Fine Tuning Brew Temperature on a Heat Exchanger Machine

Espresso machines using a Heat Exchanger can produce incredible espresso shots, as we all know. Assuming all conditions are met: Fresh coffee, proper grind and tamp, and brew pressure (8.5-9.5 bars), the determining factor will be brew temperature. Brew temperature is the hardest thing to regulate on those machines and coming up with a workable routine that will consistently produce a 202 f brew temperature is indispensable.

The solution is a flush chart. But how much to flush? The quantity depends on how long the machine has been on, and idle. The flush brings down the brew water temperature to around 201 degrees f. You wait 25-30 seconds after the flush to allow the Heat Exchanger to recover the temperature to 202-203 degrees, and you pull your shot.

If your machine was off, you must first heat it up for at least 25 minutes. This is standard procedure with Heat Exchanger machines using the E61 group head. This will allow the group head and portafilter to reach minimal operational temperature. I set my machine on a timer so it automatically turns on in the morning, about an hour before I'm up. By the time I get to pull my shot, it has been warming up for 90 minutes. The chart is based on a 1 hour minimum warm-up.

HX Flush Chart. Tested on the Giotto Premium 1.1 Bars Boiler Pressure.

Espresso Machine Idle Time in Minutes	Amount of water to be flushed in oz	Recovery time to 202-203 f Brew Temperature
2	4.5	25-30 sec
3	5.0-5.5	25-30 sec
4	6.0	25-30 sec
5	6.5	25-30 sec
6	6.5-7.0	25-30 sec
7	6.5-7.0	25-30 sec
8	7.0	25-30 sec
9	7.0	25-30 sec
10	7.0	25-30 sec
11-15	7.5	25-30 sec
16-30	7.5-8.0	25-30 sec
31-60	8	25-30 sec
60 >	8-8.5	25-30 sec

1) For brew temperature that starts at 203-205 degrees use 30-35 Seconds as a recovery time.
2) Does water Tank Temperature make a difference? If your water tank temperature is 85-110 degrees f, this chart will work well. If it is 120 f and over, take 3-5 seconds off the recovery time. If it is lower than 85 degrees, add 3-5 seconds to the recovery time.
3) What if this is your first shot of the day, and all you did is the minimum 25 minutes warm-up? Flush 6 oz water. Wait 40 seconds. Flush 2 oz, wait 30 seconds, and pull your shot.

The procedure

Your portafilter basket should be out of the portafilter and in your hand. The portafilter (without the basket) should be attached to the machine, warming up. Grind, dose and tamp directly into the basket. (see below for more details). Flush, wait the recovery time (25-30 seconds), and pull the shot. If you want a 203-204 starting brew temperature, wait 30-35 seconds instead of 25-30 seconds. If you fear that you overshot to any direction – you under-flushed or over-flushed, pull a 3 oz shot without coffee, wait another 30 seconds and pull your shot.

To produce the above chart, I used the Giotto Premium with a Boiler Pressure on 1.1bars. To fine tune your own machine, there is no escape but to do your own testing. However, I suggest that you use the flush quantities in the above table as your starting point. If your boiler pressure is 1.1 bars (that is, the heating element will kick in once boiler pressure falls below 1.1 bars), you may find that these charts work well on your machine.

A word about Grinding Dosing and Tamping

Since you have only 25-35 seconds recovery time, at which time you need to grind, dose and tamp, it could be challenging to do a good job at it. I found that it is much more effective to do the following:

Keep your portafilter baskets out of your portafilter, as a general rule. When the portafilter is attached to the machine, warming up, the basket should not be in it;
Wipe dry the portafilter basket using a towel;
Grind, dose and tamp directly to the portafilter basket;
Flush;
At the end of flush start your stop watch;
Insert the portafilter basket back into the portafilter, mount it back to the group head, wait 25 -30 seconds (or whichever recovery time is applicable) from the end of flush, and pull the shot.

There is a theoretical problem in that routine: you might say that the portafilter basket temperature is lower than the portafilter when you pull the shot, and this may affect the shot quality. Though this argument is theoretically sound, in practical matters it does not produce any noticeable difference in the cup. I suspect that the fact that the portafilter is detached from the group head for only 3 seconds in this routine, more than compensates for the temperature variation between the basket and the portafilter. This routine allows for better attention to dosing and tamping and thus reduces the possibility of channeling. It is also much easier to level the coffee pack when tamping directly into the basket.

Abe Carmeli
acarmeli@sagasys.com