

GZPW Reference 250 – High End Subwoofer by Ground Zero

Smart Work and Servant Heart

► An unflashy, black 10" subwoofer for 2000 USD – this pricing takes some courage for sure... Ground Zero is obviously self-confident enough to propagate the ultimate subwoofer. So what's behind it?

Not a bling-bling show woofer, yet built to the highest standards and equipped with very good materials. Only the aluminum cap that covers the drive unit is a concession to looks

Ground Zero apparently is one of those companies that really put reference quality into their reference products. The GZPW Reference 250, as this gem signs in full, is of course the Plutonium line's reference woofer. With its modest diameter of only 10", the inconspicuous black diaphragm and the non-exaggerated drive unit, it's not really heavily built. This sub most certainly isn't meant as a contestant to the company's own GZPW, SPL or even SPL-Extreme woofers; the Reference 250 is about pure sound quality, no matter the price. And that's quite steep: 2000 USD are called up for the premium woofer, pointing the way to the fact that this isn't a woofer for the masses. However, it doesn't want to be at all – in fact, it's a statement. It's an uncompromising speaker for freaks who accept only the best quality. From our home HiFi colleagues we heard that there are customers for 10,000-Euro-speakers (a piece!), so in comparison, car HiFi actually is relatively affordable. But what do you get for your money? Well, first it's a subwoofer that's been re-engineered from scratch. The manufacturer says it took three years of development time, specifically built tools for each single component, from the membrane to the centering and the basket – and of course a



consequent development and optimization using the famous Klippel system. No, not even a woofer like the Ref 250 reinvents the loudspeaker, but maybe you can imagine the R&D department being let loose and allowed to do all the things they'd always wanted to do but hadn't been allowed to because of financial restrictions. Simply uncompromising. What might give you an idea about this is the warning sticker on the packaging: It states the danger of heavy damage when pushing the Ref 250 too hard, as the oscillating unit's movement is not restricted rigorously and could simply tear the membrane. Okay, seems we've gone to the bone now...

All normal loudspeakers work according to the plunger coil principle. The physical principles behind this are the electromagnetic induction and the resulting Lorenz force that affects a current-carrying conductor in

a magnetic field. This works best if field and current directions are perpendicular to each other, as in this case the force works vertically on both. In order to build something like this in an efficient way, a wire is wrapped around a carrier to form a coil, making sure that the magnetic field runs radially from the inside to the outside through the coil winding. Very simple – in principle. Unfortunately the membrane needs a restoring force in order to bring it back to zero position, once the electromagnetic driving force decreases (mind you, it still works in the original direction). That's the job of the spider, which is nothing more than a spring that prefers to keep the whole oscillating unit close to the zero position. Both the electromagnetic driving force and the mechanical restoring force are not ideally linear, unfortunately, resulting in certain limitations of the speaker. On the one hand, distortion results from taking away and adding signal components, on the other hand no voice coil can be long enough and no centering can work linear enough to let the speaker work perfectly also during signal peaks. Therefore the usual way to build speakers is to give it as much drive as possible on its first few millimeters of movement and catch it again as soon as possible using the restoring force of the centering. Metaphorically speaking, it's like a car with very small brakes that needs to decelerate already far ahead of the obstruction in order to prevent a crash from happening. This is an effective measure to avoid accidents, but it leaves behind linearity. Now, with the Ref 250, Ground Zero does things the other way round. This subwoofer only brakes in the very last

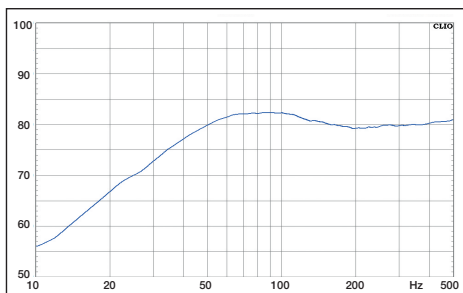


The Ref 250 works with a custom built spider that uses cotton as well as synthetic fiber



Through the basket window the remarkable bobbin can be seen. A full 15 mm overhang let the Reference 250 play with full power over an extremely wide range

moment, using an extremely oversized braking system in the form of an extremely progressively acting spider in combination with a far too long stroke. The voice coil is wound so long that it could propel the oscillating unit up to the stop – and linearly so. What we have here thus is a true super sports car among the subwoofers, one that requires a skilled hand to be driven. There's a risk – the destruction of the costly piece – but there's a reward, which is performance to the limit, if everything is just right. And to make sure that everything is right, the Klippel measurement system is the perfect tool, as it allows the developers to observe and analyze the chassis' behavior even under the most extreme conditions. In this context is only seems plausible that the centering has been completely redesigned. The membrane elicits an appreciative smile because of its extreme stiffness and thinness – I've never held something similar in my hands. It looks like paper, but there's a foam core between two thin layers of paper. This combination makes for a perfect basis for music reproduction, as several speakers have proven impressively in



Like straight out of a picture book: Optimal subwoofer frequency response that doesn't shy away from very deep bass

the past. Mass, after all, is best concentrated where it makes sense, and that's the voice coil. Ground Zero has consciously chosen ordinary copper round wire and not an edge-wise wrapped or specially rolled and coated aluminum construction. Just ordinary copper round wire. Okay, it's wound on a fiberglass core because of the lack of counter-induction. On this account – i.e., to avoid eddy currents – two shading rings have been mounted in the drive unit. These parts can sometimes be found in very high-quality low-/midrange units, but it's deployment in a subwoofer can be described as quite extreme.

So let's see how this woofer talks to us. With 132 g of moved mass and 27.4 liters equivalent volume it's surely not a fatty. The progressive centering allows for a low resonance frequency with the respective housing, according to our measurements. Indeed the Ref 250 can be tuned almost to direct current in moderately big bass-reflex cabinets. Of course our favorite is a closed cabinet. Here it shows that a compromise many high-end subwoofers nowadays have to make has been resolved very successful in this case: What I mean by this is that, in theory, big cabinets yield the best results, but in practice, the housings must be as small as possible. The Ref 250's balance between moved mass, restoring force and Q-factor hints that an impressive sonic result can be achieved with an acceptable housing size. Simply put: In a 27.5 liter cabinet, this woofer plays to the point – and it could deal with a smaller volume still.

Sound

First we consulted the inevitable bass drum, alternating between dry kick drum recordings by Sheffield Labs and fast heavy metal blast beats. The most interesting conclusion: We could really HEAR the drums, not just feel them. The way this woofer extracts audible information even from the deepest frequency range is beyond compare. Any second we spent with the Ref 250 solidified our judgment that this is the most correct bass reproduction in the world. The reason is simple; only few, if any other subwoofer is able to follow the signal as precisely as the Reference 250 does – and to be honest, we weren't interested in other woofers anymore as long as the Ground Zero was playing. In a closed cabinet, this 10" woofer delivers the best of all worlds: Agility, high-level stability and deep bass extension. That's what makes it an exceptional subwoofer.

Conclusion

The GZPW Reference 250 is a truly exceptional subwoofer. It is one of the best subwoofers ever built and our perpetual dream woofer with perfect engineering, for sure – smart work and servant heart, indeed.

Elmar Michels



Ground Zero GZPW Reference 250

Manufacturer	Ground Zero, Germany		
Hotline	+49 (0)8095 873830		
Internet	www.ground-zero-audio.com		
Sound	50 %	0,8	■■■■■■■
Low frequency extension	12,5 %	0,5	■■■■■■■
Sound pressure	12,5 %	1,5	■■■■■■■
Sound purity	12,5 %	0,5	■■■■■■■
Dynamics	12,5 %	0,5	■■■■■■■
Lab	30 %	2,2	■■■■■■■
Frequency response	10 %	1,0	■■■■■■■
Efficiency	10 %	3,5	■■■■■■■
Max. SPL	10 %	2,0	■■■■■■■
Build quality	20 %	1,0	■■■■■■■

Specifications

Basket diameter	27,5 cm
Mounting diameter	23,5 cm
Mounting depth	12,8 cm
Magnet diameter	14,2 cm
Weight	5,1 kg
Nominal impedance	2 x 2 Ohm
DC resistance Rdc	3,66 Ohm
Coil inductivity Le	1,02 mH
Coil diameter	50 mm
Membrane surface	350 cm ²
Resonance frequency fs	34,5 Hz
Mechanical Q-Factor Qms	8,81
Electrical Q-factor Qes	0,44
Overall Q-factor Qts	0,42
Equivalent volume Vas	27,4 l
Moved mass Mms	132,1 g
Rms	3,25 kg/s
Cms	0,16 mm/N
B x l	15,37 Tm
SPL 1W, 1m	82 dB
Recommended power	250 – 800 W
Test cabinet	g 27,5 l
Reflex tunnel (d x l)	–

Rating

Price	USD 2000		
Sound	50 %	1+	■■■■■■■
Lab	30 %	2,2	■■■■■■■
Build quality	20 %	1,0	■■■■■■■

Ground Zero GZPW Reference 250

Absolute Top Class
 Performance:
 Very Good

1,3

CAR & HIFI Edition 2/2015

„Uncompromising subwoofer for uncompromising sound freaks. Any more questions?“