



AVVERTIMENTI Before connecting power tool, set Power Breaker dial as follows:
 1. Turn tool power switch from "off" to "on".
 2. Switch tool only when tool is off.
 3. Set dial to the following:
 4. Tool only - tool setting must not exceed 10A.

AVVERTENZE Antes de conectar la herramienta eléctrica, ajuste el interruptor de protección de la corriente de la siguiente manera:
 1. Encienda el interruptor de la herramienta eléctrica y asegure la llave de la fuerza de la herramienta.
 2. Apague el interruptor de la herramienta eléctrica y asegure la llave de la herramienta.
 3. Ajuste el dial a la siguiente:
 4. El interruptor de la herramienta eléctrica y el ajuste del dial no deben exceder 10 A.

AVVERTISSEMENT Avant de connecter l'outil électrique, réglez le sélecteur de régime de l'interrupteur de la force motrice de la manière suivante:
 1. Démarrage l'outil électrique et assurez-vous que la clé de commande de régime est verrouillée.
 2. Arrêtez l'outil électrique et assurez-vous que la clé de commande de régime est verrouillée.
 3. Réglez le sélecteur de régime sur le chiffre correspondant à la notice.
 4. Le sélecteur de commande sur le sélecteur de régime de l'outil ne doit pas dépasser 10 A.

Power Breaker
 7.5 8.5 9.5

AFC
 Automatic Filter Cleaning

HEPA Ready
 Meets EPA HEPA vacuum rule when VF1204 HEPA filter is used

BOSCH

HEPA FILTERS AND ONBOARD OUTLETS
 These vacuums combine HEPA (High Efficiency Particulate Air) filtration with onboard tool outlets that trigger the vacuum automatically, for the best in health and convenience.

HEPA-rated Shop Vacuums

The best capture piles of fine dust
without losing power

BY ASA CHRISTIANA

Every woodworker needs a shop vacuum, trailing behind their portable power tools like a loyal pup, and helping with cleanup. Shop vacuums don't move enough air (measured in cubic feet per minute, or CFM) to handle big chip producers like tablesaws, jointers, and planers, but what they lack in volume they make up in suction power and portability.

Over the past few years, as we've learned more about the danger of very fine dust—the kind that hangs longest in the air and penetrates deepest into the lungs—HEPA-level filtration has become the industry standard for dust-management equipment. While fine filtration might not matter as much on a job site, it matters a lot in the closed environment of your woodshop.

Manufacturers of shop vacuums (aka “dust extractors”) have responded by adding HEPA-rated filters. Adding these fine filters is not as easy as it might seem, as they are more prone to clogging, which can cut suction power drastically. To prevent clogging, manufacturers recommend using a fleece collection bag that acts as a pre-filter, capturing most of the fine dust before it reaches the HEPA filter unit.

Another defense against clogging is an automatic filter-cleaning mechanism, which reverses the pressure in short bursts to dislodge caked dust.

Today's top vacuums also include an onboard outlet for portable power tools, connected to a tool-triggered power switch, which turns on the vacuum when you turn on the tool, and keeps it running for a bit after you're done. These are super convenient, letting you park the vacuum near your chopsaw, for example, without having to lean over to switch it on and off.

These new standards and expectations have launched a wave of new products, so we decided to take a close look at HEPA-rated vacuums, head to head. Some



Limited capacity. Due to the HEPA filter units, which extend into the tank area in most cases, filter bags tend to have much lower effective capacity than a vacuum's stated tank volume would suggest. When they stopped drawing in dust, the bags in some models were actually only half full.

Power and capacity matter most

The fleece bags act as an important pre-filter for the fine HEPA filters, keeping them unclogged and free-flowing. Christiana tested raw power with the bags full and empty, and measured the effective capacity of each bag.

INITIAL PRESSURE

After loading a fresh filter bag in each vacuum, Christiana tested initial suction power. A simple gauge measures static pressure in inches of water, which represents how far the vacuum would draw water up a vertical tube.



WORKING PRESSURE

Christiana then loaded each vacuum to two-thirds of its effective working capacity with very fine dust and took another reading. Power drop-off was minimal, showing that the filter bags do a good job keeping the main HEPA filters clean.



manufacturers offer a variety of HEPA models in various sizes, so we picked one from each brand, in an 8-gal. to 11-gal. size that offers the best combination of capacity and portability.

That target range worked well, with one exception. Due to supply-chain disruptions, Festool was not able to provide the models we requested, so we had to go with their 12.7-gal. Cleantec CT 48 E AC HEPA, a larger and pricier model than we were shooting for. But the CT 48's motor and airflow stats are identical to those of the CT 26 and CT 36, for example, so other than tank/bag capacity, you can expect Festool's smaller models to perform similarly.

Tough tests and precise results

Armed with a gauge that measures static pressure, I put seven models through a series of tough tests, designed to simulate the worst conditions they might face in a typical shop. The gauge measures suction in inches of water, which represents how far the vac would pull water up a vertical tube—a standard test. For these pressure tests, I used the largest hose-end provided with the vacuum, to make sure I wasn't throttling it down unnecessarily.

To simulate the most challenging working conditions, I needed a source for very fine dust, so I turned to a large millwork shop here in Portland—Creative Woodworking NW—where the friendly owners were happy to contribute bags of consistently feathery dust captured directly from their wide-belt sander.

To establish a baseline, I loaded a new fleece bag in each vacuum and took a power reading. Initial power varies significantly, as you can see in the chart. Then I tested the vacuums with their bags mostly full, to see if suction power was compromised.

Capacity is lower than stated—I noticed right away that the HEPA filter units extend down into the tank area on most vacuums, stealing potential bag capacity. So I measured effective bag capacity by filling up each one—measuring the volume of dust with a bucket as I fed it into the hose—until the vacuum clogged and lost power.



QUIET POWER

Christiana hooked each vacuum up to his random-orbit sander, loaded with 80-grit paper, and sanded a fresh plywood panel for 4 minutes. Even the weakest machine was powerful enough to keep the panel dust-free. A smart-phone app measured noise in decibels. Readings were remarkably consistent between most vacuums with the exception of the Fein vacuum, which was quieter than the rest of the field.

On all vacs but the Festool, working bag capacities were relatively low compared to stated tank capacities. My guess is that most of the manufacturers are using the same capacity numbers calculated before the HEPA filter units were added.

Working power—Knowing now what each fleece bag could actually hold, I loaded new ones into each vacuum, sucked up enough fine dust to fill each to two-thirds of its working capacity, and took another static-pressure reading at the end of the hose. I repeated this test twice to see if I could get any fine dust past the filter bags and into the HEPA filters, and also to be sure my numbers were solid. The pressure drop was negligible on all models, telling me that the fleece bags do exactly what they are intended to do: prevent fine dust from clogging the HEPA filters.

As for automatic filter-cleaning, all the vacs have it except the Fein, but it doesn't have a measurable effect on vacuum power when the fleece bags are used.

To make sure I wasn't relying only on my vacuum gauge for testing power and efficiency, I tried a real-world sanding test. With each bag two-thirds full, I hooked up my random-orbit sander, sanding a fresh plywood square with a fresh 80-grit disk for four minutes. In all cases, even with the relatively weak DeWalt, there was almost zero dust left on the plywood.

Connecting a tool doesn't hurt power—Next I looked for pressure drop when a tool is connected to the onboard outlet. Connecting my sander had zero effect on my pressure readings, so I tried my power-hungry chapsaw, which lowered the pressure readings only 3% to 4% at most—a negligible amount.

Reusable bags offer savings

While the disposable fleece bags do their job extremely well, they fill relatively quickly in a busy shop and they aren't cheap,



TIP

CONSIDER A REUSABLE BAG

Replacing disposable filters can get expensive, so a reusable bag is a good option. Filter bags are widely available online and have a large, re-closable opening, making them easy to empty. Internal dust ports are a universal size, so this \$34 aftermarket bag fits all of the vacs in this test.

HEPA vacuums put to the test

Check the numbers for bag capacity and static pressure when comparing vacuums. Note also that although some manufacturers offer branded reusable bags, all bags fit all vacuums, and there are aftermarket models available as well.



BOSCH VAC090AH



DeWALT DWV010

Model	Price	Stated tank capacity	Effective bag capacity	Initial static pressure (in. of water)	Static pressure w/bag 2/3 full	Noise level (db)
BOSCH VAC090AH	\$550	9 gal.	4.5 gal.	90	88	80
DeWALT DWV010	\$400	8 gal.	1.5 gal.	47	47	80
FEIN TURBO II HEPA	\$480	8.4 gal.	3.8 gal.	93	91	74
FESTOOL CLEANTEC CT 48 E AC HEPA *	\$975	12.7 gal.	12.2 gal.	97	95	80
MAKITA VC4210L	\$620	11 gal.	6.25 gal.	77	74	80
METABO HPT RP350YDH **	\$640	9 gal.	5 gal.	78	75	80
MILWAUKEE 8960-20	\$650	8 gal.	3 gal.	77	75	80

* Smaller, less-expensive Festool models have same power ratings

** Identical to Metabo ASR 35, other than color scheme; ASR 35 is \$40 less

adding a significant operating cost. And if you are thinking about shaking the dust out and reusing them, it's a messy, time-consuming endeavor. As for using these HEPA vacuums without their bags, it's not recommended for fine wood dust, due to the high potential for filter clogging.

Luckily, there are reusable filter bags available to fit all models, and less expensive aftermarket models available online.

A few other factors

As for mobility, the Fein stood out with its compact footprint and four swiveling wheels. The others go with the cart approach (two fixed and two swivel casters).

All but the Bosch and DeWalt vacuums have brakes of some kind. Festool's single, centralized brake was much easier to activate than the wheel brakes on others.

Last but not least, there is the noise. I

used a couple of smart-phone apps to compare noise levels, making sure numbers were consistent. Fein was significantly quieter than its competitors, measured on the logarithmic decibel scale.

A few models stand out

The clear winner here is Festool's CT 48 Dust Extractor. It has amazing capacity relative to its size, and unmatched suction power. It packs in a number of subtle but very helpful design touches, like a clever



FEIN TURBO II HEPA



FESTOOL CLEANTEC CT 48 E AC HEPA



MAKITA VC4210L



Disposable filter bags (5 pack)	Reusable bag avail. from mfr.	Hose length (ft)	Cord length (ft)	Notes
\$35	\$70	10.5	13	Single adapter included, tapering from 1 3/8 in. to 1 7/16 in.
\$32	No	16	8	Tank latches hard to operate for emptying/changing bag.
\$33	No	13	16.5	4 swivel wheels make it very mobile; flat, lipped top great for resting tools.
\$53	\$217	11.5	24	Foot brake easy and effective; cord and hose storage excellent; comes with helpful vacuum attachments.
\$41	\$152	14	24	Includes 3 handy hose-end adapters (one stepped).
\$70	No	11	24	Two versatile hose adapters; indicator light for full bag/clogged filter.
\$70	No	13.5	24	Three handy adapters (one stepped).



METABO HPT RP350YDH



MILWAUKEE 896020

foot brake and easy hose and cord storage. The model we tested is pricey, but you don't really need its automatic filter cleaning device when you use filter bags, so I would go with the CT 48 E HEPA (\$840), or save even more with a smaller model like the CT 26 or 36, which have the same suction numbers but lower bag capacities. The Festool CT 26 E HEPA offers 6.3 gal. of capacity, for example, and costs \$740.

In the value category, it's hard to beat Fein's Turbo II. While it lacks the capacity

of some, it almost matched Festool's power readings. I also like how quiet, compact, and nimble the Fein is, and the secure resting spot on top for my sander.

Bosch and Makita also earned Best Value honors. Between the two, Makita wins on capacity and hose adapters and Bosch wins on price and power. □

Asa Christiana is a former FWW editor who builds, teaches, writes, and shoots photos in Portland, Ore.