CONTROL VALVES Data Sheet # 2571-102-DSH-1-SF-001	PROJECT Olkaria North East Power Station UNIT Steam Venting System P.O. ITEM Steam Venting Pressure Control Valves CONTRACT OG 102 MFR SERIAL#	DATA SHEET: 1 of 2 SPEC: OG 102 TAG : PV-40-032-A,B,C,D DWG: 2571-105-M-SF-008 SERVICE: Pressure Control

FLUID Separated Geothermal Steam — CRIT PRES PC 22.09 MPa

SERVICE CONDITIONS	UNITS	MAX FLOW	NORM FLOW	LOW FLOW	MIN FLOW	SHUT OFF
FLOW RATE	kg/s	80	53.3	3.5	0.7	--
INLET PRESSURE	bara	7.87	5.32	5.5	5.5	14.3
OUTLET PRESSURE	bara	5.37	3.77	0.8	0.8	0.8
INLET TEMPERATURE	°C	177.7	161	SAT	SAT	SAT
SPEC WT/SPEC/MOL WT	kg/m3	4.20	2.76	SAT	SAT	--
VISCOSITY/SPEC HEATS RATIO	--	1.3	1.3	1.3	1.3	
VAPOR PRESSURE Pv						
*REQUIRED Cv		7633.7	6384.5	176.4	35.8	
*TRAVEL	%	99	95	19	11	0
ALLOWABLE/*PREDICTED SPL (Note 2)	dBA	100/106 (Note 1)	100/102	95/106	95/91	

LINE

PIPE LINE SIZE: IN 400 NB STD Schedule
& SCHEDULE: OUT 400 NB STD Schedule
PIPE LINE INSULATION (Note 3)

VALVE BODY/BONNET

*TYPE V-Ball
*SIZE 400 NB ANSI CLASS 150# (Note 7)
MAX PRESS/TEMP 13.5 barg/197°C
*MFG & MODEL Fisher V150
*BODY/BONNET MATL ASTM A216 WCC
*LINER MATERIAL/ID N/A
*END: IN 400 NB ANSI RF
CONNECTION: OUT 400 NB ANSI RF
*FLG FACE FINISH ANSI B16.5
*END EXT/MATL NIL
*FLOW DIRECTION Forward
*TYPE OF BONNET None
LUB & ISO VALVE No LUBE NIL
*PACKING MATERIAL PTFE
*PACKING TYPE V-Ring

TRIM

*TYPE Standard – HD Seal
SIZE 16 inch RATED TRAVEL 90%
*CHARACTERISTIC Equal Percentage
*BALANCED/UNBALANCED N/A
*RATED Cv 7840 F_L 0.37 X_T 0.135
*PLUG/BALL/DISK MATERIAL 317 CR PL
*SEAT MATERIAL Alloy 6 HD
*BEARING MATERIAL PEEK
*STEM MATERIAL 17-4PH H1075
Refer Specification for Further Requirements

SPECIALS/ ACCESSORIES

NEC CLASS 1 GROUP A,B,C,D DIV 2
- Adjustable mechanical limit stops
- Local position indication
- Construction suitable for prolonged use in severe environment resistant to silica deposition and scaling
- Bidders to submit schedule of previous geothermal experience with valves offered
- See Note 10, Note 11

Note 12: Detailed installation to be determined.
ASCO EF8342C001 Solenoid, 120VAC

ACTUATOR

*TYPE Double Acting Pneumatic Piston
*MFR & MODEL Fisher 1061
*SIZE 80 EFF AREA 88.5
ON/OFF MODULATING Yes
SPRING ACTION OPEN/CLOSE No
*MAX ALLOWABLE PRESSURE 10.3 barg
*MIN REQUIRED PRESSURE 4.1 barg
AVAILABLE AIR SUPPLY PRESSURE:
MAX 6.9 barg MIN 5.5 barg (Note 8)
*BENCH RANGE N/A
ACT ORIENTATION (Note 5)
HANDWHEEL TYPE (Note 5)
AIR FAILURE VALVE (Note 6) *SET AT 4 barg
* Failure Fixed
INPUT SIGNAL 4-20mA is 0% to 100% Open

POSITIONER

*TYPE Double Acting Electro Pneumatic
*MFR & MODEL Fisher DVC 6020
*ON INCR SIGNAL OUTPUT INCREASES
GAUGES Yes BY-PASS NO
*CAM CHARACTERISTIC Linear

SWITCHES & TRANSMITTERS

TYPE Proximity Quantity 2
*MFR & MODEL Westlock 9468BYCS
CONTACTS/RATING SPDT, 120VAC, 3A
ACTUATION POINTS Adjustable Open/Close Indication

AIR SET

*MFR & MODEL Fisher 67CFR
*SET PRESSURE 5.5 barg
FILTER Yes GAUGE Yes

TESTS

*HYDRO PRESSURE 20.25 barg
ANSI LEAKAGE CLASS Class IV

REV	DATE	REVISION	ORIG	APP
A1	Dec 91	For Client Approval	AJS	
B	Mar 99	Revised by KM	MAT	
0	Mar 00	For Construction	SDK	

NOTES TO DATA SHEET FOR PV-40-032-A, B, C, D

NOTE 1	Manufacturer to advise inlet pressure required to pass 80 kg/s steam with valve full open, back pressure as specified. Assume 7°C superheat at valve inlet.
NOTE 2	A SPL limit of 95dbA max (measured 1m downstream of valve at 1m radius, assuming 16" STD pipework and no insulation) applies to all operating conditions. Manufacturers to specify predicted SPL at specified conditions.
NOTE 3	Assume no insulation applied in determination of predicted noise levels.
NOTE 4	One-piece ball (or disc) and stem assembly preferred, otherwise specify stem material to be 17-4 P.H. S.S..
NOTE 5	Actuator and handwheel orientation (viewed in direction of flow) as follows:- PV-40-032-A,C – left hand PV-40-032-B,D – right hand
NOTE 6	Actuator shall lock valve in position in the event of a loss of air supply (Fail fixed).
NOTE 7	Rating higher than 150# may be offered.
NOTE 8	Compressed air pressure limits are within contractors design scope and may be adjusted by contractor.
NOTE 9	Contractor may offer smaller valve size provided all performance requirements are met.
NOTE 10	Stroke time under load shall be less than 10 seconds. The control valve shall be capable of following a control signal with a maximum lag of 1 second for a control signal varying at a rate of 10% per second. Independent linearity of the actuator shall be better than +/-0.5% of span.
NOTE 11	All required RF WN flanges, eccentric reducers, spiral wound gaskets, nuts, bolts, etc shall be supplied so as to provide a complete unit to suit pipeline size. All pneumatic tubing, fittings and air set shall be provided, Swagelock or equal.

NOTE 12 Positioner shall be mounted separate from the valve and actuator and isolated from the piping to avoid vibration interference.

ADDITIONAL SPECIFIC REQUIREMENTS FOR PV-40-032A, B, C & D

The vent pressure control valves to be supplied shall be 1/4 turn, metal seated control valves of the ball, segmented ball, V notch ball or eccentric disk type. The valves offered shall have been previously successfully used for geothermal vent pressure control applications. The Bidder shall include with his bid, a comprehensive schedule of such previous successful geothermal experience, as an attachment to the associated data sheet for these valves.

A proven control valve that would be acceptable for this application is the Neles/Jamesbury Q ball valve.

Fixed, in line, orifice diffuser noise control trim shall not be used due to the risk of the small orifices in these elements becoming blocked by scale deposition. However, noise trim diffusers which are incorporated as part of the rotating ball element and which rotate with the ball such that the diffuser trim orifices are completely bypassed when the valve is open are acceptable.

The control valves require to have high rangeability or turndown ratio; at least 180:1.

The actuator/valve combination shall give the following performance:

a) The actuator shall be capable of fully opening and closing the valve under load conditions, at minimum supply air pressure and with no more than the specified maximum steam leakage passing through the valve when fully closed.
b) The stroking time from close to open or from open to close when a valve is actuated from a 'full open' control signal into the positioner shall be less than 10 seconds.
c) Under a sinusoidal test the actuators with appropriate positioners shall have a frequency response such that the minus 3db frequency is greater than or equal to 0.2 Hertz, when supplied with an air pressure of 6.8 bar(g).

Each actuator shall be supplied with a side mounted declutchable handwheel, that readily enables manual operation of the actuator and valve. The clutching mechanism shall be facilitated with a mechanism to prevent vibration changing the setting of the actuator.

The volume of the steam transmission and separation system, between the wells and the power station, is estimated to be $3400m^3$.