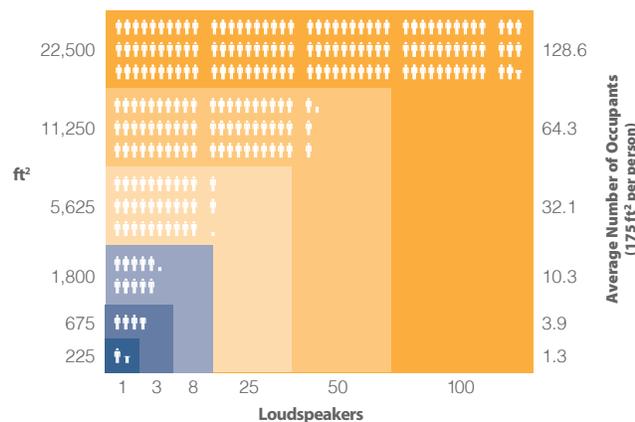


Sound masking is a *critical design choice* for which one does not want to leave a lot of room for interpretation.

Without a set of performance standards, the desired level of speech privacy, noise control and occupant comfort may be sacrificed, as well as the user's ability to easily and cost-effectively adjust their system in the future.

The best approach is to write a performance-based specification focusing on qualities critical to comfort and effectiveness. Focusing on these elements as outlined below allows competitive bids and, providing the terms are upheld, ensures a high level of performance from the system selected.



The greater the number of loudspeakers within each adjustment zone, the larger the area of compromise and the greater the number of people affected by it.

Adjustment zone size

The single most important factor within a sound masking spec is to place an upper limit on adjustment zone size (i.e. individually controllable groups of loudspeakers). Acoustic conditions and user needs vary between private offices, meeting rooms, corridors and reception areas, as well as across open plans. Designs with small adjustment zones enable the user to adjust their frequency and volume to meet these diverse needs. In this case, less truly is more: **one to three loudspeakers** in each zone provides a high degree of flexibility.



Masking sound generation

Each small adjustment zone of one to three loudspeakers should feature a **dedicated masking sound generator** in order to avoid a phenomenon called phasing (i.e. uncontrollable variations in the masking levels). To maximize unobtrusiveness, each generator should also provide a sound that occupants perceive as **random** (i.e. with no noticeable repeat cycle). The sound produced by the generator should cover the entire masking spectrum of **100 to 5,000 Hz (or as high as 10,000 Hz)**.

Volume adjustment capabilities

The workplace design and materials used in it will impact the masking sound no matter how the loudspeakers are installed (i.e. upward-facing above a suspended ceiling or direct-facing cut through a ceiling). Therefore, the spec should call for **fine volume control for each small zone** of one to three loudspeakers. **Increments of 0.5 dB** enable adjustment wherever needed in order to accommodate variable acoustic conditions. Also require the final masking volume to be **consistent within a range of 1 dBA (±0.5 dBA)** of the desired volume at each test location. Again, the benefits are comfort and consistent performance across the space.

Frequency adjustment capabilities

The system should provide **fine frequency control for each small adjustment zone** of one to three loudspeakers. The range of masking sound is generally specified to be between 100 to 5,000 Hz (or as high as 10,000 Hz). The system should provide control over these frequencies **via third-octave adjustment**, because it's both the industry standard and the basis for masking targets set by acousticians.



Loudspeaker requirements

As long as the system can meet the volume and frequency targets established by the spec, it's not essential to specify the loudspeaker's size, wattage rating or other parameters.

However, very small drivers (less than 3 inches or 76 mm) are not likely to generate sufficient levels below several hundred hertz (i.e. down to the required 100 Hz), which are necessary to create the full masking spectrum. While these frequencies play a relatively small role in reducing speech intelligibility, they are vital to occupant comfort and to mask a wider range of noises. The masking loudspeaker drivers should be **4 to 8 inches (100 to 200 mm) in diameter** and rated from **10 to 25 watts**.

Measured results

The true gauge of whether the sound masking system ultimately selected is performing as required is gained from post-adjustment measurements.

The spec should require **specific results that are measured and documented**. Best practice is to require **a test in each 1000 ft² (90 m²) open area and each closed room**, and that **the vendor adjust the sound masking system within that area as needs dictate**. Some systems can outperform this requirement, but it's a good baseline.

Overall volume and variation tolerances: Overall volume is typically set to between 40 and 48 dBA, depending on the type of space and the user's performance requirements. 48 dBA is usually the maximum for comfort; therefore, this level shouldn't be exceeded, except in special cases. As previously mentioned, the results should be **consistent within a range of 1 dBA (±0.5 dBA)**.

Masking frequency curve: There's a general curve that the acoustical community considers effective and comfortable, which is defined in **third-octave bands**. The spec should **set maximum variations for each frequency band**. A reasonable expectation is **plus or minus 2 dB** variation.

Additional considerations

Depending on their significance to the project at hand, secondary characteristics such as timer functions, zoning and control methods, security features, paging functions and aesthetics may also need to be included in the specification.

Also, sound masking systems must meet Underwriters Laboratories (UL) or similar standards for **electrical safety**. In the United States, any components installed in an air-handling plenum or into a suspended ceiling must also meet UL2043. Cables must be **plenum rated**. Low-voltage power supplies should conform to the UL1310 standard for **Class 2 power sources** or the system's power wiring requires conduit. Digital masking systems must meet **electromagnetic interference (EMI)** standards. If sustainability is a goal, users should require **Restriction of Hazardous Substances (RoHS)** compliance.

Own the spec

Even with a well-written specification, the user could end up with a non-conforming sound masking system unless the specifier, user or another person involved in the design and procurement process is appointed as a **guardian** whose responsibility it is to ensure bids actually meet the criteria outlined.

Asking for **drawings** can help to identify differences between proposals, because they show the components, quantities and locations, as well as wiring, making it easier to spot design shortcuts and discuss them with the vendor. Requesting a **spec compliance form** indicating their adherence to each aspect can also be useful. Vendors should note any deviations, describing how their system's design differs.

It's also wise to learn what **services** are offered in conjunction with each proposal under consideration. The system should be supported by professionals who can properly design and implement it and provide the user with ongoing support.

For a sample performance-based specification, see: www.soundmaskingspecs.com

We welcome the opportunity to discuss your acoustical concerns. Contact us today!