



May 12, 2017

**VIA EMAIL**

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**RE: Hunter Fan Comments on the U.S. Environmental Protection Agency's Draft 1 Version 4.0 ENERGY STAR® Residential Ceiling Fans specification**

Dear Ms. Daken:

Hunter Fan Company ("Hunter"), a leading ceiling fan manufacturer with headquarters in Memphis, TN, offers the following comments on the Draft 1 Version 4.0 Energy Star Residential Ceiling Fans specification.

**3.1 Ceiling Fan Requirements**

Hunter believes the current performance levels are set such that only ceiling fans with DC motors will meet the proposed airflow efficiency requirements. Hunter recommends lowering the requirements such that highly efficient AC fan motors will also qualify.

Ceiling fans incorporating DC motors represent an insignificant number of fan sales each year for the industry due to the high cost and consumer's unwillingness to pay for such fans. There are no signs that the significant cost of DC motors and the associated electronics will drop to consumer friendly price points in the next 5-8 years. By targeting DC motor performance levels, the EPA will effectively set the Energy Star target so high that companies will not see an avenue or incentive to have Energy Star fans in any significant amount across their ceiling fan product lines. By setting performance levels that can still be achieved with a highly efficient AC motors, more companies would be willing to strive for Energy Star certification and ultimately a significantly more amount of highly efficiently fans will be in the market at consumer friendly price points. More total energy will be saved with highly efficient AC motors due to the volume of fan sales at the consumer friendly price points.

**3.2 Ceiling Fan Light Kit Requirements**

Hunter appreciates the EPA's understanding that LED lamps and serviceable integrated LED modules should be treated the same to the extent possible. As discussed during the stakeholder meeting on

April 28, forcing serviceable integrated LED units to be tested with the glass cover on for lumen output would not fairly treat these highly efficient integrated LED units.

### **3.2.3 Option 2 Performance Requirements – Flicker and NEMA 77**

Hunter encourages EPA to make sure this new, untested standard is fully vetted before incorporating it into this ceiling fan performance standard. Flicker may not be an issue because companies already weed these products out knowing consumers will not buy products with flicker issues.

### **4.1 Wired and Remote Control**

Hunter would like EPA to clarify the functionality required of the specified hard wired backup. Does the backup need to include all the functionality of the remote control (e.g. dimming, six speeds, forward/reverse)?

Overall Hunter believes that providing a fully functional backup wall control solution for remote controls is not necessary and presents a significant cost increase to consumers. Wall control backup is considerably challenging from a technical standpoint. Controls for fans with DC motors are unique to a specific fan or line of fans. Traditional hard-wired fan-speed controls are not compatible with fans having a DC motor. To the extent the wall control backup utilizes wireless communication, it likely wouldn't work if there is already a problem with the receiver in the fan for receiving signals from the remote control. One would need to provide an entirely separate receiver to overcome that issue. It may be possible for a hardwired solution utilizing power-line communication. Besides the cost though, Hunter's previous experience with power-line communication is that it can suffer errors due to transients and poor power supplied from the grid.

A fully functional traditional pull chain would be cumbersome from a user experience to cycle through all six speeds and dimming. One would need a reverse switch as well. Hunter has conducted consumer studies and has learned that consumers prefer the feel of a mechanical pull chain versus a digital pull chain. Having a complete redundant control that provides the mechanical feel of a pull chain adds cost in addition to the cost of integrating those with the digital controls found in a DC ceiling fan. Overall this is more cost to an already expensive, niche DC product.

To the extent that the EPA was merely referring to an on/off mechanical wall switch, consumers already have these but would only be able to turn the fan off and on. Typical DC fan controls don't have a hard-wired solution for separate ceiling fan light controls. In Hunter's experience, consumers like to choose their own color mechanical wall switch (e.g. almond, ivory, or white) as opposed to having a ceiling fan manufacturer choose for them. Hunter has additional questions whether many consumers would even install a backup control as opposed to using the remote only.

Most DC ceiling fans integrate the receiver with the motor drive electronics. To the extent the motor drive electronics are involved in the failure, no wireless or hardwired backup control solution will operate the fan anyway.

#### **4.2 Products with Connected Functionality - Optional**

Hunter supports the interpretation of Open Access that includes common, secured platforms like Apple's HomeKit. Platforms such as these are readily available for third parties wishing to integrate with other devices operating on the same platform.

Because energy consumption for a ceiling fan is already low, reporting data in 30 minute intervals should be sufficient and would be less burdensome on manufacturers.

#### **5. Minimum Warranty**

Hunter agrees with the 10-year warranty on the motor itself. While Hunter appreciates the intent and spirit of EPA's proposal for a 10-year warranty on the motor electronics, Hunter believes this to be unrealistic and an unfair burden. Specifying a 10-year design life of a ceiling fan product is okay. Design life is not the same as providing a 10-year warranty though. For the reasons specified below, Hunter proposes that no warranty requirements are set forth for the motor electronics.

#### **Practicalities of Honoring a 10-year Electronics Warranty**

To honor the 10-year electronics warranty manufacturers would either need to keep an inventory of applicable electronics for 10 years from the last sale of the ceiling fan product or guarantee backward compatibility when introducing new motor electronics. Keeping 10 years' worth of any part is expensive from a company inventory and warehouse perspective. But even if the financial burdens could be overcome, electronic components (especially capacitors) have known self-life issues. In other words, the motor electronics likely wouldn't work anyway past 5 years. The main reason for this is that warehouses are not climate controlled. So the electronics experience huge swings in temperature and humidity during the year. They dry out in the winter and saturate in the summer. Overall the dramatic swings in climate significantly degrade the electronic components. Motor electronics in consumer homes are okay because many homes have optimal climate control for electronics (60F-80F, 40-50 % relative humidity). Switching to a climate controlled warehouse is not a viable option for ceiling fan manufacturers.

Although manufacturers strive to have backward compatibility where possible, achieving it is not possible in most cases. Like cell phones and computers, ceiling fan electronics are constantly changing as well. New and better technologies emerge that are not compatible with previous technologies. In a 10-year period electronic motor controls and the motors they control will change substantially several times. Backward compatibility doesn't just depend on software either. The motor driver electronics are specific for the motor and application. Backward compatibility for motor electronics, especially for the DC motors needed to achieve the EPA proposed performance levels, is not feasible because they are specifically designed for a specific DC motor.

Ultimately manufacturers would need to be prepared to replace the entire ceiling fan with a comparable ceiling fan in order to fulfill a 10-year warranty requirement on the motor electronics. No doubt the cost of Energy Star rated fans would significantly increase in order for manufacturers to practically cover a 10-year warranty.

### Electronic Suppliers

Ceiling fan manufactures do not have special buying power or leverage over the electronics industry. Receiving a one year warranty from an electronics supplier can be difficult. Asking the electronics supplier to only cover half of a 10-year warranty isn't even a conversation starter. Consequently ceiling fan manufacturers would be solely responsible for warranting parts that they do not make, design, or even have substantial influence over.

### Variabilities in the Field

Another reason why a 10-year warranty isn't practical is the difficulty in accounting for all the variables that affect the life of electronics. The following list is just a sample list of factors that can affect the service life of the fan motor electronics beyond ordinary wear and tear:

- Quality of the installation (wobble vs non-wobble)
- Frequency and duration of use
- Quality of power supplied from the grid where the consumer lives
- Location of the installation (indoor vs outdoor, kitchen/garage vs bedroom)
- Climate where the fan is installed (humidity and temperature)

The factors above all add to the cumulative degradation of the motor electronics that can shorten the fan service life to be less than the design life. DC motors and the corresponding motor electronics on fans do not have a long enough history to give manufacturers comfort, via actual data, that a 10 year warranty is appropriate without charging the consumer a substantial amount more to account for the unknown factors.

### Overall Fairness

Rarely do modern cell phones, TVs, computers, appliances, etc. offer more than a one year warranty. Many offer only a 90 day warranty. These products are from some of the best brands and manufacturers in the world who have access to the best electronic suppliers in the world. If the leaders in these industries cannot justify that a one year warranty is feasible, it wouldn't be fair to expect the ceiling fan industry to do what others cannot do.

Within all the Energy Star product categories, the substantial majority do not have specifications that require a warranty requirement in order to offer consumers with great, energy efficient Energy Star rated products. Some of these categories, like clothes washers, utilize similar motor technology (BLDC motors) and electronics as ceiling fan do but they are not required to warranty the motor or electronics. Hunter cannot determine what is different with ceiling fans that would require the extraordinary burden of a 10-year motor electronics warranty or any specific warranty on the electronics.

### **7. Labeling & Packaging**

EPA is recommending a fair amount of labelling to be placed on the ceiling fan packaging. Hunter is hopeful that the EPA carefully reviewed each of the several requirements to make sure that consumers would actually find the required information useful. For example, do consumers really

review the packaging to confirm the minimum (lowest) starting temperature for the lamp and ballast platform of the CFLK?

**Inter-Lab Repeatability**

Hunter wants to make sure EPA is aware that the new DOE ceiling fan test procedure that is incorporated into this specification may have up to a 20% variability between certified test labs. Hunter has conducted an informal round-robin testing on five of its fans between four test laboratories around the world. Each of the four labs (which includes Hunter’s lab) tested the same five fans utilizing the new ceiling fan test procedure. Test results varied on some of the fans up to about 20%. The variability was significant even between two labs owned by the same testing agency but located on different continents.

In the next six months Hunter intends to work with the DOE, major test labs, and other ceiling fan manufacturers to conduct a formal round-robin test. To the extent that natural variability exists when conducting the new ceiling fan test procedure, enforcement bodies such as the DOE and EPA need to take such variability into consideration when enforcing the minimum energy efficiency standards.

Ideally the test procedure would be altered to remove the variability. We are still trying to determine the exact cause of the variability.

**Miscellaneous**

Hunter encourages EPA to explicitly state that for a ceiling fan sold with a light kit to be Energy Star certified, both products must meet the applicable Energy Star criteria.

**Conclusion**

Hunter is more than happy to have a further discussion on this subject matter. Thank you for your time and consideration.

Sincerely yours,



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