

H₂LT

LIGHT TOWER

**Harnessing the energy source
of tomorrow for how you work today.**

Introducing the H₂LT Light Tower from Multiquip...
the industry's first hydrogen fuel cell-powered light tower.



Multiquip is leading the way in hydrogen fuel cell technology.

Hydrogen is the most abundant element on earth, but it is always bound to something else. It's found in common molecules like water, natural gas and plants and is produced by unlocking the chemical bonds in these molecules.

Fuel cells using hydrogen are a quiet, efficient and virtually pollution-free power source that can power vehicles, buildings, power equipment, laptops, cell phones and much more. Using a process discovered more than 150 years ago, fuel cells began supplying electric power for spacecrafts in the 1960's and then were pursued for commercial use. They are an alternative to internal combustion engines in vehicles and provide power in stationary and portable applications due to their energy efficiency.

Multiquip research and innovation has brought this clean energy technology to the forefront of the construction and power marketplace. In line with our commitment to corporate responsibility, we are the first construction equipment manufacturer to introduce a hydrogen-powered light tower to the industry.

Part of our EarthSmart™ product line, the H₂LT Light Tower is the first of its kind, and ushers in a new era in the industry. We believe our future economy will feature hydrogen as an energy carrier in the stationary power, transportation, industrial, residential and commercial sectors, and Multiquip EarthSmart™ products will be leading the way.

EarthSmart™

Tower Specifications

Max. Tower Height: 33.9 ft. (10.3 m)
Wind Stability: 65 MPH (105 km/h)
Weight: 2,700 lb (1,225 kg)

Introducing the Multiquip EarthSmart™ H₂LT

Hydrogen Fuel Cell Benefits:

Environmentally-Friendly – It is the ultimate green product that uses an alternate power source.

- Non pollution
- No diesel particulate emission

Environmental Contribution – With one unit we displace 900 gal of diesel fuel/year and eliminate 9.1 metric tons/year of CO₂ (based on avg. light tower operation). Using the GREET model we achieve a **73% GHG savings** using hydrogen.

Safe – No gasoline or liquid fuel sources means no combustion occurs in the process for safer use in any environment, indoors or out. Operates cleanly with zero emissions – can be operated inside and in tunnel/underground applications.

Ultra Efficient and Quiet – 5kW Proton Exchange Membrane Hydrogen Fuel Cell replaces a standard diesel engine for quiet operation – 44dB at 23 feet (normal conversation is 60dB at 10 feet).

- Multiquip fuel cells have an efficiency of 46.9%. This compares to typical gasoline engine efficiencies of about 25% and diesel engine efficiencies of 30%. Standard gasoline engines only convert 8-10% of fuel energy, while diesel engines may achieve between 11-13%. Fuel cells offer the highest fuel to energy conversion.

Run Time – Due to the high efficiency of the lights, the 8kg of on-board hydrogen will last 66 hours with all lights burning.

Reliable – Extremely low maintenance with no moving parts (except one fan with MTBF 40,000 hours), and no fuel to spill. Maintenance limited to trailer compartment.

- All solid state design

Easy to Refuel – Standard nozzle is identical to ones used for fuel cell vehicles – filling operation takes less than 15 minutes.

Plasma Light Benefits:

Bright and Powerful – 8 Plasma lights provide 23,000 lumens per light – each quartz bulb is 1/4" x 1/4", the size of a TicTac® candy.

- Color Rendering up to 74
- Color Temperature 5750K

Efficient and Flexible – High efficiency bulbs feature 120 lumens/watt, rapid re-strike, 45 second turn-on.

- Energy savings of 50% compared to 1000W traditional systems

Long-lasting Performance – Bulbs feature a 50,000-hour lifetime.

- Digitally controlled

Quiet – No audible noise or flicker when illuminated.

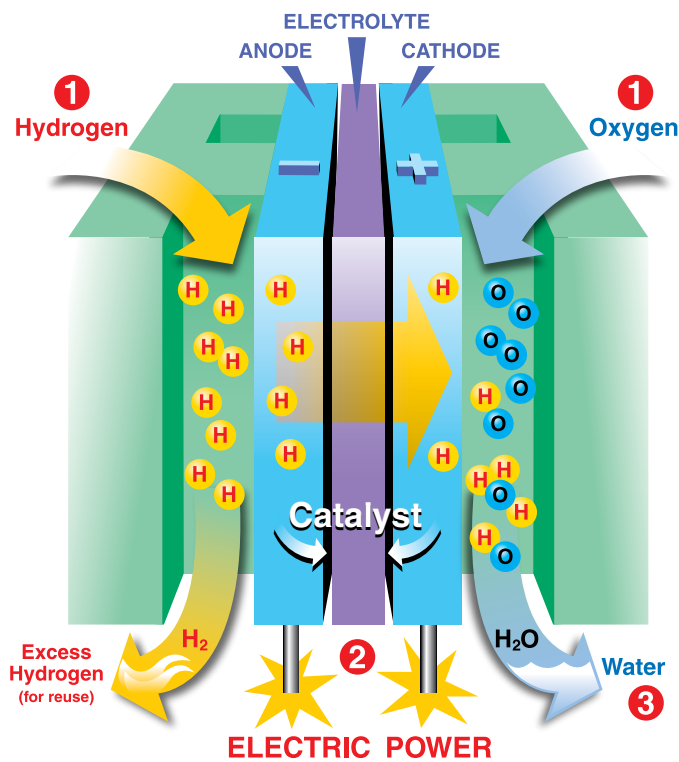
- No arc flicker



HOW DOES IT WORK?

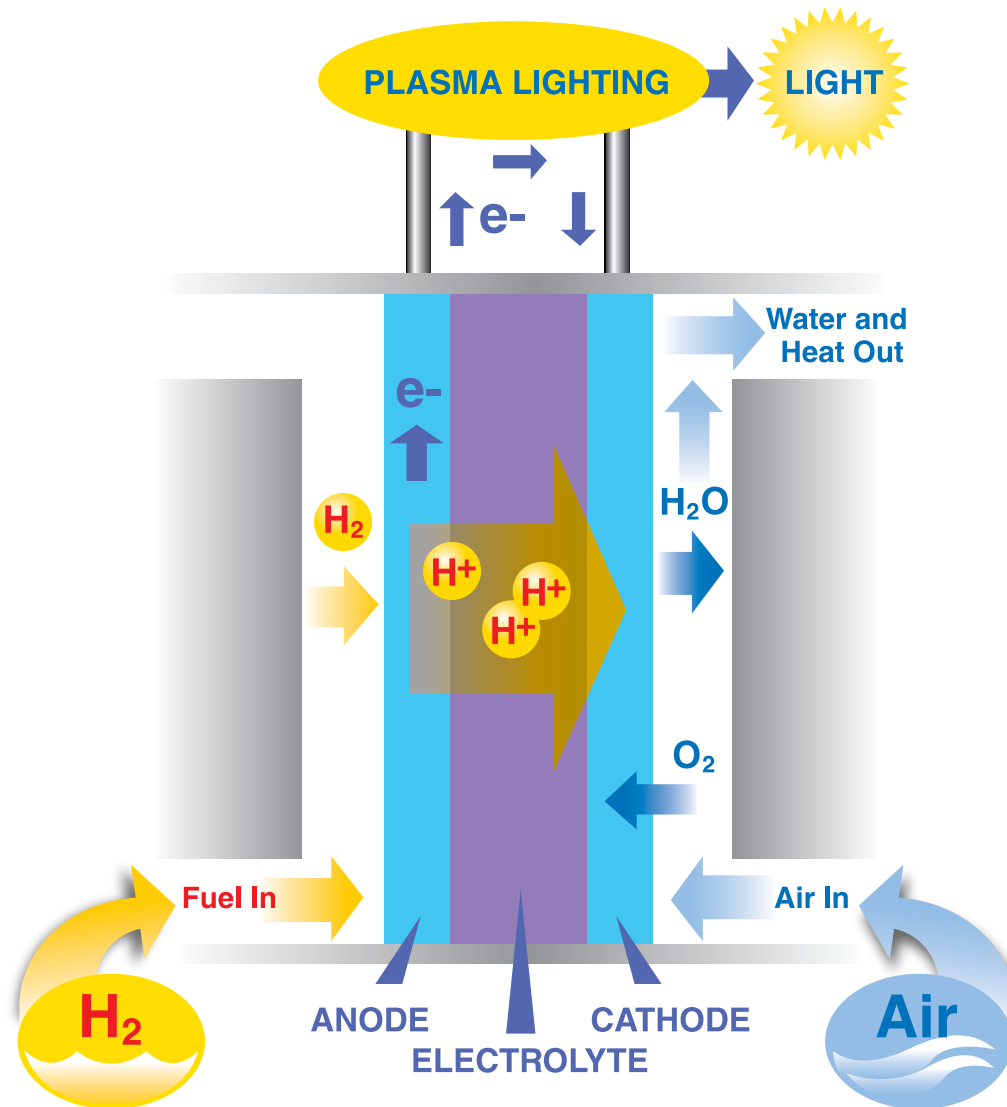
A highly efficient system combining today's most advanced power and light technologies.

Individual Fuel Cell

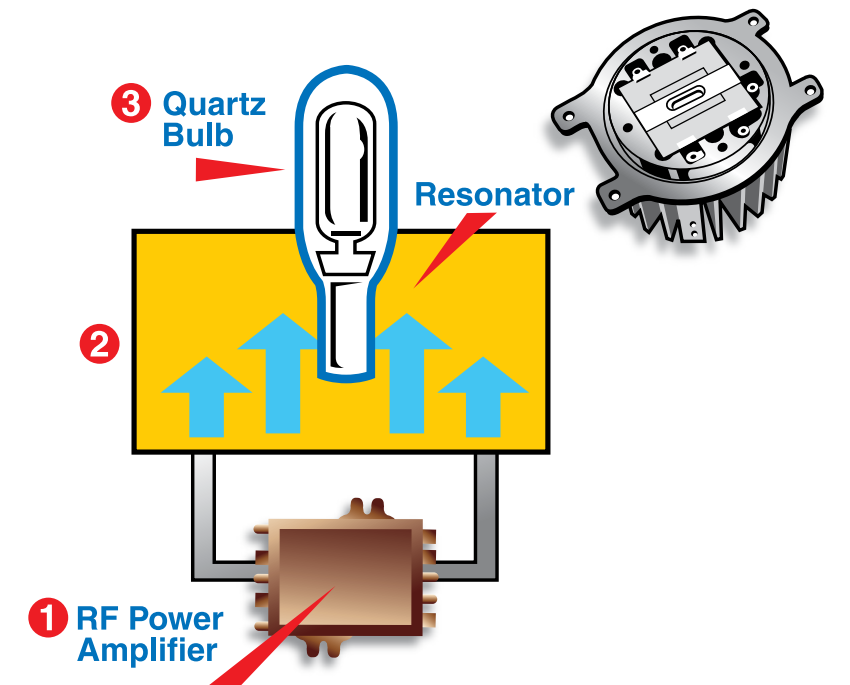


1. Hydrogen enters the fuel cell and is pushed through membrane plates to the anode on one side of the fuel cell. Oxygen enters on the other side and is channeled to the cathode. At the anode, hydrogen splits into positive ions (protons) and negatively charged electrons.
2. Positively charged ions pass through the Polymer Electrolyte Membrane to the cathode. The negatively charged electrons travel to the cathode along an external circuit, creating electricity that powers the lights.
3. When the electrons and positively charged hydrogen ions meet at the cathode, they combine with oxygen to form water, which disperses into the air as water vapor. (Water amount is minimal, vapor only adds humidity to the area.)

Multiquip H₂LT Hydrogen Fuel Cell Powered Light Tower



Light Emitting Plasma (LEP)



1. An RF circuit is established by connecting an RF power amplifier to a ceramic resonant cavity known as the "puck". In the center of the puck is a sealed quartz bulb that contains materials consistent with metal-halide lamps.
2. The puck driven by the power amplifier creates a standing wave confined within its walls. The electric field is strongest at the center of the bulb, which ionizes the gasses inside.
3. The ionized gas heats up and evaporates the metal halide material, which forms a bright plasma column within the bulb to radiate light. Behind the bulb, a highly reflective powder reflects nearly all light in a forward direction.

Fuel Cylinder Product Data

Model	ALT 836U
Quantity	4
Specification	DOT-SP 10945
Service Pressure (ea)	5,000 PISG
Operating Temperature	-65° F to 160° F
Service Life	15 Years
Linear Material	6061-T6 Aluminum Alloy
Resin Material	Epoxy
Reinforced Material	Carbon/Glass
Transportation Approval Certifications	US DOT-SP 10945-5000 KHK/METI (Japan) ECE R110 (Europe) ISO11439 (Europe) FMVSS 304 (United States) CSA B51 (Canada) ANSI NGV2 (North America)

LiFi Light Product Data

Emitter Length Including Bulb	86.5mm
Emitter Diameter	100mm
Driver Unit L x W x H	193 x 85 x 32
Rated Average Life	50,000 hours
Total Initial Lumens	23,000 lumens
Average Turn-on Time	45 seconds
CCT*	5750K
CRI**	74
Nominal DC Power @ 28V2	249 watts
DC Input Voltage	28
Input Current (A)	8.9

* CCT - Color temperature is a characteristic of visible light.

** CRI - A measure of the ability of a light source to reproduce color compared to an ideal or natural light source.



HOW SAFE IS IT?

The Story of Hydrogen

Hydrogen is found everywhere on earth. Most hydrogen used for fuel is produced by passing super-heated steam through natural gas to break the chemical bonds in both compounds. Electrolyzing water, passing a current through water to break the chemical bonds, produces some hydrogen. A process using biogas, methane from landfills, wastewater or decaying plant material also produces hydrogen, electricity and heat. Other researchers are experimenting with ways to make hydrogen using algae, microbes, bacteria and direct sunlight on water.



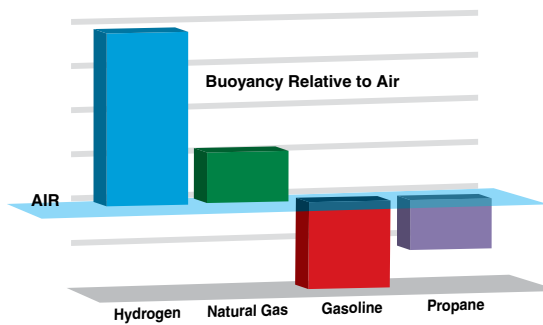
Hydrogen is abundant and can be produced anywhere from a variety of energy sources. It does not produce fumes or harmful emissions – using hydrogen in fuel cells produces only electricity and pure water – no pollutants. The advancement of hydrogen energy can help solve many environmental concerns and Multiquip is on the leading edge of this technology, bringing EarthSmart™ solutions to your business.

Hydrogen is colorless, odorless, tasteless, non-toxic and non-poisonous. When compared to other fuels – gasoline, propane and natural gas – the advances in hydrogen technology have made its use safer in almost all applications.

Hydrogen, when ignited, burns with a pale blue flame that is nearly invisible in daylight and radiates little infrared heat. For any applications that may result in combustion, users have to be aware of its presence and take precautions to avoid contact.



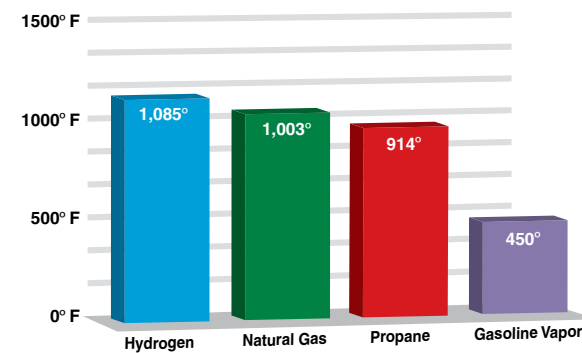
Disperses Quickly



Hydrogen is lighter than air and rises at a speed of almost 45mph (20m/s). While other fuels stay near the ground and could ignite, hydrogen disperses almost immediately.

- 57 times lighter than gasoline
- 14 times lighter than air

Higher Flash Point



Compared with other fuels, hydrogen has a higher flash point, so it is much more difficult to ignite.

Ultra-Strong Tanks

Compressed H₂ storage systems won't explode. Carbon fiber wrapped metal or polymer lined tanks are stronger than conventional gasoline tanks, and are equipped with temperature activated pressure relief valves that are required to release any pressure, per DOT certification requirements, in a very narrow and concentrated area that will immediately disperse.



Rigorous Testing Criteria



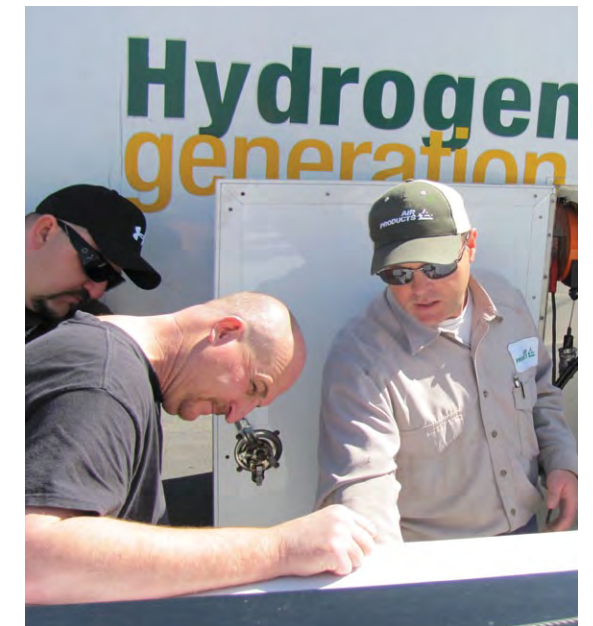
All of the tanks are DOT certified and have been through testing consisting of fire, dropping, gunfire, pressure cycling, overpressure, temperature, impact and permeation. There is no rupture, safety valves will vent any pressure. As an added precaution the Multiquip H₂LT system will immediately detect any leak and turn the system off.

The fuel cell is fully tested, certified and listed by CSA-America. The product meets or exceeds the requirements of State Fire and Building codes, NFPA1 – Uniform Fire Code; NFPA 55 – Storage handling of compressed gases; NFPA 70 National Electric Code (NEC) and meets ISO (many of the ISO standards are currently in definition and development).

Refueling across North America

Currently there are 68 hydrogen fuel stations in the United States and Canada with 23 more planned in the near future to fill the growing demand.* The first traditional gasoline "filling station" was constructed in St. Louis in 1905, the second in Seattle in 1907 and according to the 2002 census; the US now has over 117,000 gas stations. Just as the gasoline network grew over time, so will the hydrogen infrastructure.

Air Products, has more than 50 years of hydrogen experience and is on the forefront of hydrogen energy technology development. They deliver hydrogen for their stations via truck and offer mobile fuel trucks. Praxair and commercial filling stations have also entered the hydrogen distribution channels. Your local gases supplier can offer bottled hydrogen suitable for refueling. Refueling a Multiquip H₂LT is as easy as refueling a fuel cell vehicle, and takes less than 15 minutes.



*Source: National Hydrogen Association

**Turn tomorrow's technology
into today's advantage.**

Turn to Multiquip.

Call Toll Free today 800.421.1244
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