CONTINUOUS BLOWDOWN HEAT EXCHANGER SCHEDULE

DESIG	PLANT LOAD (LBS/HR)	PLANT PRESSURE (PSIG)	FLASH PRESSURE (PSIG)	BLOWDOWN (%)	MINIMUM BLOWDOWN FLOWRATE (GPM)	MINIMUM MAKE-UP FLOWRATE (GPM)	BASIS OF DESIGN
CBHX-1	80,000	100	5	3	4	28	PENN SEPARATOR , AHRD-6-30

ECONOMIZER SCHEDULE

DESIG	DESIGN PRESSURE (PSI)	DESIGN TEMPERATURE (°F)	WATER FLOW CONFIGURATION	GAS FLOW CONFIGURATION	UNIT DUTY (MBTU-HR)	UNIT WET WEIGHT (LBS)	APPROXIMATE OVERALL DIMENSIONS (WxLxH)	WATER SIDE: FLUID	FLOW (PPH)	ENTERING TEMP (°F)	LEAVING TEMP (°F)	MAX PRESS DROP (PSI)	FOULING FACTOR	FLUE GAS SIDE: FLUID	FLOW (SCFM)	ENTERING TEMP (°F)	LEAVING TEMP (°F)	MAX PRESS DROP (IN. W.C.)	FOULING FACTOR	BASIS OF DESIGN
EC-1	450	600	COUNTER FLOW	VERTICAL	450	3,067	58"x70"x95"	FEEDWATER	20,700	227	250	1.0	0.0005	FLUE GAS	4,740	369	289	0.16	0.001	CLEAVER BROOKS, CRE-42
EC-2	450	600	COUNTER FLOW	VERTICAL	450	3,067	58"x70"x95"	FEEDWATER	20,700	227	250	1.0	0.0005	FLUE GAS	4,740	369	289	0.16	0.001	CLEAVER BROOKS, CRE-42
EC-3	450	600	COUNTER FLOW	VERTICAL	450	3,067	58"x70"x95"	FEEDWATER	20,700	227	250	1.0	0.0005	FLUE GAS	4,740	369	289	0.16	0.001	CLEAVER BROOKS, CRE-42

NOTES:
1. ECONOMIZER CASING SHALL BE CONSTRUCTED OF STAINLESS STEEL.
2. ECONOMIZER INTERNALS SHALL BE CONSTRUCTED OF REMOVABLE ONE INCH DIAMETER (1"). AL-6XN STAINLESS STEEL TUBES WITH CARBON STEEL FINS.
3. ECONOMIZER SHALL MEET ALL A.S.M.E. CODE REQUIREMENTS.
4. ECONOMIZER MANUFACTURER SHALL PROVIDE SAFETY RELIEF VALVE.
5. SYSTEM CONNECTIONS SHALL BE A MINIMUM OF CLASS 300 FLANGED CARBON STEEL.

GENERAL NOTES:
1. ALL ITEMS THAT REQUIRE ACCESS, SUCH AS FOR OPERATING, CLEANING, SERVICING, MAINTENANCE, AND CALIBRATION, SHALL BE EASILY AND SAFELY ACCESSIBLE BY PERSONS STANDING AT FLOOR LEVEL, OR STANDING ON PERMANENT PLATFORMS, WITHOUT THE USE OF PORTABLE LADDERS. EXAMPLES OF THESE ITEMS INCLUDE, BUT ARE NOT LIMITED TO: ALL TYPES OF VALVES, FILTERS AND STRAINERS, TRANSMITTERS, CONTROL DEVICES. PRIOR TO COMMENCING INSTALLATION WORK, REFER CONFLICTS BETWEEN THIS REQUIREMENT AND CONTRACT DRAWINGS TO THE RESIDENT ENGINEER FOR RESOLUTION.

BLOWDOWN SEPARATOR SCHEDULE

DESIG	TANK HEIGHT (INCHES)	INLET (INCHES)	VENT (INCHES)	DRAIN (INCHES)	COOLING WATER TEMP (°F)	BASIS OF DESIGN
BDS-1	34	2	5	5	70	PENN SEPARATOR , A34

NOTE: PROVIDE FLANGED VENT AND DRAIN CONNECTIONS.

CONDENSATE SURGE TANK SCHEDULE

DESIG	TYPE	DESIGN OPERATING PRESSURE (PSIG)	MIN RETENTION AT FULL LOAD (MINUTES)	MIN RETENTION AT FULL LOAD (GAL)	TANK DIMENSIONS (DIA x OAL)	TANK EMPTY WEIGHT (LBS)	TOTAL APPROXIMATE FLOODED WEIGHT (LBS)	BASIS OF DESIGN
CST-1	HORIZONTAL	VENTED	20	2,400	6' x 14'	10,500	34,500	BFS INDUSTRIES

WATER SOFTENER SCHEDULE

DESIG	SYSTEM	NORMAL OPERATING MODE	WATER HARDNESS INLET (PPM)	WATER HARDNESS OUTLET (PPM)	OPERATING TEMPERATURE (°F)	OPERATING PRESSURE (PSI)	GRAIN CAPACITY PER TANK (GRAINS)	CONTINUOUS FLOW RATE (GPM)	PEAK FLOW RATE (GPM)	MAXIMUM PRESSURE DROP AT CONTINUOUS FLOW RATE (PSI)	VESSEL SIZE (EACH TANK) (DIA x H)	VESSEL PRESSURE RATING (PSI)	MAXIMUM REGENERATION TIME (MINUTES)	MAXIMUM BACKWASH FLOW (GPM)	BRINE TANK: CAPACITY (GAL)	DIMENSIONS (DIA x H)	ELECTRICAL	APPROX WEIGHT (LBS)	BASIS OF DESIGN
WSF-1	BOILER MAKE-UP (NP)	TRIPLEX SEQUENTIAL	120	0	70	65	900,000	150	216	15	42" x 80"	[illegible]	[illegible]	45	500	57" x 63"	120 / 1 / 60	10,000	MARLO MR-900-2

NOTE: TRIPLEX SEQUENTIAL: ONE TANK OPERATIONAL, ONE TANK REGENERATION, ONE TANK STAND-BY.

SCOTCH MARINE FIRETUBE BOILER SCHEDULE

DESIG	SERVICE	TYPE	CAPACITY: POUNDS PER HOUR (PPH)	HORSEPOWER (HP)	MBTU's PER HOUR	EXHAUST GAS TEMPERATURE (GAS/OIL)(°F)	DESIGN PRESSURE (PSIG)	OPERATING PRESSURE (PSIG)	MIN HEATING SURFACE (SQ.FT.)	MIN BOILER EFFICIENCY (GAS/OIL)(%)	SKID MOUNTED AIR COMPRESSOR (HP)	ELECTRICAL	TOTAL APPROXIMATE OPERATING WEIGHT (LBS)	APPROXIMATE OVERALL DIMENSIONS (LxWxH)	BASIS OF DESIGN
B-1	STEAM	4 PASS WET-BACK	20,700	600	20,085	375 / 383	200	100	3000	83 / 86	7½	480 / 3 / 60	65,000	24' x 10.5' x 12'	CLEAVER BROOKS, MODEL 4WI
B-2	STEAM	4 PASS WET-BACK	20,700	600	20,085	375 / 383	200	100	3000	83 / 86	7½	480 / 3 / 60	65,000	24' x 10.5' x 12'	CLEAVER BROOKS, MODEL 4WI
B-3	STEAM	4 PASS WET-BACK	20,700	600	20,085	375 / 383	200	100	3000	83 / 86	7½	480 / 3 / 60	65,000	24' x 10.5' x 12'	CLEAVER BROOKS, MODEL 4WI

NOTES:
1. SAFETY VALVE SETTINGS: 135 PSIG, 140 PSIG
2. FIRST HIGH PRESSURE CUT-OUT SETTING: 120 PSIG SECOND HIGH PRESSURE CUT-OUT SETTING: 130 PSIG
3. MINIMUM STEAM QUALITY: 99.0%
4. ALTITUDE: 100 FEET ABOVE SEA LEVEL
5. REFER TO LOW NOx BURNER SCHEDULE FOR ADDITIONAL INFORMATION.
6. STEAM NOZZLE SHALL BE CONSTRUCTED WITH A REINFORCEMENT PAD.

PUMP SCHEDULE

DESIG	LOCATION	SERVICE	TYPE	PUMP ROTATION (VERIFY)	FLOW (GPM)	HEAD (FEET H₂O)	SUCTION / DISCHARGE	MOTOR: HP	RPM	ELECTRICAL	DUTY	VFD	MINIMUM PUMP EFFICIENCY (%)	APPROXIMATE WEIGHT (LBS)	BASIS OF DESIGN
CTP-1	CONDENSATE SURGE TANK	CONDENSATE TRANSFER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	84	135	2½" x 2½"	7.50	3,500	480 / 3 / 60	CONTINUOUS	NO	70.6	230	AURORA PUMPS, PVM SERIES
CTP-2	CONDENSATE SURGE TANK	CONDENSATE TRANSFER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	84	135	2½" x 2½"	7.50	3,500	480 / 3 / 60	CONTINUOUS	NO	70.6	230	AURORA PUMPS, PVM SERIES
CTP-3	CONDENSATE SURGE TANK	CONDENSATE TRANSFER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	42	135	2" x 2"	3.00	3,500	480 / 3 / 60	CONTINUOUS	NO	64.8	131	AURORA PUMPS, PVM SERIES
BFP-1	DEAERATOR	BOILER FEED WATER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	46	370	2" x 2"	7.50	3,500	480 / 3 / 60	INVERTER	YES	66.1	187	AURORA PUMPS, PVM SERIES
BFP-2	DEAERATOR	BOILER FEED WATER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	46	370	2" x 2"	7.50	3,500	480 / 3 / 60	INVERTER	YES	66.1	187	AURORA PUMPS, PVM SERIES
BFP-3	DEAERATOR	BOILER FEED WATER	VERTICAL MULTISTAGE	COUNTER CLOCKWISE	46	370	2" x 2"	7.50	3,500	480 / 3 / 60	INVERTER	YES	66.1	187	AURORA PUMPS, PVM SERIES
FOP-1	FUEL OIL PUMP PIT	No2 FUEL OIL	ROTARY POSITIVE DISPLACEMENT	COUNTER CLOCKWISE	11	290	1¼" x 1¼"	2.00	1,725	480 / 3 / 60	CONTINUOUS	NO	-	120	PREFERRED, LO-204
FOP-2	FUEL OIL PUMP PIT	No2 FUEL OIL	ROTARY POSITIVE DISPLACEMENT	COUNTER CLOCKWISE	11	290	1¼" x 1¼"	2.00	1,725	480 / 3 / 60	CONTINUOUS	NO	-	120	PHILLIPS FUEL SYSTEMS, D-15

LOW NOx BURNER SCHEDULE

BOILER No	COMBUSTION AIR TEMPERATURE (°F)	HUMIDITY (%)	EXCESS AIR (%) (GAS/OIL)	NATURAL GAS: TURNDOWN	TRAIN INLET PRESSURE (PSIG)	NOx (PPM)	CO (PPM)	FUEL OIL No 2: TURNDOWN	TRAIN INLET PRESSURE (PSIG)	NOx (PPM)	CO (PPM)	FORCED DRAFT FAN: HP	RPM	ELECTRICAL	DUTY	VFD	BASIS OF DESIGN
1	80	50	15 / 15	10:1	10	30	50	8:1	120	90	50	40	3,500	480 / 3 / 60	INVERTER	YES	PROVIDED BY BOILER MANUFACTURER
2	80	50	15 / 15	10:1	10	30	50	8:1	120	90	50	40	3,500	480 / 3 / 60	INVERTER	YES	PROVIDED BY BOILER MANUFACTURER
3	80	50	15 / 15	10:1	10	30	50	8:1	120	90	50	40	3,500	480 / 3 / 60	INVERTER	YES	PROVIDED BY BOILER MANUFACTURER

NOTES:
1. NO COMBUSTION AIR PRE-HEAT.
2. GAS SPUDS SHALL BE STAINLESS STEEL.
3. FORCED DRAFT FAN INLET SHALL BE SCREENED.
4. EMISSIONS PARTS PER MILLION (PPM) ARE BASED ON 3% OXYGEN (O_2).

DEAERATOR CONNECTIONS SCHEDULE

DESCRIPTION	MINIMUM CONNECTION SIZE (DIA)	QUANTITY EACH
PUMPED CONDENSATE INLET :	3"	1
STEAM INLET :	8"	1
RELIEF VALVE OUTLET :	1½"	1
TEMPERATURE INDICATOR / TRANSMITTER :	¾"	3
PRESSURE INDICATOR :	¾"	1
ATMOSPHERIC VENT :	1½"	1
HEATER MANWAY :	18"	1
HIGH PRESSURE RETURN :	2"	1
VACUUM BREAKER :	2½"	1
BOILER FEED WATER PUMP RECIRCULATION :	1½"	1
BOILER FEED WATER PUMP SUCTION :	6"	1
OXYGEN SAMPLE POINT :	¾"	1
STORAGE MANWAY :	12"x16"	2
OVERFLOW :	4"	1
LEVEL CONTROL :	1½"	2
GAUGE GLASS :	1½"	2
CHEMICAL FEED :	1¼"	1
MANUAL DRAIN :	1½"	1

STEAM TRAP SCHEDULE

DESG	GENERAL LOCATION	TYPE	TRAP SIZE	MINIMUM INLET PRESSURE (PSIG)	MINIMUM DIFF PRESS (PSIG)	FLOW RATE (LB/HR): OPER FLOW	SAFETY FACTOR	DESIGN FLOW	STEAM TEMP (°F): OPER	MAX	BASIS OF DESIGN
T-01	100S STEAM HEADER END DRIP	INVERTED BUCKET	½"	100	80	110	3	330	338	361	-
T-02	100S STEAM HEADER END DRIP	INVERTED BUCKET	½"	100	80	110	3	330	338	361	-
T-03	100S WHISTLE VALVE DRIP	INVERTED BUCKET	½"	100	80	5	3	15	338	361	-
T-04	DEAERATOR PRV	INVERTED BUCKET	½"	100	80	110	3	330	338	361	-
T-05	5S AT REDUCING STATION	FLOAT & THERMOSTATIC	¾"	5	1/4	16	2.5	40	227	250	-
T-06	100S MAIN TO DISTRIBUTION	INVERTED BUCKET	½"	100	80	64	3	191	338	361	-
T-07	100S MAIN TO REDUCING STATION	INVERTED BUCKET	½"	100	80	12	3	36	338	361	-
T-08	100S AT REDUCING STATION	INVERTED BUCKET	½"	100	80	12	3	36	338	361	-
T-09	15S AT REDUCING STATION	FLOAT & THERMOSTATIC	½"	15	1/4	16	2.5	40	250	262	-
T-10	5S MAIN TO DA-1	FLOAT & THERMOSTATIC	1"	5	1/4	16	2.5	40	227	250	-
T-11	5S MAIN FROM CBHX-1	FLOAT & THERMOSTATIC	¾"	5	1/4	16	2.5	40	227	250	-
T-12	15S END OF MAIN DRIP	INVERTED BUCKET	½"	15	12	20	3	60	250	262	-
T-13	15S MAIN TO HEATING EQUIPMENT	INVERTED BUCKET	½"	15	12	20	3	60	250	262	-
T-14	HV-B-1 EQUIPMENT DRIP	FLOAT & THERMOSTATIC	1½"	5	1/4	383	2.5	950	227	262	-
T-15	HV-B-2 EQUIPMENT DRIP	FLOAT & THERMOSTATIC	1½"	5	1/4	383	2.5	950	227	262	-
T-16	HV-B-3 EQUIPMENT DRIP	FLOAT & THERMOSTATIC	1½"	5	1/4	383	2.5	950	227	262	-
T-17	100S EMERGENCY BOILER	INVERTED BUCKET	½"	100	80	33	3	100	338	361	-

DEAERATOR SCHEDULE

DESIG	TYPE	NORMAL CAPACITY (TOTAL MASS FLOW) (PPH)	MAX O_2 CONTENT (CC/LITER)	MIN TURNDOWN CAPACITY	DESIGN MAKE-UP WATER TEMP (°F)	DESIGN MAKE-UP WATER FLOW (%)	DESIGN OPERATING PRESSURE (PSIG)	DESIGN OPERATING TEMPERATURE (°F)	MAX OPERATING PRESSURE (PSIG)	MIN OPERATING PRESSURE (PSIG)	STORAGE TANK: MIN RETENTION AT FULL LOAD (MINUTES)	MIN RETENTION AT FULL LOAD (GAL)	APPROX DIMENSIONS (DIA x LENGTH)	TOTAL APPROXIMATE EMPTY WEIGHT (LBS)	TOTAL APPROXIMATE FLOODED WEIGHT (LBS)	BASIS OF DESIGN
DA-1	TRAY	60,000	0.005	20:1	70	100	5	400	30	FULL VACUUM	20	2,400	6' x [illegible]	31,[illegible]	53,000	BFS INDUSTRIES

NOTES:
1. DEAERATOR SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ASME PRESSURE VESSEL CODES WITH 1/8" CORROSION ALLOWANCE.
2. CONSTRUCT PER HEAT EXCHANGER INSTITUTE (HEI) STANDARDS OF CONSTRUCTION.
3. STEAM NOZZLE SHALL BE CONSTRUCTED WITH A REINFORCEMENT PAD.
4. DEAERATOR MANUFACTURER SHALL PROVIDE ACCESS PLATFORM AND LADDER TO DEAERATOR HEAD FOR TRAY REMOVAL.

STEAM VENT SILENCER SCHEDULE

DESIG	LOCATION	FLOW (PPH)	OUTLET SIZE (INCH)	BASIS OF DESIGN
SVS-1	100 STEAM HEADER	21,000	16	VANEC MODEL 521-16

NOTES:
1. 12 dB MINIMUM AT 63 Hz
17 dB MINIMUM AT 125-250 hZ
25 dB MINIMUM AT 250-500 Hz
34 dB MINIMUM AT 500-8000 Hz

FINAL DESIGN
APPROVED FOR CONSTRUCTION

Revisions: | Date

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Approved: Project Director
Project Title: REPLACE BOILERS - FCA D, ENERGY AT THE MALCOM RANDALL VAMC
Location: GAINESVILLE, FLORIDA
Date: MARCH 9, 2018 | Checked: JSN | Drawn: RWD
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