BOILER FEEDWATER PUMPS
STANDARD DATASHEET (DS)

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1.0 The blank data sheets included in this section shall be completely filled in. The data listed therein shall not relieve the Seller of the responsibility for meeting the requirements of the detailed specifications. Where alternates are indicated, the Seller shall provide complete information for each alternate. Filling in the cell where Buyer has specified a value confirms the Seller complies to that requirement.

2.0 IN ADDITION TO COMPLETING THE FILL IN DATA SECTION BELOW, SELLER SHALL PROVIDE THE FOLLOWING AS PART OF THE PROPOSAL:

- Preliminary General Arrangement (Outline Drawing) showing size, thickness, weights, nozzle connections, locations and manways.
- Preliminary Foundation Loading Diagram including seismic and wind loads (+15%, -0%) and anchorage details.
- Priced list of spare parts recommended for startup and commissioning of proposed Equipment with prices effective as specified in Section GR-A.
- Piping and Instrumentation Drawings (P&IDs)
- Motor Horsepower/Performance Curves and/or datasheets.
- Performance Curves
- Equipment Delivery List including all equipment and accessories to be provided, as required by the specifications, with method of shipping. This list will be used in the evaluation of Proposals to establish the quantity and assembly required for the Equipment proposed.
- Engineering and Manufacturing Schedule indicating major activities and durations for engineering design, submittal of drawings and information, fabrication, submittal of instruction manuals, factory testing and delivery.

3.0 THE SELLER SHALL PROVIDE THE FOLLOWING FILL-IN DATA TO THE BUYER ELECTRONICALLY (IN EXCEL FORMAT) WITH SELLER'S PROPOSAL. THIS SECTION WILL BE INCLUDED IN THE FINAL MATERIAL CONTRACT.

4.0 The Seller has provided the data shown in the following table as part of its Proposal. The Buyer has relied on the data provided for purposes of award of this Agreement, and design of related systems and facilities for the Project. The equipment shall meet (or exceed) the characteristics and data provided, or the requirements of the Specifications, whichever is more stringent.

4.1 In no case shall the information provided herein relieve the Seller of his responsibility for meeting the requirements of the detailed Specifications.

4.2 Additional information shall be provided as requested by the Buyer.

Owner Requirement - Cannot be changed

Blank Fields (No Color Fill) - Seller to Input

BOILER FEEDWATER PUMPS DATASHEET (DS)

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	Boiler Feedwater Pumps		Buyer Specified		
Item	Description	Units	Rev. 0	Seller's Offer	Comments
1.00	General				
1.01	Scope				
1.01.01	Quantity of Boiler Feedwater Pumps		2 sets of 2 (4)	2 sets of 2 (4)	
1.01.02	Quantity of Electric Motor Drivers		2 sets of 2 (4)	2 sets of 2 (4)	
1.01.02a	Quantity of Fluid Couplings		4	4	
1.01.03	Pump/Motor Speed Control Required		Hydraulic Coupling	Yes with Voith	
1.01.04	Pump Capacity (per pump)	%	100%; see Performance Case Summary	100	
1.01.05	Quantity of Spare Boiler Feedwater Pumps		0	0	
1.01.06	Location (Indoor, Outdoor)		Outdoor	Outdoor with SH5 noise enclosure on pump and VSC incl. heating	
1.01.07	Pump Manufacturer		By Seller	KSB Frankenthal	
1.01.08	Pump Model Number		By Seller	HGC 6/1+8	
1.01.09	Pump Tag Number		11-LAB00-PMP-01A 11-LAB00-PMP-01B 21-LAB00-PMP-01A 21-LAB00-PMP-01B	As specified	
1.02	Design Considerations				
1.02.01	Minimum Operating Temperature	°F	285.2	285.2	
1.02.02	Maximum Suction Temperature	°F	331.5	331.5	
1.02.03	Design/Maximum Suction Pressure	psig	195	195	
1.02.04	Design HP Discharge Pressure	psig	By Seller	4126 ~~4110~~	
1.02.05	Design IP Discharge Pressure	psig	By Seller	2058 ~~1377~~	
1.02.06	Design Temperature	°F	By Seller	375	
1.02.07	Pump Design Speed	rev/min	By Seller	3452 ~~3450~~	
1.02.08	Maximum water temperature change rate for cooling hot pump	°F/min	By Seller	50K /min	
1.02.09	Rise to shutoff at design speed of the total head at the design point (Each Pump)	%	Minimum: 120% Nominal: 125% +/-5%	130%	Shut-off HP (9078ft) / HP Case #8 (6970ft) ~~Shut-off HP (9042ft) / HP Case #8 (6980ft)~~
1.02.10	Maximum TDH at shutoff conditions at maximum speed of coupling (HP Discharge)	ft	By Seller	9078 ~~9042~~	@3452 ~~3450~~ rpm
1.02.11	Maximum TDH at shutoff conditions at maximum speed of coupling (IP Discharge)	ft	By Seller	4301 ~~2730~~	@3452 ~~3450~~ rpm
1.02.12	Maximum Surface Design Temperature (for insulation/lagging design)	°F	140°F	140°F	
1.03	Pump Performance				
1.03.01	Performance Guarantee Case		Curve-Defining Case (By Seller)	#8	
1.03.02	Guaranteed TDH at guaranteed capacity (HP discharge)	ft	Per Performance Case Summary	6970 ~~6980~~	
1.03.03	Guaranteed capacity at guaranteed TDH (HP discharge)	gpm	Per Performance Case Summary	4031 ~~4033~~	
1.03.04	Brake horsepower at guaranteed TDH and capacity	bhp	By Seller	7963 ~~7869~~	pump shaft power
1.03.05	Guaranteed TDH at guaranteed capacity (IP discharge)	ft	Per Performance Case Summary	3150 ~~2034~~	
1.03.06	Guaranteed capacity at guaranteed TDH (IP discharge)	gpm	Per Performance Case Summary	364	
1.03.07	Auxiliary Power Guarantee Case - Fired Guarantee		Case 2		
1.03.08	Guaranteed auxiliary power consumption at motor terminals (inclusive of all test tolerances). This shall include all operating pumps, standby pumps, and auxiliaries	kW	By Seller	6769 ~~6669~~	
1.03.09	Auxiliary Power Guarantee Case - Unfired Guarantee		Case 1		
1.03.10	Guaranteed auxiliary power consumption at motor terminals (inclusive of all test tolerances). This shall include all operating pumps, standby pumps, and auxiliaries	kW	By Seller	3782 ~~4846~~	
1.03.11	Pump capacity at run-out	gpm	Per Technical Specification	4436.3 ~~4436~~	+10% of HP flow of case #8
1.03.12	TDH at pump run-out capacity	ft	By Seller	6601 ~~6585~~	
1.03.13	NPSHR at pump run-out capacity	ft	By Seller	35.8	NPSH 3%
1.03.14	NPSHR at design capacity	ft	By Seller	31.5	NPSH 3%
1.03.15	Minimum Continuous Stable Flow (MCSF) required	gpm	By Seller	1388 ~~appr. 1040~~	@3452 ~~3450~~ rpm
1.03.15A	TDH at MCSF	ft	By Seller	8708 ~~appr. 8720~~	
1.03.16	Pump efficiency	%	By Seller	83.7	hot, Case #8
1.03.17	Motor efficiency	%	Per Section E1	96.6 ~~96.9~~	WEG motor, 75% load
1.03.18	Overall pump and motor efficiency	%	By Seller	Later	
1.03.18A	Required motor nameplate rating	hp	Per Section E1	9812 ~~9650~~	
1.03.19	Maximum brake power required at run-out	bhp	By Seller	8409 ~~8747~~	pump shaft power
1.03.20	Warm-up flow (if required)	gpm	By Seller	N.A.	
1.03.21	Pump speed	rev/min	By Seller	appr. 2160 ~~2675~~ to 3452 ~~3450~~	
1.03.24	Critical speed	rev/min	No critical speeds within 25% of the pump operating speed	Confirmed	Pump may be operated within the provided operating range.
1.03.22	Temperature rise of feedwater at rated capacity	°F	By Seller	Approx. 1.8	(calculated for case #8)
1.04	Preliminary cooling water requirements - Total				
1.04.01	Total flow required per pump	gpm	By Seller	542	
1.04.02	Cooling water pressure loss	psid	< 10.0	< 10.0	
1.04.03	Heat duty per pump	Btu/hr	By Seller	4,657,300	Equal to 1365 kW
1.04.04	Maximum operating inlet cooling water temperature	°F	120	120	
1.04.05	Minimum operating inlet cooling water temperature	°F	40	40	
1.04.06	Cooling water piping design temperature	°F	150	150	
1.04.07	Cooling water piping design pressure	psig	Per Section GR-A	150	
1.04.08	Pump oil temperature start permits can be achieved while the aux lube oil pump is running and the full amount of cooling water flow (line 1.04.01) is at minimum inlet temperature (line 1.04.05) (Yes/No)		Yes	Yes	Oil heater provided by Seller
2.00	Construction				
2.01	General				
2.01.01	Pump Type		Multi-Stage Segmental Ring Section	HGC (Segmental Ring Section)	
2.01.02	Number of stages		By Seller	1+8	
2.01.03	Recommended suction strainer mesh size (Startup)		By Seller	500µm	
2.01.04	Recommended suction strainer mesh size (Operation)		By Seller	500µm	
2.01.05	Suction connection orientation (vertical, horizontal, other)		Vertical	Vertical	
2.01.06	HP discharge connection orientation (vertical, horizontal, other)		Vertical	Vertical	
2.01.07	IP discharge connection orientation (vertical, horizontal, other)		Vertical	Vertical	
2.01.08	Type of mechanical seals		Cartridge	Cartridge	
2.01.09	Shaft sleeves (included, not included)		By Seller	Included	

BOILER FEEDWATER PUMPS DATASHEET (DS)

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	Boiler Feedwater Pumps		Buyer Specified		
Item	Description	Units	Rev. 0	Seller's Offer	Comments
2.01.10	All radial and thrust bearing lubrication		Forced	Forced	
2.01.11	Minimum Design Metal Temperature (MDMT)	°F	-20	Confirmed	Enclosure provided for operation; storage at this temperature (-20 F) is acceptable, acceptable operating temps to follow GR-A and vendor O&M requirements.
2.01.12	Hydraulic balancing method		Balance Drum	Balance disc	
2.01.13	Pipe cleanliness control code for cooling water		Per Section P1	CC-2 (SS)	
2.01.14	Pipe cleanliness control code for oil		Per Section M1 and P1	CC-5 (SS)	
2.02	Connections				
2.02.01	HP pump discharge (Size / Class / Type)		12", CL2500, RFFE	10", CL2500, RF	
2.02.02	IP pump discharge (Size / Class / Type)		6", CL1500 ~~900~~, RFFE	4", CL1500 ~~900~~, RF	
2.02.03	Pump suction (Size / Class / Type)		14", CL150, RFFE	12", CL300, RF	
2.02.04	Cooling water (Size / Class / Type)		By Seller, CL150, RFFE	6", CL150, RF	
2.02.05	Suction side drain (Size / Class / Type)		By Seller, CL150, RFFE	1-11.5 NPT, CL150, RF	
3.00	Materials of Construction (ASTM Number)				
3.01	General				
3.01.01	Discharge Head and Nozzle		12% CR per API 610 Table H.1 Column C6	1.4006+QT650	See KSB data sheet page 3
3.01.02	Suction Head and Nozzle		12% CR per API 610 Table H.1 Column C6	1.4006+QT650	See KSB data sheet page 3
3.01.03	Impellers and Diffusers		12% CR per API 610 Table H.1 Column C6	1.4317 + QT (suction impellers) 1.4008.09 (impeller)	See KSB data sheet page 3
3.01.04	Shafts		12% CR per API 610 Table H.1 Column C6	1.4313.09+GAL CR	Chrome-plated, see KSB data sheet page 3
3.01.05	Impeller Wear Rings (if part of Seller's design)		12% CR per API 610 Table H.1 Column C6	not applicable	
3.01.06	Casing		By Seller	1.4006+QT650	See KSB data sheet page 3
3.01.07	Casing Rings		12% CR per API 610 Table H.1 Column C6	RWA 350	See KSB data sheet page 3
3.01.08	Shaft Sleeves		Manufacturer's Standard	1.4138	See KSB data sheet page 3
3.01.09	Shaft Slingers		Carbon Steel	Carbon Steel	
3.01.10	Gaskets and seals		By Seller	EPDM	Additional information during detailed design
3.01.11	Diaphragms and stage piece		By Seller	Not applicable	
3.01.12	Internal bolting and studs		By Seller	Stainless steel	Additional information during detailed design
3.01.13	External bolting and studs		By Seller	1.6772	Main Studs
3.01.14	Ring Sections		12% CR per API 610 Table H.1 Column C6	1.4006+QT650	See KSB data sheet page 3 (same as stage casing)
3.01.15	Ring Section Gaskets		Viton or EPDM (ring sections maybe metal-to-metal fit) (elastomers for use other than between ring sections and not directly exposed to process temperatures may be EPR, Nitrile)	EPDM80 and metal-to-metal fit	
3.02	Mechanical Seals				
3.02.01	Cover		316 Stainless Steel	316/316L Stainless Steel	See attached document "T00-H30-R00_Smarr - Mechanical seal sectional Drawing" for details. Final mechanical seal selection after order.
3.02.02	Rotating Face		Carbon	Silicon Carbide	
3.02.03	Stationary Face		Silicon Carbide	Carbon	
3.02.04	Magnetic Separator		No	No	
3.02.05	Elastomers		Viton, EPR, or EPDM	EPDM	
4.00	Fluid Coupling				
4.01	Manufacturer		Voith	Voith	
4.02	Model number		By Seller	620 SVNL 33G	
4.03	Type		Per Technical Specification	Hydraulic coupling	
4.04	Rated horsepower	hp	Per Technical Specification	8449 ~~8293~~	Voith Design @ maximum speed (at output shaft)
4.10	Shaft Coupling				
4.10.1	Service Factor		Minimum 1.5	Confirmed	
5.00	Bearing				
5.01	Type of radial bearing		Per Technical Specification	Sleeve bearing	
5.02	L_{10} Life		Per Technical Specification	N/A	
5.03	Material		Per Technical Specification	Steel / Cast steel	Details during order execution
5.04	Type of thrust bearing		Per Technical Specification	Tilting-pad thrust bearing as lift-off device	
5.05	Manufacturer		By Seller	KSB Choice	
5.06	Material		By Seller	Steel / Cast steel	Details during order execution
6.00	Mechanical Seal				
6.01	Seal Plan (API No.)		Per Technical Specification	23 + jacket cooling	
6.02	Compliant with API (Yes / No)		Yes	Yes	
6.03	Manufacturer		By Seller	KSB	
6.04	Model number		By Seller	4KSHPKS105 40187	
6.05	Material		By Seller	Q2BEGG	
7.00	Lubrication System				
7.01	Primary material of construction		Per Technical Specification	Later	according to VSC supplier standard
7.02	Oil type		By Seller	ISO-VG 32 or 46	To be finalized based on final conditions
7.03	Required oil volume per pump	gal	By Seller	Later	
7.04	Total volume of oil used on skid	gal	By Seller	113.6 + 14.5	oil in the sump approx. + oil in the rot. parts Preliminary total oil volume acc. to Voith drawing

BOILER FEEDWATER PUMPS DATASHEET (DS)

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	Boiler Feedwater Pumps		Buyer Specified		
Item	Description	Units	Rev. 0	Seller's Offer	Comments
7.05	Base plate containment volume	gal	Per Technical Specification	Base plate containment volume	
7.06	Forced Lubrication		By Seller	Confirmed	
7.07	Oil supply and return temperature	°F	By Seller	131 / 149	Preliminary (forced oil)
7.08	Oil pressure at cooler inlet (Design / Operating)	psig	By Seller	150	Preliminary design pressure
7.09	Electric oil pump	hp / V / Ph	By Seller	4 / 460 VAC / 3	Preliminary
7.10	Oil heater	kW / V / Ph	By Seller	5.4 / 460 VAC / 3	Preliminary
7.11	Lubricating oil supplied to the electric motor (Yes / No)		Yes	Yes	
8.00	Allowable Nozzle Loads				
8.04	Allowable Suction Nozzle Loading Force				
8.04.01	Fx	lb	Per Technical Specification	2xAPI	
8.04.02	Fy	lb	Per Technical Specification	2xAPI	
8.04.03	Fz	lb	Per Technical Specification	2xAPI	
8.05	Allowable suction nozzle loading moment				
8.05.01	Mx	lb-ft	Per Technical Specification	2xAPI	
8.05.02	My	lb-ft	Per Technical Specification	2xAPI	
8.05.03	Mz	lb-ft	Per Technical Specification	2xAPI	
8.06	Allowable HP discharge nozzle loading force				
8.06.01	Fx	lb	Per Technical Specification	2xAPI	
8.06.02	Fy	lb	Per Technical Specification	2xAPI	
8.06.03	Fz	lb	Per Technical Specification	2xAPI	
8.07	Allowable HP discharge nozzle loading moment				
8.07.01	Mx	lb-ft	Per Technical Specification	2xAPI	
8.07.02	My	lb-ft	Per Technical Specification	2xAPI	
8.07.03	Mz	lb-ft	Per Technical Specification	2xAPI	
8.08	Allowable IP discharge nozzle loading force				
8.08.01	Fx	lb	Per Technical Specification	2xAPI	
8.08.02	Fy	lb	Per Technical Specification	2xAPI	
8.08.03	Fz	lb	Per Technical Specification	2xAPI	
8.09	Allowable IP discharge nozzle loading moment				
8.09.01	Mx	lb-ft	Per Technical Specification	2xAPI	
8.09.02	My	lb-ft	Per Technical Specification	2xAPI	
8.09.03	Mz	lb-ft	Per Technical Specification	2xAPI	
8.10	External cooling water supply				
8.10.01	Size	in	By Seller	6"	one connection point according with ANSI nozzle
8.10.02	Type		RFFE	RF	
8.10.03	Number		By Seller	1	
9.00	Physical Properties				
9.01	Pump weight	lb	By Seller	11,592	Filled, Preliminary
9.02	Motor weight	lb	By Seller	32,599 ~~31792~~	Preliminary
9.03	Fluid coupling weight	lb	By Seller	9,878	Filled, Preliminary
9.04	Baseplate weight	lb	By Seller	18,739	Preliminary
9.05	Total shipping weight (pump, fluid coupling, and baseplate)	lb	By Seller	40,652	Preliminary, Excluding oil cooler
9.06	Total weight (wet)	lb	By Seller	78,155 ~~77348~~	Preliminary
9.07	Overall size (L x W x H)	in	By Seller	See GAD	Preliminary
10.00	Motor				
10.01	Manufacturer		By Seller	WEG	WEG Portugal
10.02	Model number		By Seller	Later	
10.03	Horsepower	hp	By Seller Per Section E1	9812 ~~9650~~	
10.04	Voltage	V	By Seller Per Section E1	13200 ~~6600~~	
10.05	Rated amperage	A	By Seller Per Section E1	368.2 ~~722.1~~	
10.06	Specified locked rotor current	%	By Seller Per Section E1	650	
10.07	Service Factor		By Seller Per Section E1	1.15	
10.08	Starting torque	lb-ft	By Seller Per Section E1	See motor data sheets	
10.09	Enclosure type		By Seller Per Section E1	WP-II	weather protected
11.00	Instrumentation				
11.01	Number of bearing thermocouples / RTDs per pump		Per Technical Specification	4	One dual per radial bearing, Two dual on the thrust bearing with one transmitter per dual element, i.e. total 4 transmitter
11.02	Type of bearing thermocouples / RTDs per pump		Per Technical Specification	Dual Thermocouple Type K	
11.03	Number of motor winding RTDs per motor		Per Section E1	6	
11.04	Type of motor winding RTDs per motor		Per Section E1	Duplex RTDs	
11.05	Number of bearing thermocouples / RTDs per motor		Per Section E1	2	With one transmitter per dual element, i.e. total 2 transmitter
11.06	Type of bearing thermocouples / RTDs per motor		Per Section E1	Duplex RTDs	One duplex RTD with transmitter, per motor bearing
11.07	Thermocouple/RTD Manufacturer		Per Section E1	See list of measuring points	
12.00	Vibration Monitoring				
12.01	Monitoring system type		Bently Nevada Orbit 60	Sensors compatible with Orbit 60	Buyer provides the cabinet; Seller provides the probes Seller-provided vibration probes shall be compatible with Bently Nevada's Orbit 60 system.
12.02	Vibration monitor provided by		Buyer	Confirmed	
12.03	Total number of vibration probes per pump		By Seller	6	4x shaft, 2x axial rotor position (thrust bearing)

BOILER FEEDWATER PUMPS DATASHEET (DS)

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	Boiler Feedwater Pumps		Buyer Specified		
Item	Description	Units	Rev. 0	Seller's Offer	Comments
12.04	Vibration probes with transmitters provided on each pump DE and NDE radial bearing		One (1) X and One (1) Y	One (1) X and One (1) Y	Total 4
12.05	Vibration probes with transmitters provided on pump thrust bearing		Two (2) Z	Two (2) Z	= axial rotor position, total 2
12.06	Seismic (Accelerometer) probes with transmitters on each hydraulic coupling DE and NDE radial bearing housing		One (1)	One (1)	Total 2
12.07	Vibration probes w/ transmitters provided on each motor DE and NDE bearing		One (1) X and One (1) Y	One (1) X and One (1) Y	Shaft vibration, Total 4
12.08	Key Phasor		Yes	Yes, 2	One on pump, one on motor
12.09	Vibration probe manufacturer		Bently Nevada	Bently Nevada	
12.10	Vibration probe model number (non-contact, proximity)		By Seller	3300 XL	
12.11	Vibration probe model number (contact, velocity/acceleration)		By Seller	330400	
13.00	Testing				
14.00	Hydrostatic test				
14.01	Test Pressure	psig	1-1/2 times the max. pressure at rated speed or 1 1/4 times the maximum expected shutoff discharge pressure of the largest diameter impeller that the pump casing can accommodate, whichever is greater	maximum 6599	=maximum 455 bar
15.00	Performance Test				
15.01	NPSHR Test Allowable Head Reduction	%	3%	3%	
15.02	Motor Required for Factory Acceptance Test		See Technical Specification	Shop	Job motors will delivered directly to site
16.00	Noise Level				
16.01	Near field pump & motor, Unmitigated at 3 ft (1 m) horizontal distance and 5 ft (1.5 m) above grade.	dBA	By Seller	97	
16.02	Near field pump & motor, Mitigated at 3 ft (1 m) horizontal distance and 5 ft (1.5 m) above grade.	dBA	85.0	85	
16.03	Far field pump/motor, Unmitigated at 100 ft (30 m) horizontal distance and 5 ft (1.5 m) above grade.	dBA	By Seller	102	
16.04	Far field pump/motor, Mitigated at 100 ft (30 m) horizontal distance and 5 ft (1.5 m) above grade.	dBA	102.0	102	
16.05	Type of noise mitigation (acoustic blanket or noise enclosure)		By Seller	Noise enclosure	

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PUMP SPECIFICATION DATASHEET (DS) TABLE

Case #	Case Description	# Pumps in Operation	Temperature of Fluid at Suction Nozzle (F)	Static Pressure of Fluid at Suction Nozzle (psia)	Margined Suction Mass Flow (lb/h)	Margined Suction Flow (gpm)	Margined IP Takeoff Flow (lb/h)	Margined IP Takeoff Flow (gpm)	Margined HP Flow (lb/h)	Margined HP Flow (gpm)	Margined IP dH (ft)	Margined HP dH (ft)	Margined Total HP dH (ft)	BFP Suction NPSHA at Unmargined Flow (ft abs)
1	Guarantee 1	1	315.4	103.7	1,245,575	2,728	243,584	531	1,001,992	2,196	1,980	1,950	3,930	78.5
2	Guarantee 2	1	329.7	110.7	1,957,759	4,320	172,007	376	1,785,752	3,944	3,030 ~~1800~~	3,810 ~~5040~~	6,840	48.5
3	Cold Day - BL - DB	1	296.2	70.8	2,015,452	4,361	176,173	378	1,839,279	3,983	2,600 ~~1920~~	4,370 ~~5050~~	6,970	46.7
4	Cold Day - FSNL	1	297.0	91.2	360,165	780	91,066	197	269,099	584	1,580	1,050	2,630	96.9
5	Design Day - MECL	1	296.2	89.5	568,697	1,232	103,543	223	465,155	1,009	1,620	980	2,600	94.4
6	Max Throttle Case HP and RH	1	294.5	69.8	1,988,033	4,298	165,779	355	1,822,254	3,943	2,800 ~~1900~~	4,150 ~~5050~~	6,950	48.1
7	Max HP and RH Flow	1	317.3	96.1	1,877,887	4,113	185,627	403	1,692,260	3,710	2,880 ~~1820~~	3,660 ~~4720~~	6,540	52.9
8	Max Throttle Case LP	1	331.5	112.5	1,990,827	4,397	166,655	364	1,824,172	4,033	3,150 ~~1790~~	3,820 ~~5190~~	6,970 ~~6980~~	46.7
9	RRL4 - End of start_bypass closed_Design Day	1	314.3	99.7	1,441,631	3,155	378,121	826	1,063,510	2,330	2,000	1,630	3,630	71.7
10	Amb temp sweep-BL-DB-70F	1	299.1	74.1	1,987,956	4,309	165,606	356	1,822,350	3,953	1,890	5,070	6,960	48.0
20	Design Day - 90% BL - DB	1	285.2	65.2	1,803,977	3,882	184,649	395	1,619,328	3,487	2,430 ~~1860~~	3,820 ~~4390~~	6,250	57.3
21	Cold Day - Hot Restart - HP 65 bar	1	311.5	104.8	656,462	1,434	171,124	373	485,338	1,061	1,620	980	2,600	93.0
22	Amb temp sweep-BL-EC-DB-90F	1	327.0	106.3	1,996,481	4,398	172,136	375	1,824,345	4,022	3,040 ~~1820~~	3,940 ~~5160~~	6,980	46.6

Notes:
1. NPSHa is taken at one (1) foot above Top of Concrete.
2. Pump curve shall be based upon margined flow and margined TDH columns.
3. Pump suction and discharge nozzle CL elevation is preliminarily at 1 ft above grade.
4. Pump TDH (margined) referenced to pump suction nozzle CL elevation TBD. NPSHa referenced to pump suction nozzle CL elevation.
5. All points shall be shown on pump curve and shall include pump TDH, efficiency, NPSHr, and brake horsepower.
6. Updates based on GE HDAS sub-cooling requirements.