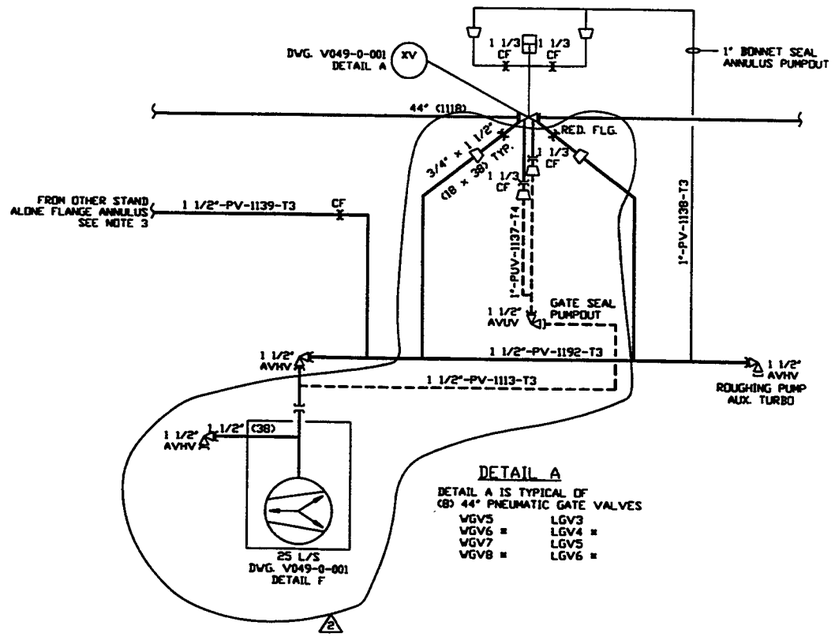
TABLE 1

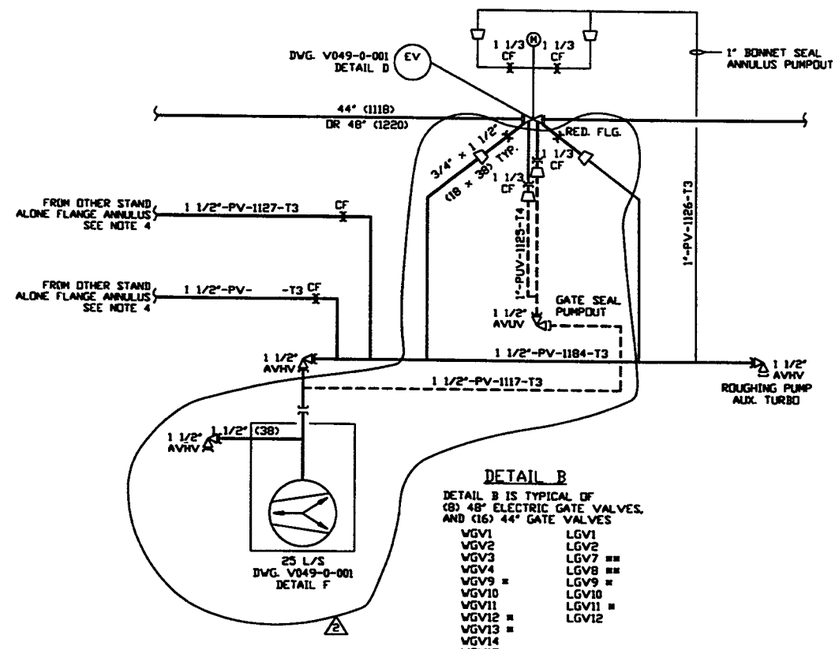
VALVE	VACUUM LINE					
VGV1	1 1/2"-PV-1117-T3	1"-PV-1125-T3	1"-PV-1126-T4	1 1/2"-PV-1127-T3	1 1/2"-PV-1184-T3	-
VGV2	1 1/2"-PV-1118-T3	1"-PV-1128-T3	1"-PV-1129-T4	1 1/2"-PV-1130-T3	1 1/2"-PV-1186-T3	-
VGV3	1 1/2"-PV-1119-T3	1"-PV-1131-T3	1"-PV-1132-T4	1 1/2"-PV-1133-T3	1 1/2"-PV-1188-T3	1 1/2"-PV-1189-T3
VGV4	1 1/2"-PV-1120-T3	1"-PV-1134-T3	1"-PV-1135-T4	1 1/2"-PV-1136-T3	1 1/2"-PV-1190-T3	1 1/2"-PV-1191-T3
VGV5	1 1/2"-PV-1113-T3	1"-PV-1137-T3	1"-PV-1138-T4	1 1/2"-PV-1139-T3	1 1/2"-PV-1192-T3	-
VGV6	1 1/2"-PV-1114-T3	1"-PV-1140-T3	1"-PV-1141-T4	1 1/2"-PV-1142-T3	1 1/2"-PV-1193-T3	-
VGV7	1 1/2"-PV-1115-T3	1"-PV-1143-T3	1"-PV-1144-T4	1 1/2"-PV-1145-T3	1 1/2"-PV-1194-T3	-
VGV8	1 1/2"-PV-1116-T3	1"-PV-1146-T3	1"-PV-1147-T4	1 1/2"-PV-1148-T3	1 1/2"-PV-1195-T3	-
VGV9	1 1/2"-PV-230-T3	1"-PV-240-T3	1"-PV-241-T4	1 1/2"-PV-242-T3	1 1/2"-PV-265-T3	1 1/2"-PV-266-T3
VGV10	1 1/2"-PV-231-T3	1"-PV-243-T3	1"-PV-244-T4	1 1/2"-PV-245-T3	1 1/2"-PV-267-T3	1 1/2"-PV-268-T3
VGV11	1 1/2"-PV-232-T3	1"-PV-246-T3	1"-PV-247-T4	1 1/2"-PV-248-T3	1 1/2"-PV-269-T3	1 1/2"-PV-270-T3
VGV12	1 1/2"-PV-233-T3	1"-PV-249-T3	1"-PV-250-T4	1 1/2"-PV-251-T3	1 1/2"-PV-271-T3	1 1/2"-PV-272-T3
VGV13	1 1/2"-PV-330-T3	1"-PV-340-T3	1"-PV-341-T4	1 1/2"-PV-342-T3	1 1/2"-PV-362-T3	1 1/2"-PV-363-T3
VGV14	1 1/2"-PV-331-T3	1"-PV-343-T3	1"-PV-344-T4	1 1/2"-PV-345-T3	1 1/2"-PV-364-T3	1 1/2"-PV-365-T3
VGV15	1 1/2"-PV-332-T3	1"-PV-346-T3	1"-PV-347-T4	1 1/2"-PV-348-T3	1 1/2"-PV-366-T3	1 1/2"-PV-367-T3
VGV16	1 1/2"-PV-333-T3	1"-PV-349-T3	1"-PV-350-T4	1 1/2"-PV-351-T3	1 1/2"-PV-368-T3	1 1/2"-PV-369-T3
VGV17	1 1/2"-PV-425-T3	1"-PV-430-T3	1"-PV-431-T4	1 1/2"-PV-432-T3	1 1/2"-PV-443-T3	1 1/2"-PV-444-T3
VGV18	1 1/2"-PV-426-T3	1"-PV-433-T3	1"-PV-434-T4	1 1/2"-PV-435-T3	1 1/2"-PV-445-T3	1 1/2"-PV-446-T3
VGV19	1 1/2"-PV-525-T3	1"-PV-530-T3	1"-PV-531-T4	1 1/2"-PV-532-T3	1 1/2"-PV-543-T3	1 1/2"-PV-544-T3
VGV20	1 1/2"-PV-526-T3	1"-PV-533-T3	1"-PV-534-T4	1 1/2"-PV-535-T3	1 1/2"-PV-545-T3	1 1/2"-PV-546-T3
LGV1	1 1/2"-PV-682-T3	1"-PV-1601-T3	1"-PV-1602-T4	1 1/2"-PV-1603-T3	1 1/2"-PV-1634-T3	-
LGV2	1 1/2"-PV-683-T3	1"-PV-1604-T3	1"-PV-1605-T4	1 1/2"-PV-1606-T3	1 1/2"-PV-1636-T3	-
LGV3	1 1/2"-PV-678-T3	1"-PV-1607-T3	1"-PV-1608-T4	1 1/2"-PV-1609-T3	1 1/2"-PV-1638-T3	-
LGV4	1 1/2"-PV-679-T3	1"-PV-1610-T3	1"-PV-1611-T4	1 1/2"-PV-1612-T3	1 1/2"-PV-1639-T3	-
LGV5	1 1/2"-PV-680-T3	1"-PV-1613-T3	1"-PV-1614-T4	1 1/2"-PV-1615-T3	1 1/2"-PV-1640-T3	-
LGV6	1 1/2"-PV-681-T3	1"-PV-1616-T3	1"-PV-1617-T4	1 1/2"-PV-1618-T3	1 1/2"-PV-1641-T3	-
LGV7	1 1/2"-PV-725-T3	1"-PV-731-T3	1"-PV-732-T4	1 1/2"-PV-733-T3	1 1/2"-PV-747-T3	-
LGV8	1 1/2"-PV-825-T3	1"-PV-831-T3	1"-PV-832-T4	1 1/2"-PV-835-T3	1 1/2"-PV-847-T3	-
LGV9	1 1/2"-PV-726-T3	1"-PV-734-T3	1"-PV-735-T4	1 1/2"-PV-736-T3	1 1/2"-PV-749-T3	1 1/2"-PV-750-T3
LGV10	1 1/2"-PV-727-T3	1"-PV-737-T3	1"-PV-738-T4	1 1/2"-PV-739-T3	1 1/2"-PV-751-T3	1 1/2"-PV-752-T3
LGV11	1 1/2"-PV-826-T3	1"-PV-834-T3	1"-PV-835-T4	1 1/2"-PV-836-T3	1 1/2"-PV-849-T3	1 1/2"-PV-850-T3
LGV12	1 1/2"-PV-827-T3	1"-PV-837-T3	1"-PV-838-T4	1 1/2"-PV-839-T3	1 1/2"-PV-851-T3	1 1/2"-PV-852-T3



DETAIL A

DETAIL A IS TYPICAL OF (8) 44" PNEUMATIC GATE VALVES

VGV5	LGV3
VGV6 *	LGV4 *
VGV7	LGV5
VGV8 *	LGV6 *



DETAIL B

DETAIL B IS TYPICAL OF (8) 48" ELECTRIC GATE VALVES, AND (16) 44" GATE VALVES

VGV1	LGV1
VGV2	LGV2
VGV3	LGV7 **
VGV4	LGV8 **
VGV9 *	LGV9 *
VGV10	LGV10
VGV11	LGV11 *
VGV12 *	LGV12
VGV13 *	
VGV14	
VGV15	
VGV16 *	
VGV17 *	
VGV18	
VGV19 *	
VGV20	

NOTES:

1. DIMENSIONS IN ( ) ARE IN MILLIMETERS.
2. SEE TABLE 1 FOR PIPING LINE NUMBERS.
3. FROM ADDITIONAL FLANGE ANNULUS. FLANGE PAIR IDENTIFIED BY THE SPOOL PIECES THAT MAKE UP THE JOINT.

VALVE	SPOOLPIECE INTERFACE
VGV5	B9/A1
VGV6	WCP1/BE-4
VGV7	B-9/A-1
VGV8	WCP2/BE-4
LGV3	B9/A1
LGV4	LCP1/BE-4
LGV5	B9/A1
LGV6	LCP2/BE-4

4. FROM ADDITIONAL FLANGE ANNULUS. FLANGE PAIR IDENTIFIED BY THE SPOOL PIECES THAT MAKE UP THE JOINT.

VALVE	SPOOLPIECE INTERFACE
VGV1	-
VGV2	-
VGV3	B-6/A-6, A-12/B-4
VGV4	B-7/ A-6, A-12/B-4
VGV9	WCP3/BE-4
VGV10	A-7/A-1
VGV11	-
VGV12	WCP4/BE-4
VGV133	WCP5/BE-4
VGV14	A-7/A-1
VGV15	-
VGV16	WCP6/BE-4
VGV17	WCP7/BE-4
VGV18	A-1/A-7
VGV19	WCP8/BE-4
VGV20	A-1/A-7
LGV1	-
LGV2	-
LGV7	-
LGV8	-
LGV9	LCP3/BE-4
LGV10	A-1/A-7
LGV11	LCP4/BE-4
LGV12	A-1/A-7

---- TUBING ASSEMBLY FOR BEAM TUBE DELIVERABLES (EXCEPT FOR LA MID STATION

* THESE VALVES HAVE BUTTWELD CONNECTIONS ON ONE END AND THEREFORE HAVE ONLY ONE FLANGE ANNULUS PUMPOUT.

** THESE VALVES HAVE BUTTWELD CONNECTIONS ON BOTH ENDS AND THEREFORE HAVE NO FLANGE ANNULUS PUMPOUTS OR PUMPS.

LIGO-D961073-02-V

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DWG. NO.	DESCRIPTION
V049-0-001	P & ID LEGEND

REFERENCE DRAWINGS

DWG. NO.	DESCRIPTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±
ANGULARITY ±2°-30' BEND ±2°
TWO PLACE DECIMAL ± .01
THREE PLACE DECIMAL ± .005
FINISHED SURFACE RMS
BREAK CORNERS .06 OUT-
REMOVE ALL BURRS

DO NOT SCALE THIS DRAWING
USED ON
NEXT ASS'Y

REV	DESCRIPTION	REB	TS	RT	SM	DMcV	RJV	04.26.96	0134
2	ISSUE FOR FDR UPDATE		TS	RT		DMcV	RJV	10.25.96	0309
1	ISSUE FOR FDR	REB	TS	RT	SM	DMcV	RJV	04.26.96	0134
0	ISSUE FOR DESIGN	REB	TS	RT	SM	DMcV	RJV	01.03.96	0031
P1	PRELIMINARY DESIGN UPDATE	REB					KY	09.26.95	0003
REV	DESCRIPTION					CHKD	DRWN	DATE	ECO#

ISSUE DESCRIPTION

PROCESS SYSTEMS INTERNATIONAL INC.
30 WALKUP DR. WESTBOROUGH, MASSACHUSETTS 01581 USA

PIPING & INSTRUMENTATION DIAGRAM
LIGO VACUUM EQUIPMENT
112cm & 122cm GATE VALVES

CAD FILE	SIZE	DWG. NO.	REV.
V0490005	D	V049-0-005	2
SCALE NONE		SHEET 1 OF 1	