

WEBSTER COMBUSTION

A Selas Heat Technology Company

INTRODUCTION

1922 ☆ ☆ ☆ 2022
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- Multi-fuel burners for commercial, light industrial and heavy industrial boiler applications
- Low NO_X and CO emissions
- UL listed, B100 compatible burners







Where Does Webster Stand on Decarbonization with Biodiesel

1. Significantly reduces the amount of CO_2 released to the environment from fossil fuels
2. Some components may need to be switched out in the pipe train to remove brass and bronze parts and to use components that have seals, seats and gaskets that are compatible with B100.
3. Burners can run with the same turndown as #2 oil.
4. Cannot use modulating return nozzles
5. A Webster burner can bounce between B100 and #2 fuel oil (and all fuel blends in between) as long as the burner is tuned to B100.

RESULTS OF B20 AND B100 TESTING

1. Applied B20 and B100 to industrial scale, modulating burners
2. B20 and B100 fuel UL certification tests for JB, JBE, HDS and HDRV burner lines
3. B100 compatible pipe train from 1000 hour cycling test with B100 fuel
4. Preserved burner turndown
5. Compatible with both pressure swirl and air atomized nozzles
6. No restrictions in combustion performance

CHALLENGES WITH B100 FUEL

1. **Nuance – the devil is in the details**
   - Storage
   - Oxidation
   - Source
   - Burner components
   - Burner tuning
2. **Knowledge gaps in applying B100 to burners**
   - Flame shape – how the flame is shaped by the fuel and aerodynamics of the burner combustion air
   - Fuel atomization – how atomization is affected by B100 with either pressure swirl atomizers or internal mix air atomizing nozzles
   - How does fuel oxidation affect combustion
   - Not a lot of analytical tools available to understand B100 combustion

B100 Burner Tests





Burners for JB, JBE, HDS and HDRV product lines passed UL certification tests:

1. **Met emission criteria for CO**
2. **Passed cold B100 test**
3. **Same burner settings used with B100 test could be kept if switched to #2 fuel oil**
4. **Pilot worked with B100**
5. **Turndown with B100 was the same as #2 fuel oil**

High Acid Number B100 1000 hr Test



There is a need for burner components, pumps, valves, strainers, pressure gauges…etc to be UL listed for B100.

Till that time UL has created a test where a high acid number B100 fuel is run through burner components to prove that they will not leak. The fuel is cycled through the different components for a total of 1000 hours.

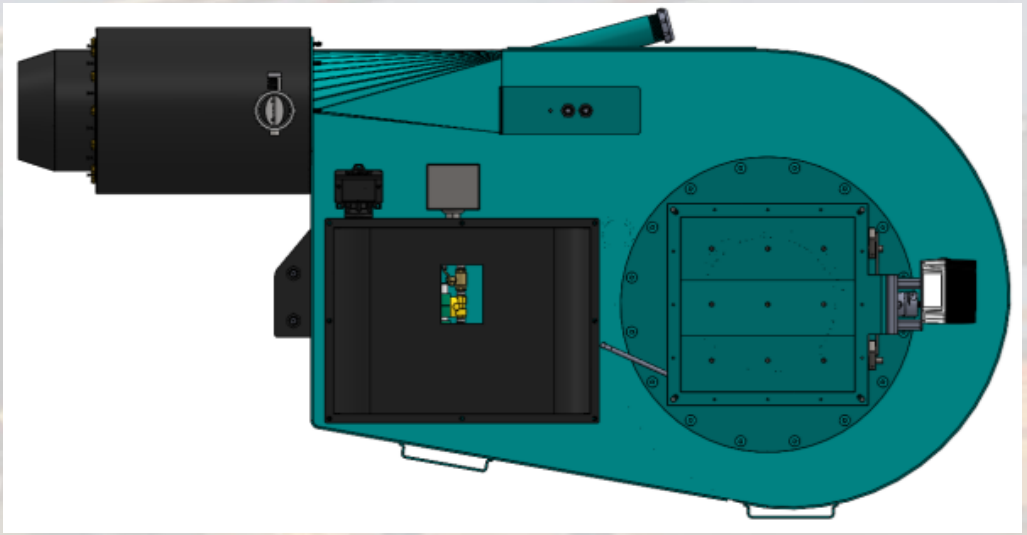
All of the components needed to run the NG, JB, JBE, HDS, and HDRV with B100 were proven and passed the 1000 hr test.

NEXT GENERATION (NG) BURNER





- Dual Fuel: Natural gas and fuel oil/B100
- High Turndown: 10:1 gas, 8:1 fuel oil/B100
- Side panels for burner controller and oil/atomizing air piping
- Integrated housing design



OIL NOZZLE: DELAVAN AIRO

Features:

1. **Air atomized – internally mixed**
2. **Solid spray pattern**
3. **Spray angle adjustable, determined by how much atomizing air is added**

Benefits

1. **Narrow spray angle required for burner exit cone**
2. **High degree of atomization**

Perfect fit, we need a narrow spray angle with a high degree of atomization





FUTURE B100 RESEARCH & INFRASTRUCTURE NEEDS

- Effects of fuel oxidation on burner combustion performance
- Oxidative stability testing infrastructure – 3rd party testing for fuel compliance on site
- Fuel anti-oxidant options and recommendations for additive schedule

CONCLUSION

Webster is well positioned to providing commercial and industrial scale, dual fuel burners with low emissions and high turndown for gas and oil/B100.

Thank you.