ALL POWER LABS

Carbon Negative Power & Products

CHARPALLET 25 (CP25)

SMART BIOCHAR REACTOR

CharPallet 25 Rendering

The **ALL Power Labs CharPallet 25** is a smart, compact, Combined Heat and Biochar (CHAB) gasifier system designed to convert 25 kg/hr waste woody biomass into high-quality, high-temperature biochar and thermal energy. It is based on our third generation gasifier architecture using APL's innovative v3.0 Swirl Hearth design, including innovations which widen the range of acceptable feedstocks, reduce feedstock preparation requirements, and improve emissions.

APL Tech is Smart Tech, linking device operation and communications with the emerging universe of carbon-trading platforms. The CharPallet integrates our newest innovations in control and UI systems, using the latest Internet of Things (IoT) protocols to allow digital Measurement, Reporting, and Verification (MRV) systems to connect directly with carbon-market platforms to generate carbon credits.

This sophisticated standalone gas-making system is optimized for high-carbon, low-PAH biochar production. The CharPallet is highly portable system sized for community farms and gardens as well as research and educational institutions. Multiple units can be networked to create a Virtual Carbon-removal Plant (VCP). CharPallets make an ideal test platform for R&D and demonstration activities in syngas-to-alternative-fuel conversion, particularly Renewable Natural Gas (RNG), and Hydrogen (H_2), as well as other gasification and renewable-energy research. It can also be paired with separate power-generation modules to produce up to 20 kW of electricity.

We offer these data with reasonable confidence given our long-running data acquisition in the development of our gasifier-genset systems and distribution of their biochar byproduct.

CORE SPECIFICATIONS

PERFORMANCE	
Biomass Consumption:	1 kg biomass = 3 m^3 gas = 2 kWh(therm)
Biochar Yield:	20% (biomass input by weight)
Maximum Gas Flow Rate:	60 m^3/hr ~20kWe or 380,000 BTU
Minimum Gas Flow Rate:	10 m^3/hr ~3kWe or 60,000 BTU
Gas Energy Density:	6.5 MJ/m^3
Max. Continuous Operation:	~12 hours
Start-Up Time:	5-20 Minutes

PRODUCER GAS COMPOSITION	
Nitrogen (N_2)	45% (by mass)
Carbon Monoxide (CO)	22%
Hydrogen (H_2)	20%
Methane (CH_4)	3%
Carbon Dioxide (CO_2)	10%
Tars (aromatic hydrocarbons)	<50 mg/m^3

BIOCHAR VALUES	
Carbon Content	>90%
H:C Ratio	<0.2
Polycyclic Aromatic Hydrocarbons (EPA 16 PAH)	<50 mg/kg
Benzo[a]pyrene PAH - B(a)P-TEEQ basis	0.0 mg/kg

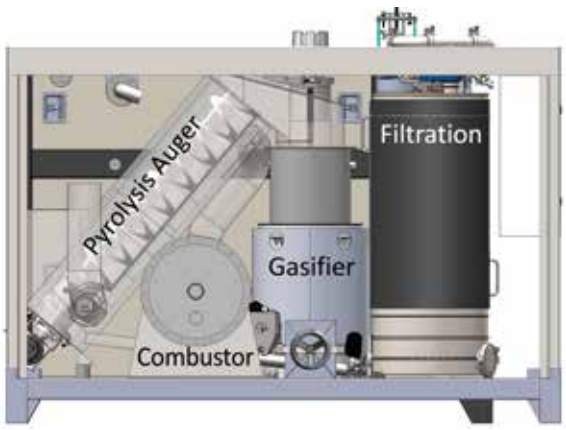
SMART AUTOMATION

AVAILABLE FEATURES	
Remote Monitoring	Temperature, Pressure, Biomass/Biochar Mass
Automated Start Up & Operation	Automated Electric Ignition & Valving
Remote Control	Technical Proof
IoT Data Collection to Cloud	Mobile Connectivity with 3rd Party Apps
Process Optimization	On-board Automation
Measurement Reporting & Verification	10+ Temp, 5+ Pressure, Lambda, Mass Airflow
MRV Process Monitoring	
MRV Input	Biomass Consumption
MRV Output	Biochar Production

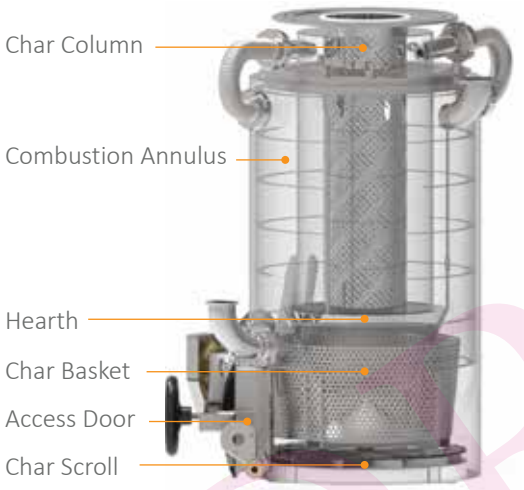
The specifications provided herein are working values based on standard operation with qualified feedstock & are subject to change without notice

CHARPALLET RENDERINGS

GASIFIER SIDE



SWIRL-HEARTH REACTOR COMPONENTS



SUPPORTING INFRASTRUCTURE REQUIREMENTS

SPECIFICATIONS	
Form Factor	Half Skid
Footprint	3 feet x 6 feet (1 meter x2 meters)
Clearance: for external components and material loading/unloading	4 feet all sides (1.25 meters)
Shore Power	120/240 Vac 1800 W max
Fuel Drying	15% ± 3% moisture (dry weight) may require External Drying Module
Fuel Loading	Conveyor or Manually
Biochar Handling	Manual or Conveyor
Instrumentation and Controls	Interactive automation, monitoring & datalogging systems

BIOMASS FEEDSTOCK

SPECIFICATIONS	
Particle Size	1/8 in. - 1.5 in. (3 mm - 65mm)
Walnut Shells	Compatible
Hardwood Chips (e.g. oak, ash, beech)	Compatible
Softwood Chips (e.g. pine, fir, cedar)	Compatible
Fines Fraction: less than 1/8 inch	<12% by weight
Main Fraction: 1/8 inch to less than 2.5 inches	>75% by weight
Coarse Fraction: greater than 1.5 inches and all must be less than 2.5 inches	<3% by weight
Moisture Content (Dry Basis)	<15% External Drying Required

All specifications are subject to change without notice

ALL Power Labs

ALL Power Labs is the global leader in small-scale gasification technology. We make biomass-fueled equipment that is ready for everyday work, to serve real-world, distributed-energy, biochar, and CO_2 removal needs. Our compact gasifiers are now at work in over thirty countries, and support research at more than fifty universities around the world.

Our team is an unusual combination of hands-on fabricators and university-trained scientists and engineers. The result is a powerful combination of technical ability and physical know-how for developing innovative energy solutions.

ALL Power Labs makes machines that transform organic waste into useful Power and Products, for work at the intersection of industry, agriculture, and climate. APL intends to make a consequential impact on global energy poverty and greenhouse-gas drawdown through mass delivery of its carbon-negative energy devices.

Our facility is in Berkeley, California. Please contact us to arrange a visit the next time you are in the Bay Area. We would love to show you around.

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