

## Scope of Supply and Purchaser's Responsibilities

FT8 SWIFTPAC POWER ISLAND  
EQUIPMENT ONLY BASE BID  
DUAL FUEL WITH WATER INJECTION

Qty: 3



**Pratt & Whitney**  
A United Technologies Company

Pratt & Whitney Power Systems

Line No.	Item	Description	Quantity	Design	Supply	Erection	Notes
2	I.	GAS TURBINE POWER ISLAND					
4							
6	1	GAS TURBINE PACKAGE	6	P	P	C	
12		Gas Generator (GG8-3 Core Engine)		P	P	C	
14		Power Turbine		P	P	C	3600 RPM Design
18		Diffuser		P	P	C	
20		Collector Box		P	P	C	
22		Exhaust transition		P	P	C	
24		Fabricated gas turbine base and mount assembly		P	P	C	
26		Coupling connecting power turbine and generator		P	P	C	
28		Hydraulic starting motor		P	P	C	
30		Ignition system		P	P	C	
32		Off-line compressor internal water wash system		P	P	C	Includes piping system, nozzles, valves, etc internal to the Gas Turbine Enclosure. Excludes Water Wash Skid
34		<b>Off-line compressor internal water wash system with Skid</b>					Includes complete Off-line water wash system including Skid
38		Gas turbine heating system		P	P	C	For condensation control
44		Lube oil system		P	P	C	Combined gas generator & power turbine
46		* Single oil-to-air cooler		P	P	C	
48		* Motor driven pumps		P	P	C	two AC and one DC turbine lube oil pumps
50		* Stainless steel piping		P	P	C	
54		Fuel supply system		P	P	C	
56		* Fuel gas strainer		P	P	C	
58		* Gas fuel fire valve		P	P	C	
60		* Liquid fuel fire valve		P	P	C	
62		* Liquid fuel flowmeter/totalizer		P	P	C	
66		Buffered air system		P	P	C	
68		* Single air-to-air cooler		P	P	C	
70		* Instrumentation for temperature control		P	P	C	
72		Water injection NOx control system		P	P	C	
74		* One AC motor driven pump		P	P	C	
76		Gas turbine enclosure		P	P	C	Prime painted
80		* Secondary cooling air system with louvers		P	P	C	
82		* Vents and drains		P	P	C	
84		* Interior AC/DC lighting		P	P	C	
86		* CO <sub>2</sub> Fire Suppression System		P	P	C	CO <sub>2</sub> Bottles provided
88		* Sound attenuation to meet 85 dB(A) average		P	P	C	At 3 feet (one meter)
90		* Gas detection system		P	P	C	
92		Two-stage inlet air filter with weather hood		P	P	C	1st stage prefilter, 2nd stage high-efficiency media.
100		Inlet silencing		P	P	C	One inlet section
106		<b>Exhaust Stack</b>		P	P	C	<b>30 ft exhaust stack; two exhaust silencing sections.</b>
108		* Quick Disconnect Electrical Interface		P	P	C	
110							
112	2	HYDRAULIC STARTING PACKAGE	3	P	P	C	Mounted in Generator enclosure.
114							

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Line No.	Item	Description	Quantity	Design	Supply	Erection	Notes
116	3	GENERATOR PACKAGE	3	P	P	C	
120		Brush Open Ventilated Air Cooled Synchronous Generator or equivalent		P	P	C	BDAX 72.290ER; 60 Hz
124		Brushless Exciter Assembly		P	P	C	With pilot exciter
126		Stator Heaters		P	P	C	
128		Neutral ground transformer/resistor		P	P	C	
130		Current transformers		P	P	C	Quantity 10 per package
132		Stator RTD's		P	P	C	Quantity 6 with 6 spares per package
134		Vibration probes		P	P	C	Proximity
136		Bearing drain RTD's		P	P	C	One per bearing
138		Bearing metal RTD's		P	P	C	One per bearing
140		Hot and cold air RTD's		P	P	C	
142		Rotor ground detection		P	P	C	
144		Lube oil System		P	P	C	Air cooled
146		* Duplex filters		P	P	C	
148		* Motor driven pumps		P	P	C	Two AC and one DC
150		* Stainless steel piping downstream of filters		P	P	C	
154		Enclosure		P	P	C	Prime painted
158		* Inlet air filter		P	P	C	
160		* Inlet and exhaust silencing		P	P	C	
162		* Interior AC/DC lighting		P	P	C	
164		* Sound attenuation to 85 dB(A)		P	P	C	Inlet and Exhaust silencing
166		* Fire detection system		P	P	C	
170		* Quick Disconnect Electrical Interface		P	P	C	
172							
174	4	CONTROL PACKAGE	3	P	P	C	Completely prewired and pretested
176		Prefabricated steel enclosure		P	P	C	
178		* HVAC		P	P	C	
180		* Fluorescent lighting		P	P	C	
182		* DC emergency lighting		P	P	C	
184		* AC power outlets		P	P	C	
186		* Smoke detector		P	P	C	
190		Operator control cabinet		P	P	C	
192		* Starting and operating controls		P	P	C	Manual and automatic
194		* Speed indication		P	P	C	
196		* Voltmeters		P	P	C	Bus and generator
198		* Ammeter		P	P	C	
200		* Wattmeter		P	P	C	
202		* VAR meter		P	P	C	
206		* Synchroscope and lamps		P	P	C	
208		Monitoring cabinet		P	P	C	
210		* ICE Monitor (CRT, keyboard and software for operator interface)		P	P	C	
212		* Printer		P	P	C	
214		Instrument Cabinet		P	P	C	
216		* Automatic voltage regulator (AVR)		P	P	C	Main and standby channels (2)
218		* Digital synchronizer		P	P	C	
220		* Vibration monitor		P	P	C	Gas turbine and generator
222		* Fire protection system power supplies		P	P	C	
224		* Static inverter		P	P	C	
226		Unit control cabinet "Engine A"		P	P	C	
228		* Control system for automatic starting, running, loading, unloading and shutdown of the unit.		P	P	C	
230		* Timer Panel		P	P	C	
232		* Expansion chassis		P	P	C	
234		Unit control cabinet " Engine B"		P	P	C	

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236		* Timer panel		P	P	C	
238		* Expansion chassis		P	P	C	
240		Generator protective relay panel		P	P	C	Beckwith
242		* Generator protective relays		P	P	C	
244		* Lockout relays		P	P	C	
246		* Watt hour meter		P	P	C	
248		Motor Control Center		P	P	C	
250		* AC and DC distribution panels		P	P	C	
252		* Motor starters		P	P	C	
254		* Distribution transformer		P	P	C	
256		* Breakers as required		P	P	C	
260		<b>* Automatic transfer switch</b>		P	P	C	To accommodate a Black Start Diesel Generator or alternate Emergency Feed
262		Master terminal cabinet		P	P	C	
264		* Field termination blocks		P	P	C	
266		* Power supplies		P	P	C	
268		Ventilated cubicle with rack mounted lead acid batteries		P	P	C	24 VDC and 125 VDC
270		Battery chargers		P	P	C	
272		Switchgear module 15 kV Class		P	P	C	
274		* Metalclad switchgear compartment		P	P	C	Mounted in control enclosure
278		* Circuit breaker		P	P	C	4000 Amp/ 750 MVA, 15kV class Totally enclosed, 15kV class, 4000 Amp
284		* Non-segregated insulated 3 phase bus duct		P	P	C	
286		* Lightning arresters and surge capacitors		P	P	C	
288		* Current transformers and potential transformer		P	P	C	
290		* CTG Auxiliary transformer		P	P	C	
294		<b>Networked Remote Control System On-Site</b>		P	P	C	For Monitoring and Control from a Networked On-site Location
300		<b>Synchronous Condensing Capability</b>		P	P	C	
302		* Quick Disconnect Electrical Interface		P	P	C	
304							
306		5 INSTALLATION HARDWARE					
310		Interconnecting piping for hydraulic start and water injection		P	P	C	Between PWPS supplied skids and CTG only
316		Foundation embedded material		C	C	C	Includes all anchor bolts, shims and plates, and grout for PWPS supplied equipment.
318		Interconnecting electrical cables		P	P	C	Between PWPS supplied skids and CTG
320							
322		6 STARTUP AND COMMISSIONING SPARE PARTS AND CONSUMABLES		P	P		For PWPS Scope of Supply
324							
326	II.	ADDITIONAL RESPONSIBILITIES DURING CONSTRUCTION AND START-UP					
328							
330		Technical Representatives to advise Customer Supervisory Personnel during FT8 equipment erection checkout, and startup			P		Field Service support description can found in the PWPS "Project Management and Customer Support" document.

Line No.	Item	Description	Quantity	Design	Supply	Erection	Notes
332		Instruction Manuals and Plant Documentation provided: Construction Manual, Commissioning Manual & Sign-off Sheets, Picture Book, PWPS Drawing Package, Vendor Manuals & Drawings, FT8 Maintenance Manual, FT8 Illustrated Parts Catalog, FT8 Service Bulletins, TWINPAC Operating Instructions, Bill of Material, As Built Drawings.			P		Provided as one CD or alternate electronic format for PWPS Supply
334		PWPS training "Power Plant Operators Course"			P		Includes customer training on site. Training description can be found in the PWPS Customer Training Document version 21-0802. Travel and lodging for customer's personnel not included.
336		Performance Testing			P		The customer is responsible for providing all necessary support to install, calibrate, and remove all temporary and plant instrumentation/equipment necessary for performing the acceptance test. PWPS provides technical support and manages the test plan for this work.
340	III.	PROJECT DEVELOPMENT AND OWNER'S RESPONSIBILITIES					Owner is responsible for compliance with PWPS' operating, installation, and maintenance instructions.
342							
344		1 SITE DEVELOPMENT		C	C	C	Owner is responsible for all areas of site development and are not limited to the items listed in this document.
346		Adequate Title and Interest, Permanent Facility Permits, Construction Permits and Licensing			C		To permit the installation of such units and their operation for at least the period contemplated by the contract. Provide PWPS representatives unrestricted access at all times as may be reasonably necessary in the performance of their duties.
348		Sub-Soil Investigation & Report		C	C	C	Minimum sub-foundation bearing capacity of 2500 psf (120 kPa) and limits differential settlement of the main foundations equal to or less than 0.0005 times the foundation length.
350		Foundations for all Equipment		C	C	C	PWPS will provide Loading Diagrams for PWPS supplied equipment.
353		Power Island Grounding		C	C	C	Per TPM130
354		Provision of <b>Secure Field Office</b> . Furnished with electricity, Heating and Air Conditioning, Drinking Water, Desks, Chairs, Parking Area, Lockers and others which are necessary for Field Works, Services & Sanitary Facilities of Office Personnel.		C	C	C	Including 10' x 40' (3 m x 12 m) area for a field office. This field office shall be able to accommodate 6 - 8 PWPS individuals.
355		SAFETY PROVISION, Provide a safe working environment that meets or exceeds international standards including: OSHA, and all applicable local, regional, and national standard and regulations.		C	C	C	If at any time PWPS personnel and sub-contractors do not feel safe they may leave site.
356		Provision of First Aid and Medical Services - OSHA Approved		C	C	C	

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358		Provisions of Local Communication Facilities		C	C	C	Including radio, telephone (local and long distance) with international direct dialing and fax machine. This should be a minimum of 3 lines in the PWPS field office. A separate dedicated T1 line or phone line shall be provided to each turbine control system in the control house.
360		Temporary Construction Staging & Secure Inventory Area			C		A minimum area of approximately 115' by 136' is recommended per Power Island. A minimum of two shelved conex boxes and one non shelved or enclosed equivalent per SWIFTPAC prior to delivery of equipment.
362		Access Road(s), Interior Roads, and Parking Areas		C	C	C	All-weather and unobstructed
364		Transmission System		C	C	C	
366							
368		2 ENGINEERING AND CONSTRUCTION					
370		Plant Engineering			C		
372		All Labor for complete off-loading, Inventory, Inventory control, Storage, Erection, Installation, Checkout, Testing, and Start-up of all PWPS and non-PWPS supplied equipment and material.			C		
374		Maintaining and Guarding all Facilities, Equipment, and Materials during construction			C		Including security fence
376		Site Organization During Construction			C		Including Resident Field Construction Manager; Supervision & Manpower for Erection Works, Checkout, Trouble Shooting, Start-up & Commissioning, Test Operation & Trial Operation, Plant Start-Up Engineering
378		Emissions and Acoustic Testing			C		
380		Worker's Compensation, Employer's Liability, or any other Local Insurance Required			C		PWPS will cover all PWPS personnel.
382		Consumable Material for Erection Works			C		As required
384		Construction Equipment, Tools and Aids			C		Including but not limited to the following: Cement Mixers, Loaders, Trucks, Cranes of varying capacities, Power Generators, Air Compressors, Welders, Drilling Equipment, Pipe Working Facilities & all hand tools required for expeditiously and competently completing all phases of the work under the contract.
386		Required Tests Prior to Startup: Including but not limited to:			C		
388		* Resistance ratio and polarity tests			C		Generator and Transformer CTs and PTs
390		* All high voltage dielectric tests * Field check and calibration Protective Relay Calibration *			C		All PWPS supplied protective relays and circuits. The PWPS Commissioning and checkout manual further clarifies the Customers responsibilities.
392		Phasing and Synchronizing the Generator to Purchaser's system			C		
394							
396	3	POWER ISLAND INTERFACES					
398		BOP Motor Control Centers			C		

Line No.	Item	Description	Quantity	Design	Supply	Erection	Notes
400		Control System Interface			C		Customer is responsible for all-interconnecting hardware, software and documentation for all BOP I/O communication and control.
402		Natural Gas for Start-up, Testing and Operation 445 psig (30 bar), Approximately 4700 scfm (2.2 m3/sec) per gas turbine			C		Interface Point: Flange on PWPS Power Island. Per PWPS Natural Gas Fuel Specification FR-2. Fuel to be tested by a certified lab and the results provided to PWPS prior to start-up.
406		Liquid Fuel for Start-up Testing, and Operation 30-75 psig (2.0-5.1 bar), Approximately 36 gpm (136 l/min) per gas turbine			C		Interface Point: Flange on PWPS Power Island. Per PWPS Liquid Fuel Specification FR-1. Fuel to be tested by a certified lab and the results provided to PWPS prior to start-up.
408		Injection Water for NOx Control 5-50 psig (0.3-3.4 bar), Approximately 25 gpm (115 liters/min) per gas turbine			C		Interface Point: Flange on PWPS Power Island. Per PWPS Specification AR-1. Water to be tested by a certified lab and the results provided to PWPS prior to start-up.
410		Potable Water for Gas Turbine Off-line Water Wash 50 psig (3.4 bar) min., Approximately 300 gallons (1150 liters) per gas turbine water wash at 110 gpm (415 liters/m)			C		Interface Point: Flange on PWPS Power Island. Per PWPS Potable Water Quality Specification
414		Instrumentation Air. 75 CFM Free, Dry Air at 70 psig (90 psig max)			C		Interface Point: Flange on PWPS Power Island.
415		Vent and Drain. Maximum flow on Oily Waste drain is 35 GPM for water wash.			C		Interface Point: Connections on PWPS Power Island.
416		High Voltage Power			C		Interface Point: Generator Terminals.
418		Backfed Electrical Power Supply 255 kW per Power Island, 13.8kV, 60 Hz, 3 phase for lighting, heating and intermittent auxiliaries			C		Plus as required for BOP loads
420		Construction Power-Including distribution to the PWPS supplied equipment			C		480 V, 3 phase, 24 hours per day to electric generator upon arrival of the generator. Reliable temporary 480 V, 400 Amps power at the control house for checkout and start-up at least 21 days prior to the first fire date of the first unit to be commissioned.
422							
424		4 OTHER OWNER RESPONSIBILITIES					The following list of items is provided for your convenience and gives examples of the types of equipment and/or services that are outside the PWPS Scope of work, and if required, are the sole responsibility of the Owner.
426		Site Survey/Plot Plan		C	C	C	
428		Excavation for Foundations, Pipes, Roads, Cabling & Grounding Grid		C	C	C	
430		Site Leveling		C	C	C	
432		Backfill		C	C	C	
434		Finish Grading		C	C	C	
438		Surface Drainage to and including any Collection Pond		C	C	C	
440		Oily Water Separator		C	C	C	
442		Sanitary Waste Disposal		C	C	C	
444		BOP and Plant Fire Protection Systems-Hydrants Panels and Extinguishers			C		Including Fire Protection during construction

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446		Plant Lighting			C		
448		Intra-communication system			C		
450		Site Fencing and Gates			C		
452		Construction Water			C		
454		Builder's All Risk Insurance (BAR)			C		
456							
458							
460	IV.	OPTIONS					
462							
468							
470							
472							
474							
476							