

# HbT

The Hydrogen Generation Specialists

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## **Model 600 NG-A Fact Sheet**

## **On-Site Hydrogen Generation System**

NOTE: All information provided is nominal. SI Units in ( )

### **SYSTEM PACKAGE**

#### **INCLUDED COMPONENTS AND SERVICES**

Model 600 NG-A UOB™ reformer / CO shift reactor skid  
Pressure Swing Adsorption (PSA) Purification Unit  
Integrated automatic PLC controls  
Pressure Vessels to applicable codes  
Electrical Components to applicable codes  
On-site installation guidance  
Operation, safety and maintenance training  
All components are skid mounted  
Documentation  
12 month limited Warranty on all components

#### **OPTIONAL EQUIPMENT**

Natural Gas Compressor  
Air Compressor Package  
Quench Water System  
Cooling Water System  
Modular Enclosure  
Remote Monitoring Program  
Waste Gas Flare  
Hydrogen Purity Monitor  
Weatherization

### **PRODUCT HYDROGEN SPECIFICATION**

Hydrogen Flow Rate	600 SCFH (15.7 Nm <sup>3</sup> /hr)	Impurities:	
Pressure	70 - 100 PSIG (483 - 690 kPag)	Dew Point	-80° F (-62° C)
Discharge Temperature	80° F (27° C)	Nitrogen + Argon	< 500 PPM <sub>v</sub>
Purity	99.95% (Up to 99.999% optional)	CH <sub>4</sub>	< 2 PPM <sub>v</sub>
		CO	< 2 PPM <sub>v</sub>
		CO <sub>2</sub>	< 2 PPM <sub>v</sub>
		O <sub>2</sub>	< 2 PPM <sub>v</sub>

### **UTILITY REQUIREMENTS**

#### **NATURAL GAS REQUIREMENT**

Type	Natural Gas (gas analysis for each site will be provided by buyer)	
Rate (norm / max)	400 / 480 SCFH	(10.5 / 12.6 Nm <sup>3</sup> /hr)
Inlet Pressure	10 PSIG	(69 kPag)
Heat Content	1,000 BTU/SCF (HHV)	(1055 kJ/Nm <sup>3</sup> )
Discharge Pressure (Norm/Min/Max)	210/205/300 PSIG	(1448/1413/2069 kPag)
Discharge Temperature (Min/Max)	60 / 300°F	(15.5 / 149° C)

#### **PROCESS AIR REQUIREMENT**

Type	Filtered air	
Rate (Norm/Max)	1900 / 2280 SCFH	(50 / 60 Nm <sup>3</sup> /hr)
Discharge Pressure (Norm/Min/Max)	210 / 205 /300 PSIG	(1448/1413/2069 kPag)
Discharge Temperature (Min/Max)	60 / 300°F	(15.5 / 149° C)

#### **ELECTRICAL REQUIREMENT**

Electricity (for compressors)	480 V, 3 phase, 60 Hz
Rate	14 kWh
Electricity (for controls)	110 V, single phase, 60 Hz
Rate	1.0 kWh

#### **INSTRUMENT AIR REQUIREMENT**

Type	Filtered, dry air	
Rate	10 SCFH	(0.26 Nm <sup>3</sup> /hr)
Pressure (Min/Max)	80 / 120 PSIG	(552 / 827 kPag)
Dew Point	Minus 20° F	(-28.9° C)

(continued on other side)

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## Model 600 NG-A On-Site Hydrogen Generation System Fact Sheet continued

### NITROGEN REQUIREMENT (for start-up and shutdown only)

Quantity	1500 SCF (39 Nm <sup>3</sup> ) per start-up, 200 SCF (5 Nm <sup>3</sup> ) per shut down	
Rate	500 SCFH (13 Nm <sup>3</sup> ) (during start-up and shut down only)	
Pressure	70-80 PSIG	(482 – 552 kPag)
Purity	99.9%	
Dew Point	-80° F	(-62° C)

### QUENCH WATER REQUIREMENT

Flow Rate normal/design	6 / 8 GPH	(0.02 / 0.03 m <sup>3</sup> /hr)
Pressure (at skid tie-in point) min/max	250 / 300 PSIG	(1724 / 2069 kPag)

Water shall be provided to the skid at constant pressure (+/- 5 psi / 35 kPa) under all operating conditions.

### STANDARD QUALITY FOR QUENCH WATER

Constituent	Range	Units
Ion Removal	98-99	%
Effluent Sodium	0.5-10	Ppm
Effluent Silica	0.005-0.1	Ppm
Conductivity	2.5-10	Umhos/cm
Bacteria	0	100/ml
PH	6.0-8.0	

### COOLING WATER REQUIREMENT

This specification is a general guide to cooling water quality requirements. Water quality will vary significantly by geographic region. HbT recommends that local water quality experts be consulted for water treatment strategies in each geographic region.

Rate	10 GPM	(2.3 m <sup>3</sup> /hr)
Pressure (Min/Max)	30 / 150 PSIG	(207 / 1034 kPag)
Supply Temperature (Min/Max)	70 / 90° F	(21 / 32° C)
Temperature Rise (Norm)	20° F	(11° C)
pH	6.5-9.0	
Chlorine	0.4 ppm Max	
Organic Solvents	50 ppm MaxTotal	
Dissolved Solids	5000 ppm Max	

### WEIGHTS AND MEASUREMENTS

<u>Equipment</u>	<u>W</u>	<u>L</u>	<u>H</u>	<u>Weight (lb.)</u>
UOB™ Skid	5' (1.5 m)	9' (2.7 m)	7' (2.1 m)	3,650 (1657 kg)
H <sub>2</sub> PSA	3' (0.9 m)	4' (1.2 m)	6' (1.8 m)	1,800 (817 kg)
Air Compressor	4' (1.2 m)	7' (2.1 m)	6' (1.8 m)	1,400 (636 kg)
NG Compressor	4' (1.2 m)	5' (1.5 m)	4' (1.2 m)	1,000 (454 kg)
Quench Water System	3' (0.9 m)	4' (1.2 m)	4' (1.2 m)	500 (227 kg)
Waste Gas Flare	3' (0.9 m)	3' (0.9 m)	6' (1.8 m)	300 (136 kg)
Cooling Water System	4' (1.2 m)	5' (1.5 m)	6' (1.8 m)	1,000 (454 kg)
Modular Enclosure	8' (2.4 m)	30' (9.2 m)	8' (2.4 m)	TBD

### GENERAL SITE REQUIREMENTS

Elevation	< 500 FEET (150 meters)
Seismic Zone	UBC Zone 0
Ambient Temperature Range	Maximum 110° F (43° C), Minimum 35° F (2° C)
Drain	Required for process condensate and blowdown.
Access	Horizontal and vertical access required for burner maintenance.
Telephone Line	A standard telephone line is required to be wired up to the system for remote monitoring and warranty effectuation.

FOR MORE INFORMATION PLEASE REQUEST FULL TECHNICAL SPECIFICATION.  
ALL INFORMATION IS NOMINAL AND SUBJECT TO MODIFICATION.