ZPE Device Requirements (Solid State)

In assessing the merits of ZPE device technologies and potential implementations, there is a set minimum immutable requirements that form the core of our design and test process. We call these requirements "musts". ALL "musts" must be achieved in order for us to publish its design for wide replication. When you read through the list, you will get a sense for why these are important characteristics. There are also "wants" and "delighters" that are more about ease of use, convenience, cost, and other user-centric things. These are often more the purview of those who would commercially produce devices based on the vetted designs and provide means for product differentiation and improvements.

This is a preliminary list for a Solid State category of ZPE device. The requirements will be updated as part of ongoing project team process.

1. Usability	1.01	must include all components necessary for demonstration/testing
	1.02	must be operable by anyone generally familiar with the art (to allow independent testing)
	1.03	must accommodate means to easily make any adjustments necessary for optimal operation
	1.04	must be able to be disassembled and reassembled using reasonably common processes without destroying functionality
	1.05	must have common access points for typical power measurement
2. Functionality	2.01	must produce and sustain a stable DC voltage of at least 450V, or an AC voltage of at least 110 V rms per phase
	2.02	must produce a sustained power output of at least 10 kw
	2.03	must have means to start and stop
	2.04	must have reasonable means for replacement of parts
	2.05	must repeatedly start from "off" to specified output within 1 min
	2.06	must have repeatable performance (must perform repeatably from cold start in different locations and at different times)
	2.07	must be replicatable from readily available parts to the general public
	2.08	must have a reasonable means of scaling voltage and power
3. Safety & Compliance	3.01	must not emit any harmful radiation, gases, fields, particles, ions ….
	3.02	must not have uncontrolled/uncontained sparks when used in the intended application
	3.03	must remain under control or have safety shutdown for overrun conditions
	3.04	must contain a (automated) safety shutoff that kills output within 20 msec upon fault or have overvoltage protection

3. Safety & Compliance	3.05	must be safely moveable and transportable
	3.06	temperature must not exceed 130F (burn threshold)? during operation
	3.07	must not present an explosion hazard
	3.08	must safely contain any toxic or harmful components safely within device
	3.09	the device shall be contained to protect against contact with unintended objects/body parts
	3.10	must have a visible indication that the unit is on (e.g., power ON led)
	3.11	must have an OFF switch
	3.12	must comply with all agency related safety and emissions regulations
	3.13	must not generate disruptive EMF
	3.14	must have means of discharging any remaining charge after turning OFF
4. Physical	4.01	no continuously moving parts (want)
	4.02	inclusive volume should not exceed 4 cubic feet (want_
	4.03	weight should not exceed 25 kg (want)
	4.04	any potentially hazardous feature must be covered/shielded
5. Connectivity	5.01	must contain accessible connection points that accommodate test measurement devices
	5.02	must include common means of connection based on voltage type
	5.03	must have a form of quick connect for initiator device/wires if said initiation device is a separate component
6. Ruggedness	6.01	must be able to be transportable without degrading functionality/performance.
	6.02	functionality and performance must be independent of vibration and repeated moderate drop (3 inches?)
	6.03	must contain handles or features to facilitate lifting
7.Documentation	7.01	must have complete parts list that includes required specifications/tolerances
	7.02	must have complete electrical diagrams
	7.03	must have complete fabrication and assembly instructions
	7.04	must have engineering drawings for all fabricated parts with associated materials and tolerance specifications
	7.05	documentation must be in standard digital format