

Large (high capacity) Weathering Chambers

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Is it really better to go large?

The recent introduction of Q-Lab's [Q-Sun Xe-8](#) xenon test chamber brings up the discussion of the merits of these very large weathering chambers. This air-cooled device competes directly with Atlas' [Ci5000](#) tester and Suga Test Instruments [GX90](#) which are both water-cooled. This is the one major difference that one of the devices has. Other minor differences among the three are specimen holders, calibration methods, maintenance schedules, temperature, and humidity control.

These devices share several design parameters. They all have a very large footprint, require a lot of complex hook-ups for water, drains, electrical, and venting. Each of them uses a rotating drum to mount the specimens, and can each fit about 120 to 150 medium sized specimens. These large chambers also all come with a high price tag, and a high maintenance and operating budget. Each company will present reasons why their device is best and why you should buy their equipment. The first thing to consider though is whether to buy a very large chamber. What advantages does it give, and what are the drawbacks?

The obvious advantage is that you can expose a lot of specimens in the same chamber which helps reduce reproducibility variability. This might be the only advantage though, and it comes with a price. There are several reasons why I prefer to have several medium sized chambers rather than one large one. I ran a lab with small, medium, and large chambers, and the middle sized was the most versatile. I would even prefer the smaller chamber to a very large chamber. I will apply some common sense to the question and also refer to my Universal Testing Equation (UTE) which is described in more detail on [BENCHMARK](#). As you will be able to tell very easily, my preference will always be for several medium chambers.

The first and most obvious disadvantage for a very large chamber is you are putting all your eggs in one basket. If that chamber is down, then you have a lot of specimens not being exposed. If the chamber is down for a long time, specimen integrity can be questioned. If the chamber is operating incorrectly, then all the specimens are affected. With several chambers, you have reserve space, backup for a down chamber, and always have a way confirm the valid operation of all the other testers.

You can only run one test cycle at a time, so all your specimens must be exposed to the same test specification or method. Commercial test labs will generally offer multiple methods, as their customers will have many different objectives. No deviations allowed, even a slight variance in black panel temperature is not permitted. Looking into new cycles, or testing for a different end use application will require a different device.

These devices are very expensive as mentioned earlier, so it is imperative that you keep the chamber as full as possible. Every blank space on the rack is a freeloader, costing money and providing no benefit. If you cannot keep your very large chamber full at all times, that's a waste. You are irradiating empty spaces, you are spraying water on blank specimens, If you are running the same cycle in 3 mid-sized

chambers and there is a drop in specimens to test, you can just turn off one of the devices and save expenses.

All the very large chambers are rotating drum specimen mounting. While this does improve the uniformity versus flat bed specimen mounting, the specimens still must be repositioned. Even rotating drum devices have temperature, humidity variances and some irradiance differences. Specimen repositioning in the very large chambers with drum mounting is always a chore. No matter how you do it, every single specimen holder has to be removed, spun around and replaced. Sometimes you can do three at a time, sometimes only one. Most of the time, the center specimen never gets moved. Conversely, specimen repositioning in a flat bed mounting is easy and can be done in seconds. Specimens can be moved in groups using mini-trays or just by sliding. You can read more of this and other differences in one of our editorial pieces on [flat bed vs rotating drum](#) specimen mounting on the Benchmark website.

Referring to our Universal Testing Equation, this will tell us a few other items.

1. Value: are you getting more features for the extra price?
2. Complexity: very large chambers have more complex systems, each one a potential failure point

The advantages of the mid-sized chambers over a very large chamber are many, but of course it will depend on each laboratory to decide what is the best fit for their needs. Commercial test labs that have to offer a multitude of different tests will probably not find the very large capacity chambers to be profitable. On the other hand, labs that are within OEM facilities that only use one exposure method (SAE J2527 comes to mind) might see the high-capacity single chambers to work best.

Thank You,