Different ways to determine the design-flow of most toilet bowls.
Let the toilet tell you what it is:

Universal-Rundle
6.0 Lpf / 1.6 gpf

STERLING
1.6 GPF/6.0 LPF
Sometimes the inside of the tank will tell you
Toilet Rebuild Fundamentals

If gpf data is NOT stamped on bowl or inside tank; look for the date of manufacture inside the tank.

Anything made after Jan 1993 is 1.6 or less.
If there are no visible markings on bowl or tank; look at the bowl trap way at rear of bowl.

Most 1.6 toilets will have a visible trap way
Toilet Rebuild Fundamentals

Trap way not visible on most 3.5 gpf toilets
In order to flush on 1.6 gallon, the water spot has to be much smaller.

Much smaller water spot in these 2 toilets, indicate a 1.6 or lower flush.
The size of the water spot on older bowls is much larger, when compared to low flush bowls.

Large water spot seen in these 2 bowls implies a 3.5 gallon toilet.
Field Test

If all else fails, put 18 linear feet (about 3 arm lengths) of single ply toilet paper into bowl (with tank lid off). Flush toilet, count to 3, then manually close flapper. If paper exits the bowl, it is a 1.6 toilet. If paper just swirls around and nothing else; it is a 3.5 gpf.
Water Closet View

Area under the flapper is always filled with air

Air-filled void of rim at top of bowl.
What does a flapper do?

The flapper is the rubber-compound sealing device that separates water stored in the tank from the bowl. Due to the weight of the water (8.34 lbs/gallon) stored in the tank; when the flapper opens water is pushed through the Douglas valve and into the bowl. At the end of the flush the flapper re-seats and allows the tank to re-fill.
How does a standard 3.5 gpf flapper work?

The standard flapper when seated in the water closet has a cone that is filled with air.

When the toilet is flushed, the flapper raises; the air that is trapped in the cone keeps the flapper raised off its seat until the water level falls to the level of the flapper and the flapper returns to its seat.

Since air is lighter than water, it keeps the flapper raised during the flush.
How does an Early Closure Flapper (ECF) work?

The hole that is cut in the upper region of the cone allows the entrapped air in the cone to escape when the flapper rises off its seat.

With the flapper in the up position; water enters the cone through the bubbler and forces the entrapped air out through the hole. This causes the flapper to close well before the water level reaches the flapper—hence the name: Early Closure.
Significance of bubbler hole size.

The size of the orifice in the bubbler determines how fast water is allowed to displace the entrapped air in the cone. A larger hole will allow the cone to fill with water faster; causing the flapper to close faster.

Knowledge Check: If a bubbler with no hole in it is inserted into the flapper, what will happen when the toilet is flushed?
Float Type ECF’s depend on buoyancy of the float to keep flapper up.
Float ECF Operation

The float on an ECF will follow the water level in the tank. These flappers do not have bubblers, so they would close immediately after opening if not for the float. They are adjusted by sliding the float along the length of the chain. The closer the float is positioned to the flapper; the longer the flapper will stay open.
Dial Flappers
The Fluidmaster™ 502 Universal PerforMax Flapper with Microban is typically the best option when rebuilding 1.6gpf tank toilets. It is adjusted by positioning the hole over a 90 degree arc.
When the hole is in the 12 o’clock position; the flapper will close the quickest.

Hole at 12 o’clock = fast close

Hole at 9 o’clock = slower close
Some ULF Toilets may need standard flappers.

Tanks with an internal dam cause the water level inside dam to decrease rapidly; which results in quick flapper closure. This design is used on some (NOT very common) 1.6 gpf toilets.

Note that the dam has been cut away on this toilet; so an ECF would be necessary.

Some toilets may have a raised (or pedestal) flush valve. These toilets also need a standard flapper.
Bowl Refill rates should be timed, so that the bowl’s water spot is filled just as the ballcock shuts off.
The replacement fill valve for most 2” flapper toilet is a Fluidmaster 400A ballcock. It has an unrestricted refill rate of 28%; but this may be 28% too much for some toilets.

- The size of the bowl’s water spot is the main factor in selecting the correct fill line restrictor.
- ULF toilets with a very small water spot are usually good with an orange restrictor.
- If unsure; mark the max-water line and check level as tank is filling.
Most HET toilets (1.28 gpf or less) require a different Fluidmaster fill valve. Keep in mind that fill rates vary widely.

- Due to the many different bowl designs on the market today—some toilets need 0 (zero) fill going to bowl, while others need almost as much water going into the bowl as into the tank.

- For this reason it is very important to know which Fluidmaster is in your tank and what model toilet is being rebuilt.
Toilet Rebuild Fundamentals

Many of the newer 1.28 gpf toilets with 3 inch flappers require high flows going to the overflow during the flush.

### REPRESENTATIVE FLOW RATE CHARTS

(200+ models detailed in PRO45U Instruction Sheet or at FluidmasterPRO.com)

#### AMERICAN STANDARD

<table>
<thead>
<tr>
<th>TOILET MODEL</th>
<th>MODEL #</th>
<th>TANK MODEL #</th>
<th>INSERT COLOR</th>
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<tbody>
<tr>
<td>Cadet 3 Enclosed Trayway Floor RF ADA (NET)</td>
<td>Internet # 20281954</td>
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<tr>
<td>Champion 4 Max (EL) ADA (NET)</td>
<td>2506.12857, Internet # 25512065, THD SKU: 615556</td>
<td>4215A.101</td>
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<td>Cadet 3 Dual Flush</td>
<td>2806.216</td>
<td>4339.216</td>
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<td>H2Option RF ADA 12&quot; Rough-in Dual Flush</td>
<td>2808.216</td>
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<td>Cuvata: 40889-0 Dual Flush (EL) ADA</td>
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<td>Commode Class 6-EL ADA</td>
<td>K-5549</td>
<td>4818</td>
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<td>Sterling Windsym (NET) Single Flush</td>
<td>402215-0</td>
<td>404515</td>
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<td>Wolflord Classic Complete Solution (NET) 2pc Round</td>
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#### GERBER

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<td>Viper Elongated Dual Flush Bowl (B)</td>
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#### MANSFIELD

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<td>Summit Dual Flush Elongated Front</td>
<td>4382CK</td>
<td>3386</td>
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#### GLACIER BAY

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<td>Glacier Bay 10 Dual Flush Elongated</td>
<td>215-583</td>
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<td>Glacier Bay: All In One</td>
<td>135-428</td>
<td>146-911</td>
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<td>Glacier Bay by Niagara Dual Flush (EL) ADA 12&quot; rough-in (NET)</td>
<td>636-678</td>
<td>N2410T</td>
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#### TOTO

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<tr>
<td>Aqua III (EL)</td>
<td>CST464M</td>
<td>ST464M</td>
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<td>Drake II (EL ADA; Formerly Gwyneth Two-Piece) (NET)</td>
<td>CST454CEF(G)</td>
<td>ST454E #1 - Drake II</td>
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If you don't know the toilet, use the light blue diverter insert.
Toilet Rebuild Fundamentals

Toilet Tank Rebuild Steps

1. Turn off water at angle stop
2. Flush toilet & remove old flapper
3. Remove old supply line & ballcock
4. Remove old handle
5. Install new supply line
6. Install new ballcock
7. Install new handle
8. Install new flapper
9. Adjust handle and flapper
10. Turn water back on
11. Check for leaks & proper flush

For details on the 11 step process contact Water Management
For more information on how to troubleshoot your tank toilets or to receive discount pricing on replacement parts contact:

Water Management, Inc.
703-370-9070
www.watermgt.com
Check for proper flow with **T5 Flushmeter**.