITTINGS SHALL BE INSULATED AS SPECIFIED FOR HOT WATER SUPPLY PIPING. IN ADDITION, CONTINUOUS VAPOR BARRIER SHALL BE MAINTAINED. INSULATION THICKNESS SHALL BE 1/2".
13. HANGERS, ANCHORS, CLAMPS AND INSERTS
A. PROVIDE ADJUSTABLE CLEVIS HANGERS FOR PIPING 2" & LARGER, AND CAST BRASS SPLIT-RING HINGED HANGERS FOR SMALLER PIPING. SUPPORT PIPING FROM BUILDING STRUCTURE TO MAINTAIN REQUIRED GRADE AND PITCH OF PIPE LINES, PREVENT VIBRATION, SECURE PIPING IN PLACE. SECURE HANGERS TO INSERTS WHERE PRACTICAL. HANGER RODS SHALL HAVE MACHINE THREADS.
B. HANGER RODS SHALL BE CONNECTED TO BEAM CLAMP, UL-APPROVED CONCRETE INSERTS OR PHILLIPS OR APPROVED EQUAL EXPANSION SHIELDS. RAMSET OR POWER DRIVEN INSERTS WILL NOT BE ALLOWED.
C. HANGER SPACING SHALL MEET REQUIREMENTS OF STATE AND LOCAL CODES.
14. SLEEVES AND PENETRATIONS
A. PIPE SLEEVES THROUGH FIRE-RATED CONSTRUCTION SHALL BE SCHEDULE 40 STEEL. SLEEVES THROUGH PARTITIONS AND NON-FIRE-RATED CONSTRUCTION SHALL BE 26 GAUGE GALVANIZED STEEL WITH LOCK LONGITUDINAL SEAMS. AS SPECIFIED IN THIS SECTION OF THE SPECIFICATIONS.
B. FIBRE STOP PENETRATION SEALS IN FIRE-RATED CONSTRUCTION SHALL BE CERAMIC FIBRE, MINERAL FIBRE, OR SILICONE FOAM. PROVIDE MINERAL FIBRE BOARD, MATTING OR PUTTY FOR DAMMING AND FORMING. FINISH SEALS FLUSH TO WALL SURFACE AND FILL GAPS WITH SILICONE ADHESIVE SEALANT CAULKING.
C. PACKING FOR SLEEVES THAT DO NOT REQUIRE MAINTENANCE OF FIRE RATING SHALL BE OAKUM, SILICATE FOAM, CERAMIC FIBRE OR MINERAL FIBRE WITH APPROVED SEALANT. PACK OR FOAM TO WITHIN ONE INCH OF BOTH WALL SURFACES. SEAL PENETRATION PACKING WITH APPROVED CAULKING AND PAINTABLE WATERPROOF MASTIC SURFACE FINISH OR SILICONE CAULKING.
15. MATERIALS AND WORKMANSHIP
A. MAINTAIN MAXIMUM HEADROOM AT ALL TIMES. DO NOT RUN PIPES EXPOSED UNLESS SHOWN EXPOSED ON DRAWINGS. MATERIAL AND EQUIPMENT SHALL BE NEW AND INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDED BEST PRACTICE SO THAT COMPLETED INSTALLATION SHALL OPERATE SAFELY AND EFFICIENTLY.
16. CONTINUITY OF SERVICES
A. DO NOT INTERRUPT EXISTING SERVICES WITHOUT OWNER'S APPROVAL.
17. ACCESS
A. PROVIDE PROPER ACCESS TO EQUIPMENT AND VALVES THAT REQUIRE INSPECTION, REPLACEMENT OR REPAIR. ACCESS PANELS SHALL BE A MINIMUM OF 12" X 12".
18. TESTING
A. TEST AND ADJUST PLUMBING SYSTEMS AS REQUIRED BY ARCHITECT AND AUTHORITIES THAT HAVE JURISDICTION. PERFORM TESTS RECOMMENDED BY MANUFACTURERS OF MATERIALS AND EQUIPMENT.
B. TEST PLUMBING SYSTEMS UNDER PRESSURE AND HEADS SPECIFIED IN PLUMBING CODES.
C. CDA PIPING SHALL BE PRESSURE TESTED UTILIZING SOURCE GAS OR NITROGEN UP TO 150 PSI FOR A PERIOD OF 1 HOUR, WITH NO LOSS.
D. PW(USP) PIPING - HYDROSTATICALLY TEST ALL PIPE SYSTEMS WITH DEIONIZED WATER AT 100 PSIG FOR ONE HOUR. DOCUMENT ALL RESULTS, COMPLY WITH 21 CFR, PART 211 (FDA CGMP'S) FOR DOCUMENTATION OF SYSTEM INSTALLATION AND TESTING PROCEDURES.
19. CLEANING
A. CLEAN SYSTEMS THOROUGHLY BEFORE TESTING. FIXTURES, EQUIPMENT, PIPE, VALVES AND FITTINGS SHALL BE FREE OF GREASE, METAL CUTTINGS, DIRT AND OTHER FOREIGN MATERIAL.
B. REPAIR STOPPAGE, DISCOLORATION AND DAMAGE TO PARTS OF BUILDING, FINISH AND FURNISHINGS DUE TO FAILURE TO PROPERLY CLEAN PIPING SYSTEM.
20. CLEANING OF THERMOPLASTICS
A. SYSTEM IS TO BE STERILIZED IN PLACE, LEAK CHECK AND PRESSURE TEST THE SYSTEM WITH AIR OR WATER, PRIOR TO STERILIZATION.
B. DISCONNECT ANY UV LIGHTS AND REMOVE ANY SUB-MICRON FILTER CARTRIDGES FROM THEIR HOUSINGS AND INSTALL 5 MICRON FILTER CARTRIDGES.
C. CLOSE VALVES ON INLET AND OUTLET AND OPEN BYPASS ON ANY DI BOTTLES TO PREVENT THE STERILIZING SOLUTION FROM ENTERING DI BOTTLES AND CONTACTING THE RESIN, WHILE STILL ALLOWING THE SOLUTION TO CIRCULATE.
D. FILL STORAGE TANK TO A DEPTH OF APPROXIMATELY 3 FT. WITH DI WATER. CALCULATE THE TOTAL VOLUME OF WATER IN THE STORAGE TANK AND THE PIPING LOOP. ADD SUFFICIENT HYDROGEN PEROXIDE (H2O2) TO THE WATER IN THE STORAGE TANK TO RESULT IN A SOLUTION STRENGTH OF 10% H2O2).
E. WHEN CIRCULATING THE H2O2 SOLUTION, SAMPLE THE WATER AT EACH SINK VALVE, AS FOLLOWS, TO VERIFY THE PRESENCE OF THE H2O2 SOLUTION:
F. UTILIZE A NACH CO., INC. PRE-MANUFACTURING TEST KIT MODEL NO. HYP-1 (CAT. NO. 2291-00) OR APPROVED EQUAL. THIS KIT SHALL BE USED TO TEST H2O2 PRESENCE BY A DROP COUNT TITRATION) THIOSULFIDE METHOD.
G. ADJUST THE PH OF A QUART OF POTASSIUM PERMANGANATE (KMNO4) AND PH 6.5 WITH SULFURIC ACID (H2SO4). A QUART SHOULD BE ADEQUATE FOR TESTING MOST SYSTEMS.
H. DRAW APPROXIMATELY ONE-HALF CUP OF WATER FROM EACH SINK VALVE, INDIVIDUALLY, AND ADD A SMALL AMOUNT OF THE TEST SOLUTION (KMNO4) TO THE SAMPLE.
I. IF H2O2 IS PRESENT IN THE SAMPLE, IT WILL TURN CLEAR OR BROWN; IF NO H2O2 IS PRESENT, IT WILL REMAIN PURPLE. F. WHEN TESTING VERIFIES THE H2O2 SOLUTION IS PRESENT AT ALL TEST LOCATIONS, TURN OFF THE DISTRIBUTION PUMP AND OPEN INLET AND OUTLET VALVE AS REQUIRED TO RETAIN THE SOLUTION IN THE LOOP FOR A MINIMUM OF 12 HOURS, WHILE ISOLATING THE TANK FROM THE LOOP.
J. DURING THE 12 HOUR RETENTION PERIOD, THE STORAGE TANK CAN BE DRAINERD AND CLEANED. THIS IS ACCOMPLISHED BY FIRST DRAINING THE TANK TO BELOW THE MANHOLE. ENTER THE TANK AND USING SUITABLE SPRAYING DEVICE AND PRESSURE, WASH THE TANK WALLS AND DOME WITH THE RESIDUAL H2O2 IN THE TANK. AFTER SPRAYING, DRAIN THE TANK TO A SUITABLE DRAIN AND THEN THOROUGHLY RINSE THE INTERIOR WITH DI WATER ALLOWING IT TO GO TO DRAIN ALSO. VACUUM ANY RESIDUAL DI WATER AND THEN DRY THE TANK. REPLACE THE MANHOLE AND CLOSE THE TANK DRAIN. FILL THE STORAGE TANK WITH DI WATER AND RE-VALVE OR INSTALL A BYPASS TO ALLOW THE BUILDING LOOP RETURN LINE TO DISCHARGE TO DRAIN FOR THE FLUSHING AND DRAINING OF THE LOOP.
1. WHILE PERFORMING THE FOLLOWING TANK CLEANING PROCEDURE, FULL BODY PROTECTIVE GEAR INCLUDING BREATHING APPARATUS IS REQUIRED. ALSO, A LIFE LINE MUST BE ATTACHED TO THE PERSON ENTERING THE TANK AND AN ADDITIONAL PERSON SHOULD BE STATIONED OUTSIDE WITHIN SIGHT AND SOUND, IN CASE OF AN EMERGENCY.
K. AFTER THE 12 HOUR RETENTION PERIOD, FLUSH THE H2O2 SOLUTION IN THE LOOP TO DRAIN, UTILIZING THE DISTRIBUTION PUMP AND THE DI WATER IN THE STORAGE TANK. FLUSH UNTIL TESTING WITH KMNO4 INDICATES NO RESIDUAL H2O2 IN THE LOOP.
L. OPEN INLET AND OUTLET VALVES ON DI BOTTLES AND RECONNECT LOOP RETURN TO THE STORAGE TANK, AND REMOVE AND DISCARD THE 5 MICRON CARTRIDGES FROM THE SUB-MICRON FILTER HOUSING AND INSTALL PROPER SUB-MICRON FILTER CARTRIDGES AND RECONNECT UV LIGHTS. THIS PROCEDURE SHOULD BE REPEATED AT LEAST ANNUALLY OR MORE OFTEN IF CONTAMINATION OCCURS.
21. REGULATORS REQUIREMENTS
A. STRICTLY COMPLY WITH APPLICABLE CODES, REGULATIONS AND REQUIREMENTS OF AUTHORITY HAVING JURISDICTION.



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Table with 3 columns: No., Description, Date. Contains multiple empty rows.

VERTEX PHARMACEUTICALS

LEVEL 1 TABLET COATER SYSTEM

DRAWING NAME: PLUMBING SPECIFICATIONS

Project Number M0684-003.00

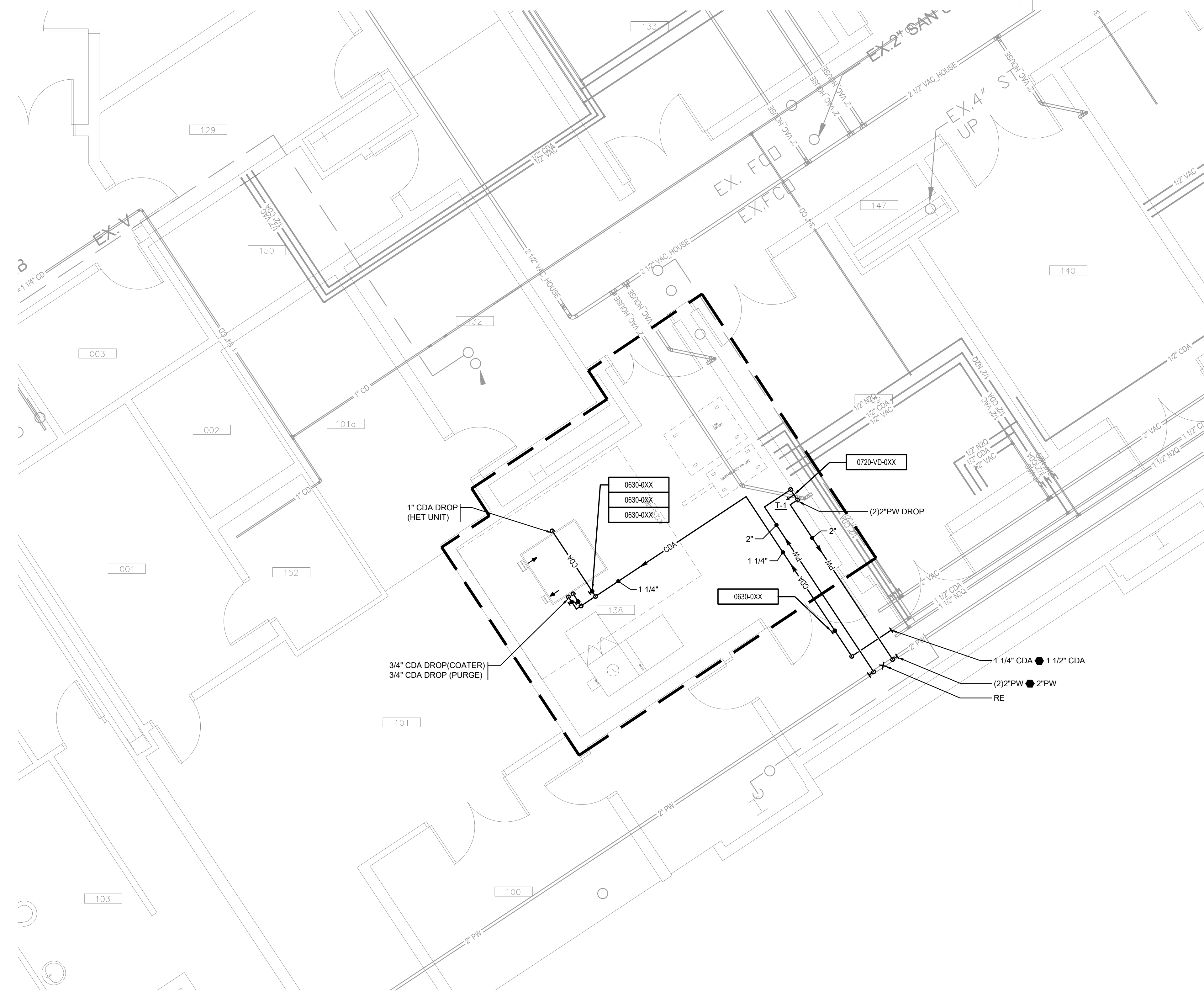
Date 08/30/16

Drawn By C.P.C.

Checked By C.P.C.

P0.02

Scale N/A



**1** LEVEL 1 PAT LAB - PROCESS PIPING PLAN PLAN  
 SCALE: 1/4"=1'-0"

**SHEET NOTES**

1. THE PC SHALL FIELD VERIFY ALL EXISTING PIPING LOCATION, SIZES, PITCH, DIRECTION OF FLOW, MATERIAL, INVERT, ETC. PRIOR TO INSTALLATION OF ANY NEW PIPING.
2. ALL NEW PROCESS PIPING SHALL BE OXYGEN GRADE, BAGGED AND CAPPED PIPING (FOR GASES), AND SHALL BE BRAZED UTILIZING A CONTINUOUS NITROGEN PURGE.
3. TEST ALL NEW GAS OUTLETS FOR SYSTEM PURITY AND CROSS CONNECTION PRIOR TO SETTING BACK IN WORKING ORDER.
4. A FULL STERILIZATION OF THE ENTIRE PURE WATER LOOP SHALL BE PROVIDED UPON COMPLETION OF WORK.
5. ALL NEW VALVE TAGS SHALL MATCH THE EXISTING SYSTEMS AND SHALL NUMBER NUMERICALLY PER THE CURRENT PROTOCOL. NEW TAGS AND NUMBERING SHALL BE FULLY COORDINATED WITH VERTEX FACILITIES.
6. ALL NEW PROCESS SYSTEMS SUBJECT TO VALIDATION SHALL BE VALIDATED BY A THIRD PARTY.

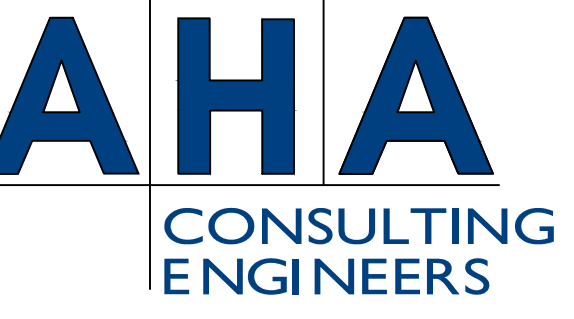
**PROCESS SYSTEM LEGEND**

**PROCESS SYSTEMS**

620 = COMPRESSED AIR  
 630 = CLEAN DRY AIR SYSTEM  
 650 = VACUUM SYSTEM  
 662 = PROCESS NITROGEN SYSTEM  
 711 = RO WATER SYSTEM  
 720 = PURIFIED (USP) WATER SYSTEM

**P&ID SYMBOLS & ABBREVIATIONS**

	CV	CONTROL VALVE
	VB	BALL VALVE
	VC	CHECK VALVE
	PCV	PRESSURE CONTROL VALVE
	FL	FILTER HOUSING
	PI	PRESSURE INDICATOR
	PIT	PRESSURE INDICATING TRANSMITTER
	PS	PRESSURE SWITCH
	DR	DRYER (DESICCANT)



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No.	Description	Date

**VERTEX  
 PHARMACEUTICALS**  
 LEVEL 1 TABLET  
 COATER SYSTEM

DRAWING NAME:  
**PLUMBING  
 LEVEL 1  
 PROCESS PIPING PLAN**

Project Number	M0684-003.00
Date	08/30/16
Drawn By	C.P.C.
Checked By	C.P.C.

**P2.11**