ITEM	QTY	PART NO.	DESCRIPTION
1	1	949-00437-000	VALVE #1, MODULATING MAKE-UP BYPASS, 1/2" NPT. N.C.
2			N/A
3	1	SEE TABLE	VALVE #3, 3-WAY BYPASS
4	1	SEE TABLE	VALVE #4, FEEDWATER VALVE, N.C.
5	1	941-00040-000	VALVE #5, MANUAL BYPASS, GLOBE, 1/2" NPT.
6			N/A
7	1	283-03582-000	PLC VALVE & PUMP CONTROL, BASIC (CEC100)
		283-03583-000	PLC VALVE & PUMP CONTROL, INTERMEDIATE (CEC200)
		NPN	PLC VALVE & PUMP CONTROL, ADVANCED (HAWK ICS ADV PKG)
8	1	SEE TABLE	ECONOMIZER, 2-STAGE CONDENSING
9	2	817-03944-000	FLUE GAS THERMOCOUPLE TRANSMITTER
10	2	817-03943-000	MAKE-UP WATER THERMOCOUPLE TRANSMITTER
11	2	817-03943-000	FEEDWATER THERMOCOUPLE TRANSMITTER

SEE NOTE #4

TABLE FOR ITEM 3	
VALVE 2 SIZE	VALVE P/N
1/2"	949-00477-000
1"	949-00474-000
1-1/4"	949-00475-000
1-1/2"	949-00476-000

TABLE FOR ITEM 4		
BOILER HP	SIZE	VALVE P/N
250	3/4"	949-00438-000
300-350	1"	949-00439-000
400-600	1-1/4"	949-00440-000
700-800	1-1/2"	949-00441-000

TABLE FOR ITEM 8		
BOILER	ECONOMIZER P/N	1ST STAGE WATER CONNECTIONS
250-300HP LE & 4WI	611-00128-000	2" NPT.
350HP LE	611-00129-000	2" NPT.
350HP 4WI	611-00137-000	2" NPT.
400HP LE & 4WI	611-00137-000	2" NPT.
500HP LE & 4WI	611-00130-000	2-1/2" NPT.
600HP LE & 4WI	611-00131-000	2-1/2" NPT.
700HP LE & 4WI	611-00132-000	2-1/2" NPT.
800HP LE & 4WI	611-00133-000	2-1/2" NPT.

NOTES:

1. THIS SYSTEM APPLIES TO HIGH PRESSURE STEAM BOILERS ONLY.

2. ECONOMIZERS ARE FURNISHED PAINTED BY C-B AND INCLUDE SQUARE AND ROUND MATING FLANGE GASKETS AND TWO .75" NPT RELIEF VALVES SET AT 300 PSIG. ECONOMIZER FLANGES ARE DESIGNED TO SUPPORT A MAXIMUM OF 500 lbs. STACK/ECONOMIZER SUPPORT BY OTHERS.

3. DEAERATOR TO BE EQUIPED WITH CONTINUOUS OPERATION BOILER FEED PUMP(S), SUCTION AND DISCHARGE PIPING. SPRAYMASTER DEAERATOR SHOWN BUT UNIT CAN ALSO BE A TRAYMASTER OR BOILERMATE STYLE.
- A DEAERATOR IS REQUIRED FOR SYSTEM OPERATION.
- (1) ADDITIONAL TAPPING MAY BE REQUIRED ON THE DEAERATOR BELOW THE WATER LINE FOR FIRST STAGE BYPASS. FOR EXISTING DEAERATORS, THE INSTALLING CONTRACTOR MUST ADD THIS CONNECTION TO THE TANK. (PIPE, FITTING & INSTALLATION BY OTHERS).
- FOR NEW DEAERATORS, THIS CONNECTION MUST BE ADDED TO THE TANK BY THE REPRESENTATIVE SALES PERSON PLACING THE DEAERATOR ORDER.

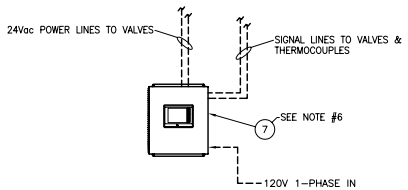
4. THE SIZE OF VALVE #3 SHOULD MATCH THE UPSTREAM CONDENSATE VALVE. SEE CHART FOR APPROPRIATE PART NUMBER. INSTALLATION NOTE: SYSTEM FLOW DOES NOT FOLLOW ARROW ON VALVE BODY.

5. DEAERATOR/SURGE TANK LEVEL CONTROLS ARE NOT INCLUDED IN THE PACKAGE PRICING. EXISTING VALVES AND/OR CONTROLS MAY BE USED PROVIDED THE VALVE IS A MODULATING TYPE. IF NEW VALVES AND/OR CONTROLS ARE REQUIRED, SEE DEAERATOR PRICE SHEETS, SECTION 130-10 FOR INFORMATION AND DETAILS ON HOW TO SIZE THE VALVES BASED ON FLOW AND PRESSURE.

6. CONTROL PANEL IS SHIPPED LOOSE FOR FIELD MOUNTING TO WALL OR STAND (BY OTHERS). CEC100 CONTROL IS INCLUDED IN THE BASE PRICING. CEC200 TOUCH SCREEN CONTROL AND THE HAWK ICS ADVANCED PACKAGE ARE OPTIONAL UPGRADES. WHEN THE HAWK ICS IS SELECTED, CONSULT CB AFTERMARKET CONVERSIONS FOR INPUT/OUPUT CONFIGURATION AND TEMPERATURE TRANSMITTING COMPONENTS.

7. CONDENSING ECONOMIZERS ARE DESIGNED FOR SYSTEMS FIRING PRIMARILY NATURAL GAS AND/OR PROPANE (VALVES AS SHOWN) WITH #2 FUEL OIL AS AN OPTIONAL BACK-UP FUEL ONLY (SEE SEQUENCE OF OPERATION). OTHER FUEL TYPES ARE NOT SUPPORTED. FOR GAS ONLY SYSTEMS, VALVES "D" & "E" ARE NOT REQUIRED.

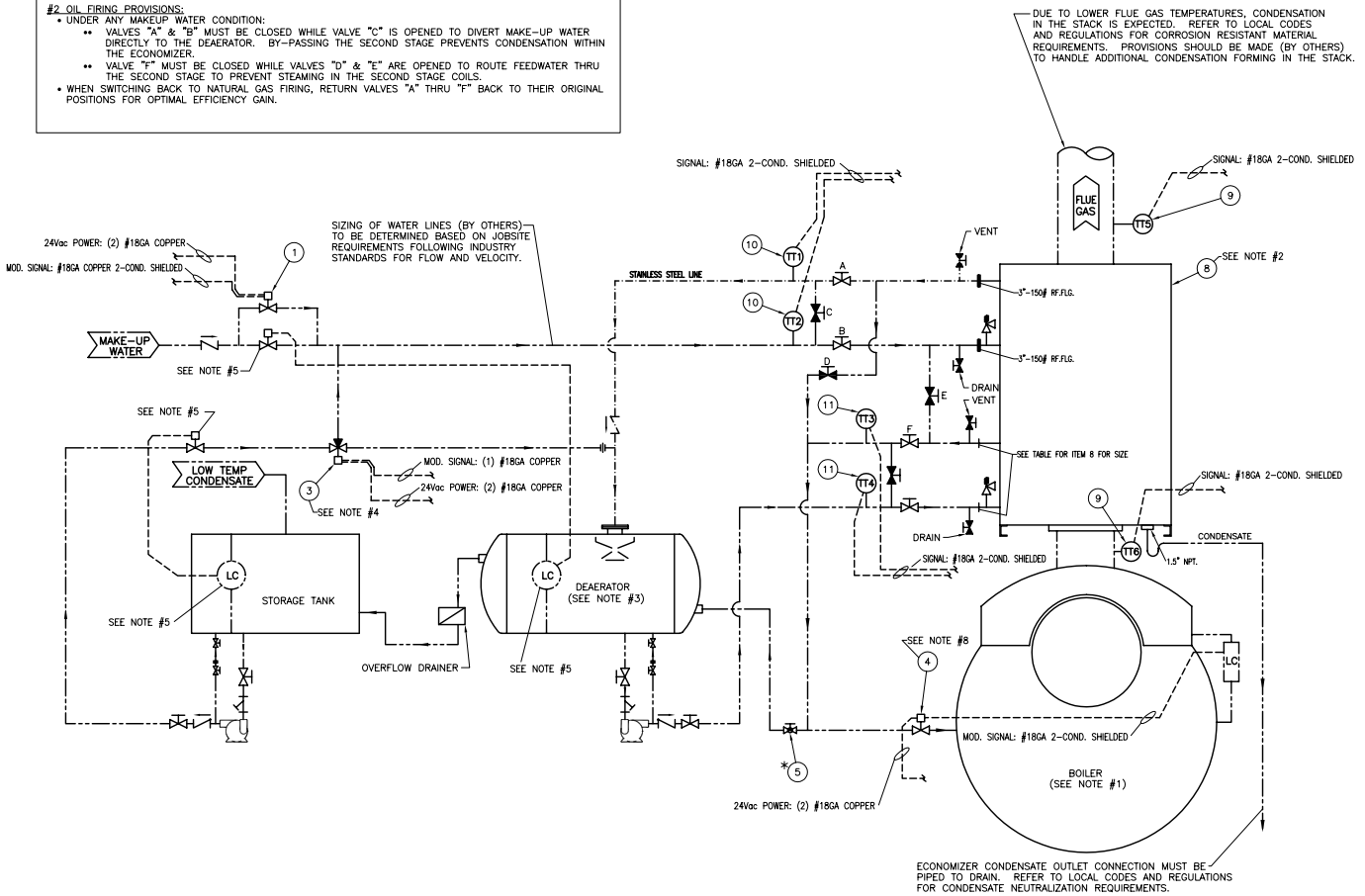
8. A MODULATING FEEDWATER VALVE IS REQUIRED ON ALL SYSTEMS. A THREE VALVE BYPASS IS RECOMMENDED BUT NOT PART OF THE BASE PRICING.



SEQUENCE OF OPERATION

COMMON OPERATION:
- STORAGE TANK LEVEL CONTROL OPENS CONDENSATE VALVE WHEN LEVEL IN STORAGE TANK RISES, SENDING CONDENSATE TO DEAERATOR.
- DEAERATOR LEVEL CONTROL SENDS SIGNAL TO MAKE-UP VALVE TO MAINTAIN LEVEL IN THE DEARATOR, SENDING MAKE-UP WATER THROUGH THE SECOND STAGE OF THE ECONOMIZER AND INTO THE DEAERATOR.
- IF SECOND STAGE OUTLET WATER TEMPERATURE CONTROL SENSES STEAMING, VALVE 3 OPENS TO DIVERT CONDENSATE THROUGH THE SECOND STAGE OF THE ECONOMIZER THEREBY INCREASING FLOW.
- IF SECOND STAGE OUTLET WATER TEMPERATURE CONTROL CONTINUES TO SENSE STEAMING, VALVE 1 IS OPENED TO ADD MORE COLD MAKE-UP WATER.
- BOILER LEVEL CONTROL SENDS SIGNAL TO VALVE 4 TO MAINTAIN LEVEL IN THE BOILER.
- VALVES 1 & 4 ARE MODULATING VALVES, ALL OTHER ARE NOT

#2 OIL FIRING PROVISIONS:
- UNDER ANY MAKEUP WATER CONDITION:
  - VALVES "A" & "B" MUST BE CLOSED WHILE VALVE "C" IS OPENED TO DIVERT MAKE-UP WATER DIRECTLY TO THE DEAERATOR. BY-PASSING THE SECOND STAGE PREVENTS CONDENSATION WITHIN THE ECONOMIZER.
  - VALVE "F" MUST BE CLOSED WHILE VALVES "D" & "E" ARE OPENED TO ROUTE FEEDWATER THRU THE SECOND STAGE TO PREVENT STEAMING IN THE SECOND STAGE COILS.
- WHEN SWITCHING BACK TO NATURAL GAS FIRING, RETURN VALVES "A" THRU "F" BACK TO THEIR ORIGINAL POSITIONS FOR OPTIMAL EFFICIENCY GAIN.



PIPING RECOMMENDATIONS FOR TWO TANK SYSTEMS WITH ONE BOILER

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REVISIONS
ENI# 39969
DATE
01/06/22/09 DJM
UPDATE TO THE MAKE-UP VALVE. DELETED ITEMS 2&6. REVISED NOTES 2&3. TEMP PANEL PER ENI# 39969-A

ALL PIPING IS BY OTHERS
ALL VALVES BY OTHERS (UNLESS OTHERWISE NOTED)
- - - - - CONTROL SIGNAL (WIRING BY OTHERS)
* DENOTES OPTIONAL EQUIPMENT
NORMALLY CLOSED VALVE
NORMALLY OPEN VALVE

ALL MATERIAL SIZES ON BILL OF MATERIAL ARE FOR REFERENCE ONLY. WORKING DIMENSIONS MUST BE FOLLOWED.
TOLERANCE, UNLESS OTHERWISE SPECIFIED:
FRACTIONAL ± DECIMAL ±
HOLE LOCATIONS ± ANGLES ±
DRILLED, PUNCHED OR SLOTTED HOLES ± .010

SHT 01 OF 01

SCALE N.T.S.
DATE 03/24/09
DRAWN DJM
SIZE D

CLEAVER BROOKS
The power of commitment
SCHEMATIC, LE/4WI BOILER W/ COND. ECON, DEA & SRG
DRWG. NO. 722-04918-000 01