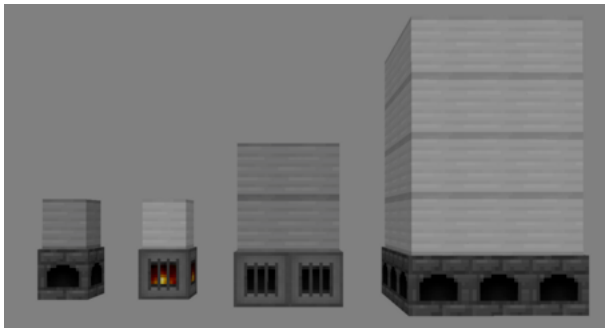
GT New Horizons

Railcraft Boiler

The **Railcraft Boiler** (Steam Boiler / RC Boiler) is a Steam producing multiblock consisting of two parts; a tank and a firebox. Both components are variable in size, from a single block up to a 3x3 footprint. The two firebox types (Solid Fueled Boiler Firebox and Liquid Fueled Boiler Firebox) function essentially the same, just taking different kinds of fuels. Both require a water source. Tanks also come in two varieties, a Low Pressure Tank (LP) and High Pressure Tank (HP). The HP version produces more steam and is more fuel efficient, but takes longer to heat up.



Four different RC Boiler configurations.

Construction

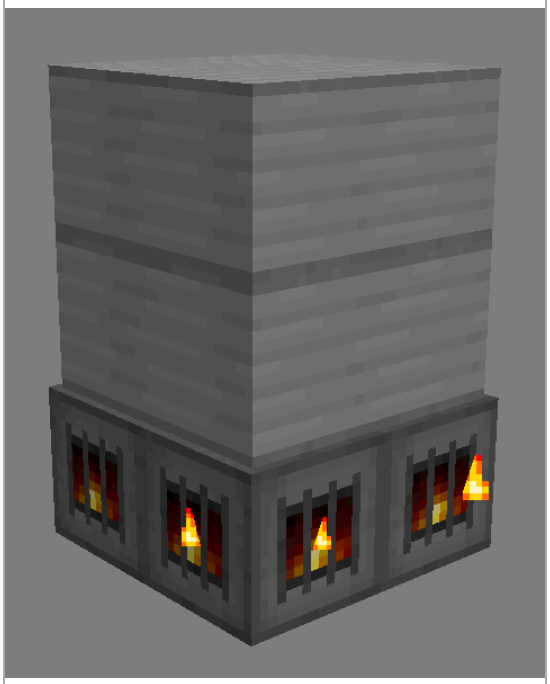
Requires:

- 1-36 Low Pressure Tank or High Pressure Tank
- 1/4/9 Liquid-Fuelled Firebox or Solid-Fuelled Firebox

A boiler will not form if touching/adjacent to any other firebox or tank blocks that are not part of its own structure; boilers cannot wallshare. The firebox blocks must all be on the bottom layer and of the same type. Tank blocks must also be only of one type, and cover all of the firebox blocks - between one and four full layers. When properly formed, the tank blocks will merge into a single solid unit and the boiler's GUI can be accessed by right-clicking.

Usage

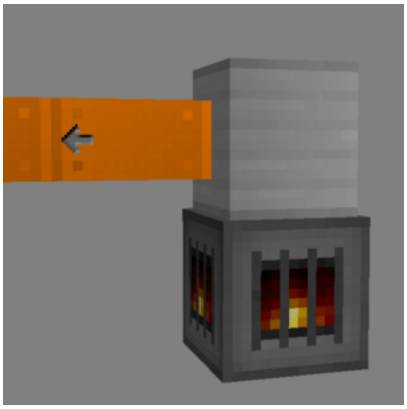
Steam Boiler (Railcraft)



Mod	Railcraft
Type	Steam Generator
Tooltip Text	Multiblock, Variable Size
Relevant Quest	Railcraft Steam Power Liquid-Fuelled Firebox
Tier	Steam
Size	1x1x2 - 3x3x5
Pollution	15 gibbl/s, per firebox
Properties:	
Blast resistance	2.7
Hardness	2.0
Luminance	13
Flammable	No
Storage	4 stacks (SF Firebox)
Liquid Storage	4k-144k L (water) 32k-576k L (steam)

	16k L (LF Firebox)

Like their GT counterparts Solar Boiler and Small Coal Boiler, RC Boilers will explode if they run dry and water is added to a hot boiler. Always keep any boiler constantly supplied with water, and ensure that the water generation is in the same chunk or chunkloaded with the boiler(s). Like most boilers, RC boilers do not care about rain and won't explode if exposed to weather.



Piping out steam

Steam can only be piped out of the tank, while fuel and water are added to the firebox on the bottom layer. Connect Fluid Pipes to any LP/HP tank block to output steam for storage or use. Due to the tank model visually rendering as smaller than a full block, it can be difficult to tell if a pipe is properly connected or not.

The steam production and water consumption of the boilers is straightforward: each LP tank produces 10L steam/tick at maximum heat and the HP tank produces 40L steam/tick; each 160L of steam produced consumes 1L of water. Boilers will only output steam when they reach half capacity or higher.

Fuel Consumption

The fuel consumption uses a complicated formula (https://web.archive.org/web/20151105223325/https://railcraft.info/wiki/device:steam_boiler), scaling non-linearly with the number and type of tanks and the current heat of the boiler. Below is a summary of the fuel consumption per tick for max-heat boilers:

Tank Size	Low Pressure	High Pressure
1x1x1	0.66875	1.5875
2x2x2	5	12
2x3x2	7.2	17.4
3x2x3	10.125	24.75
3x3x3	13.66875	34.0875
3x4x3	16.2	41.4

So, for example, one piece of charcoal (1600 burn time) in a solid-fueled firebox with 3x3x3 low-pressure boiler tanks lasts $1600/13.66875 \approx 117$ ticks, and a bucket of creosote (6400 burn time[1]) in a liquid-fueled firebox with 3x4x3 high-pressure tanks lasts $6400/41.4 \approx 154$ ticks.

Note that this math refers to the consumption at maximum heat. The fuel consumption increases with heat, but not linearly. The fuel efficiency (amount of steam generated for each unit of fuel consumed) significantly increases with heat. For example, a max-heat boiler with 3x4x3 high-pressure tanks produces twice as much steam as a similar boiler at half-heat, but it consumes only 5% more fuel. This ratio depends on the type and amount of steam tanks.

Coke Ovens

In the early game especially, you will often find yourself using Railcraft coke ovens to fuel Railcraft boilers. If you are using either charcoal or coal coke, the solid fuel of choice is produced in a Railcraft coke oven at exactly the same rate as the creosote byproduct (in terms of burn time), which means that it is very effective to run boilers in identically-sized pairs, where one boiler is solid-fueled and burns charcoal or coal coke, and the other is liquid-fueled and burns creosote.

To determine how many coke ovens you need for a pair of identically-sized boilers using this system, use the following method:

1. Decide what size boiler you want to make. Keep in mind that you are making two boilers of this size, one solid-fueled and one liquid-fueled.
2. Look up the fuel consumption of the boiler size you have chosen, using the table above. You only need to consider fuel consumption of one of your two boilers for this.
3. Multiply that fuel consumption value by 9/8 if you are planning to use charcoal, or by 9/16 if you are planning to use coal coke.
4. The resulting value, rounded up, is the number of coke ovens you need. This number of coke ovens, when used to produce your fuel of choice (charcoal or coal coke) will produce enough charcoal/coal coke to feed the solid-fueled boiler of the size you have chosen to build, and enough creosote to fuel the equivalently-sized liquid-fueled boiler.

Note that this calculation doesn't work out perfectly evenly if you compress the solid fuel into blocks before burning it. If you *want* excess charcoal or coal coke, you can do this, but be aware that your system will eventually back up on solid fuel if you do this.

Also keep in mind that this *doesn't* work for sugar or cactus coke, because creosote fuel value and solid fuel value are not produced at the same rate in these cases.

External Links

- Railcraft Wiki - Wayback Machine (https://web.archive.org/web/20151105223325/https://railcraft.info/wiki/device:steam_boiler)
- Railcraft Boiler Calculator/Simulator (https://calculator.towerofawesome.org/) (likely not accurate to GTNH values)

GTNH Changes

The GTNH version of Railcraft modifies the high-pressure tanks to produce 40L steam/tick when fully heated[2], as opposed to the 20L steam/tick in "vanilla" Railcraft. Water consumption is doubled as well.

The fuel consumption curve is slightly altered as well, reaching its maximum value at 500C, rather than at 1000C. Between 20C and 500C, the fuel consumption curve of high-pressure tanks is similar to the curve for low-pressure tanks, and between 500C and 1000C the consumption stays constant. Note that a max-heat boiler consumes fuel at the same rate as in "vanilla" Railcraft.

1. Prior to version 2.5.0 Creosote Buckets had a burn time of 6400, but 1000L of the same fluid Creosote had a lower burn time of 4800 (https://github.com/GTNewHorizons/Railcraft/blob/master/src/main/java/mods/railcraft/common/modules/ModuleCore.java#L103). This gave the Solid-Fueled Firebox 33% more burn time. Both Creosote buckets and liquid now use the normalized 6400 value.
2. https://github.com/GTNewHorizons/Railcraft/pull/17

Fuels accepted by Liquid Fueled Fireboxes

Solid Fueled Fireboxes can burn any furnace fuel. Liquid Fueled Fireboxes can only burn a limited number of fuels listed below.

- Creosote: 6400 burn time per bucket[1]
- Ethanol: 16000 burn time per bucket[1]
- Diesel: 48000 burn time per bucket[1]
- Blazing pyrotheum: 64000 burn time per bucket[1]
- Hootch: 36000 burn time per bucket[2]
- Fire water: 120000 burn time per bucket[2]
- Biofuel: 16000 burn time per bucket (has no recipe in GTNH)[1]
- Rocket Fuel: 112000 burn tipe per bucket (has no recipe in GTNH)[2]

Additionally, there is code for liquefaction coal, but this fuel seems to be unimplemented.

1. Github - ModuleCore.java (https://github.com/GTNewHorizons/Railcraft/blob/master/src/main/java/mods/railcraft/common/modules/ModuleCore.java)
2. Github - EnderIO.java (https://github.com/GTNewHorizons/EnderIO/blob/master/src/main/java/crazypants/enderio/EnderIO.java#L530)

External Links

- Simulator for the Railcraft Boilers (https://calculator.towerofawesome.org/)
- Another calculator, in spreadsheet form (https://docs.google.com/spreadsheets/d/1HgrUWh39L4zA4QDWOSHOovPek1s1eAK1VsZQy_D0zjQ/edit#gid=962322443)
