H&V ABBREVIATIONS

1C	(UNIT) 1 CABINET OR RACK
1V	(UNIT) 1 VENT (HVAC PURCH EQUIP)
AD	ACCESS DOOR
ADSD	AIR DUCT SMOKE DETECTOR
AFM	AIRFLOW MONITOR
AO	AIR OPERATOR (VALVE OR DAMPER)
A/S	AIR SUPPLY (INSTRUMENTATION)
ATF	AIRTROL TANK FITTING (BAG)
AV	AIR (OPERATED) VALVE
BD	BALANCING DAMPER
BDD	BACKDRAFT DAMPER
BS	BASKET STRAINER
COPR	CLOSE ON PRESSURE RISE
COTR	CLOSE ON TEMPERATURE RISE
CS	CENTRIFUGAL SWITCH
CU	CONTROL UNIT (TEMP SENSOR & SW)
CV	CONTROL VALVE
CUM	CUMULATOR
D-XX-X	DAMPER-(XX=P&ID REF)-(X=UNIT NO.)
DM	DAMPER MOTOR (ELECTRIC)
DO	DAMPER OPERATOR (PNEUMATIC)
DAC	DATA ACQUISITION CENTER (SEE NOTE 5)
EC	ELECTRIC HEATER CONTACTOR
E/PC	ELECTRIC (TO) PNEUMATIC CONVERTER
E/S	POWER SUPPLY
FC	FAIL CLOSED OR FLOW CONTROLLER
FD	FIRE DAMPER
FE	FLOW ELEMENT
FI	FLOW INDICATOR OR FAIL INDETERMINATE
FIC	FLOW INDICATING CONTROLLER
FO	FAIL OPEN OR FLOW ORIFICE
FR	FLOW RECORDER
FS	FLOW SWITCH
FT	FLOW TRANSMITTER
(G)	
HAH	HUMIDITY ALARM HIGH
HAL	HUMIDITY ALARM LOW
HC	HUMIDITY CONTROLLER
HIC	HUMIDITY INDICATING CONTROLLER
HLS	HIGH LIMIT SWITCH
HOTP	HIGHER OF TWO PRESSURES
HS	HAND SWITCH
HS&TC	HS & TEMPERATURE CONTROLLER
HS&TIC	HS & TEMP INDICATING CONTROLLER
HV	HAND VALVE
II	CURRENT INDICATOR (AMMETER)
(J)	
(K)	
LC	LEVEL CONTROL
LG	LEVEL GLASS
LLC	LOW LEVEL CONTROL
LOC	LOCALLY MOUNTED
LOTP	LOWER OF TWO PRESSURES
L/R	LOCKOUT RELAY
LS	LEVEL SWITCH
LTC	LIMIT TEMPERATURE CONTROL
MDS	MECHANICAL DOOR SWITCH
MF	MOLECULAR FILTER
MO	MOTOR OPERATOR
(N)	
OAT	OUTSIDE AIR TEMPERATURE
OPFR	OPEN ON FLOW RISE
OPPR	OPEN ON PRESSURE RISE
OTTR	OPEN ON TEMPERATURE RISE
OPS	OUTSIDE PRESSURE SENSOR
OT	OPERATING THERMOSTAT
PB	PUSHBUTTON
PC	PNEUMATIC CONTROLLER
PCH	PNEUMATIC CONTROLLED HUMIDIFIER
PCV	PRESSURE CONTROL VALVE
PDC	PRESSURE DIFFERENTIAL CONTROLLER
PDI	PRESSURE DIFFERENTIAL INDICATOR
PDIS	PRESSURE DIFFERENTIAL INDICATING SWITCH
PDR	PRESSURE DIFFERENTIAL RECORDER
PDT	PRESSURE DIFFERENTIAL TRANSMITTER
PDT/FI	PRESSURE DIFFERENTIAL TRANSMITTER & FLOW INDICATOR
PDS	PRESSURE DIFFERENTIAL SWITCH
P/ER	PNEUMATIC (TO) ELECTRIC RELAY
P/ES	PNEUMATIC (TO) ELECTRIC SWITCH
P/ET	PNEUMATIC (TO) ELEC TRANSMITTER
PI	PRESSURE INDICATOR
PP	PRESSURE POINT
PR	PRESSURE REGULATOR
P/R	PNEUMATIC REGULATOR
PRV	PRESSURE REGULATING VALVE
PS	PRESSURE SWITCH
PSV	PRESSURE (RELIEF) SAFETY VALVE
PT	PRESSURE TRANSMITTER
PZ	STEP CONTROLLER
(Q)	
RCF	RADIATION COLLECTION FILTER
RCFE	RAD COLLECTION FILTER ELEMENT
RE	RADIATION ELEMENT
RHI	RELATIVE HUMIDITY INDICATOR
RHC	RELATIVE HUMIDITY CONTROL
RHS	RELATIVE HUMIDITY SWITCH
RHT	RELATIVE HUMIDITY TRANSMITTER
RIM	RADIATION INDICATING MONITOR
RO	RESTRICTING ORIFICE
R/P	REFERENCE PRESSURE
RR	RADIATION RECORDER
	REGULATOR
SL	SIGNAL LIMITER
SP	SET POINT OR STATIC PRESSURE
SQ	SQUARE ROOT (CONVERTER)
ST	STEAM TRAP (TT=FST, TB=BUCKET)
SUS	START-UP STRAINER
SV	SOLENOID VALVE
SWGR	(LOCATED ON OR NEAR) SWITCHGEAR
SX	SAMPLE POINT
TC	TEMPERATURE CONTROLLER
TCV	TEMPERATURE CONTROL VALVE
TDI	TEMPERATURE DIFFERENTIAL INDICATOR
TDIC	TEMPERATURE DIFFERENTIAL INDICATING CONTROLLER
TDIS	TEMPERATURE DIFFERENTIAL INDICATING SWITCH
TDR	TEMPERATURE DIFFERENTIAL RECORDER
TDS	TEMPERATURE DIFFERENTIAL SWITCH
TDT	TEMPERATURE DIFFERENTIAL TRANSMITTER
TE	TEMPERATURE ELEMENT
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATING CONTROLLER
TR	TEMPERATURE RECORDER
TS	TEMPERATURE SWITCH
TT	TEMPERATURE TRANSMITTER
TX	TEMPERATURE (TESTING) POINT
TAH	TEMPERATURE ALARM-HIGH
TIT	TEMPERATURE INDICATING TRANSMITTER
(U)	
VO	VARIABLE ORIFICE
V-XX-X	VALVE-(XX=P&ID REF)-(X=UNIT NO.)
(W)	
(X)	
YN	IONIZATION DETECTOR
YS	Y- PATTERN STRAINER
ZS	POSITION SWITCH

PIPING SYMBOLS

- SIZE, CLASS, SERVICE — LINE IDENTIFICATION (6"-HBD-20)
- HEATING OR COOLING
- AUX. LINE
- FLEXIBLE CONNECTION
- CONTAINMENT PENETRATION (SLEEVED)
- INCREASER, REDUCER
- OPEN RADWASTE DRAIN FUNNEL (ORW)
- OPEN NORMAL WASTE (NW)
- AIR VENT
- STEAM TRAP
- FUNCTIONAL SEISMIC CLASS I BREAK
- Y-TYPE STRAINER (FLANGED)
- START UP STRAINER
- DRAWING REFERENCE
- (H, 5) DRAWING COORDINATES
- 3-WAY VALVE
- GATE VALVE (NORMALLY OPEN)
- GATE VALVE (NORMALLY CLOSED)
- GLOBE VALVE
- CHECK VALVE
- BUTTERFLY VALVE (DAMPER OR LOUVER)
- PLUG VALVE
- VARIABLE ORIFICE NEEDLE VALVE
- TRIPLE DUTY VALVE
- CIRCUIT SETTER OR CIRCUIT SENSOR
- SOLENOID VALVE
- PNEUMATIC OPERATOR DIAPHRAGM
- RESET SWITCH
- PNEUMATIC OPERATOR CYLINDER
- PNEUMATIC POSITIVE POSITIONER
- CHANGE OF PIPE SPECIFICATION
- FURNISHED WITH ASSOCIATED EQUIPMENT
- FURNISHED BY BECHTEL TO THIS POINT
- FURNISHED BY BIDDER AFTER THIS POINT

H & V SYMBOLS

- BAG TYPE FILTER
- ROUGHING FILTER
- HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTER
- PARALLEL BLADE DAMPER
- FIRE DAMPER (FD) IN DUCT (SEE NOTE 6)
- BACK DRAFT DAMPER (BDD)
- OPPOSED BLADE DAMPER
- BALANCING DAMPER (BD)
- SUPPLY (SF) OR EXHAUST (EF) FAN
- VARIABLE INLET VANES
- SUPPLY AIR REGISTER (SR)
- UNIT HEATER (U.H.) (HOT WATER OR ELECTRIC)
- EXHAUST/RETURN AIR REGISTER (ER) OR (RR)
- ELECTRIC RELAY SYSTEM (BLACK BOX)

COIL DESIGNATIONS

TYPE

- C - COOLING
- H - HEATING
- HC - HEATING & COOLING
- P - PREHEAT
- R - REHEAT
- E - ELECTRIC

H&V AIRFLOW & P&ID INDEX

M-150	PLANT AIR FLOW DIAGRAM
M-151	CONTROL BLDG. AIR FLOW DIAGRAM
M-152	REACTOR BLDG. AIR FLOW DIAGRAM
M-153	TURBINE BLDG. AIR FLOW DIAGRAM
M-154	RADWASTE BLDG. AIR FLOW DIAGRAM
M-155	ADMINISTRATION BLDG. AIR FLOW DIAGRAM
M-156	DRYWELL AIR FLOW DIAGRAM
M-157	DRYWELL COOLING WATER SYSTEM
M-158	STANDBY GAS TREATMENT SYSTEM
M-159	COOLING WATER & VENTILATION SYSTEM-TURBINE BUILDING
M-160	HEATING SYSTEM-BOILER & MAIN LOOP
M-161	HEATING AND A/C SYSTEM-CONTROL BUILDING
M-162	HEATING SYSTEM-REACTOR BUILDING
M-163	HEATING SYSTEM-TURBINE BUILDING
M-164	HEATING AND A/C SYSTEM RADWASTE BLDG.
M-165	MAIN PLANT AIR INTAKE AND M.G. ROOM
M-166	HEATING AND COOLING SYSTEM-PLANT AIR SUPPLY
M-167	HEATING AND COOLING SYSTEM-ADMINISTRATION BLDG.
M-168	HEATING AND COOLING SYSTEM-ADMINISTRATION BLDG.
M-169	CHILLED AND HEATING WATER SYSTEM-CONTROL BLDG.
M-170	HVAC-MISC. CONTROL SYSTEM
M-171	COOLING WATER SYSTEM-REACTOR BUILDING
M-172	HEATING & COOLING SYSTEM-MACHINE SHOP, OFF-GAS RETENTION BLDG. & R.R. ENTRANCE
M-173	STANDBY FILTER UNIT-CONTROL BUILDING
M-174	DRYWELL FAN SYSTEM
M-175	P&ID & AIR FLOW DIAGRAM PUMP HOUSE
M-176	P&ID REACTOR BLDG. & OFF-GAS STACK VENT SYSTEM
M-177	P&ID INTAKE STRUCTURE, WELL HSE, COMPRESSOR BLDG, H+V CONTROL DIAGRAM, BREATHING AIR BUILDING
M-178	HVAC-MISC. CONTROL SYSTEM
M-179	H&V SYMBOLS & ABBREVIATIONS
M-188 SHT 1&2	LOW LEVEL RADWASTE PROCESSING AND STORAGE FACILITY H&V

NOTES

1. SYMBOLS SHOWN ON THIS DRAWING ARE TO BE USED WITH DRAWINGS M-150 THROUGH M-178 AND M-188 SHT 1 & 2 ONLY
2. ALL AUTOMATIC H&V VALVES ARE SHOWN IN DE-ENERGIZED OR UNPRESSURIZED CONDITION.
3. FOR ADDITIONAL INSTRUMENT SYMBOLS SEE M-101.
4. CFM'S INDICATING APPROXIMATE AIR FLOW THROUGH UNCONTROLLED OPENINGS (E.G., STAIRWAYS, HATCHES, ETC.) SHOWN IN THE P&ID'S AND LAYOUT DRAWINGS ARE TO BE USED FOR REFERENCE ONLY TO THE TOTAL SYSTEM AIR BALANCE. THE ARROWS DESIGNATE THE DIRECTION OF AIR FLOW.
5. FOR MECH., ELEC. AND H.V.A.C. DWGS. FOR THE DATA ACQUISITION CENTER, SEE VENDOR PRINTS A059-001.
6. FOR CURRENT FIRE DAMPER INFORMATION AND FUNCTIONAL STATUS SEE DRAWINGS BECH-A013(1) AND BECH-A013(2).

D-097

NO.	DATE	REVISION	DRFTR.	CHK'D	ENGR.	VER.
12	7/9/98	REVISED PER DDC-3594	JAH	TAK	RLB	TWS
11	11-1-94	REVISED PER DDC-1538	DA	TAK	BMT	JDK
0		ISSUED FOR CONSTRUCTION		LV		

BECHTEL
SAN FRANCISCO

DUANE ARNOLD ENERGY CENTER-UNIT NO 1
IOWA ELECTRIC LIGHT AND POWER COMPANY
CEDAR RAPIDS, IOWA

HEATING, VENTILATING & AIR CONDITIONING
H & V SYMBOLS & ABBREVIATIONS

DRAWING NO. BECH-M179 REV. 12