Technical Information: SDE Method	
Created and approved by: js/dz	**Key words:** Stages, System Design Exchange, d&b audiotechnik, L-Acoustics
TI: 25-01-TI_NE-EN	**Relevant Versions:** SoundPLANnoise ≥ 9.1 (Update 19.03.2025)

1 Summary

System Design Exchange: The new standard for noise predictions with sound systems overcomes the challenges of standardized data exchange and calculation, solving the problems of inconsistent noise predictions.

As outdoor events in urban areas increase, effective noise management is crucial. Previously, predicting noise from events using systems from multiple manufacturers was difficult. Each manufacturer uses proprietary data formats, making workflows difficult and hindering compliance with environmental regulations. The new System Design Exchange will help to overcome the existing problems.

Content

2 SDE Solution: Standardized Data Exchange and Calculation

The SDE standard solves the existing problem by providing a common language for sound system design data. It defines:

- A standardized file format: Facilitates the seamless exchange of system designs between software platforms.
- A unified calculation method: Ensures consistent and comparable predictions across different software.
- Detailed methodology for complex acoustic interactions: Includes calibration and decoherence factors for highly accurate predictions at any distance, a capability previously unavailable.

SDE was developed by d&b audiotechnik, L-Acoustics and SoundPLAN. The official release date was mid of March 2025 and at that time included in SoundPLANnoise 9.1. If you are interested in further details about the collaboration, technical specifications and the file format, please visit our project website www.sde-info.com.

2.1 SDE Format

The SDE format is able to transfer the setup of a complete stage definition - with all the necessary properties and settings - to a noise prediction software. One SDE file consists of several files zipped together to one file with file extension *.sde. It contains information about the audience area, a calibration point, the sound system with source groups, loudspeaker cabinets and complex directivity point sources.

2.2 SDE Calculation Procedure

The SDE standard establishes a procedure for calculating noise predictions based on the exchanged acoustical data. This methodology includes a decoherence factor to account for wind fluctuations, third-octave band averaging, and calibration using an input spectrum.

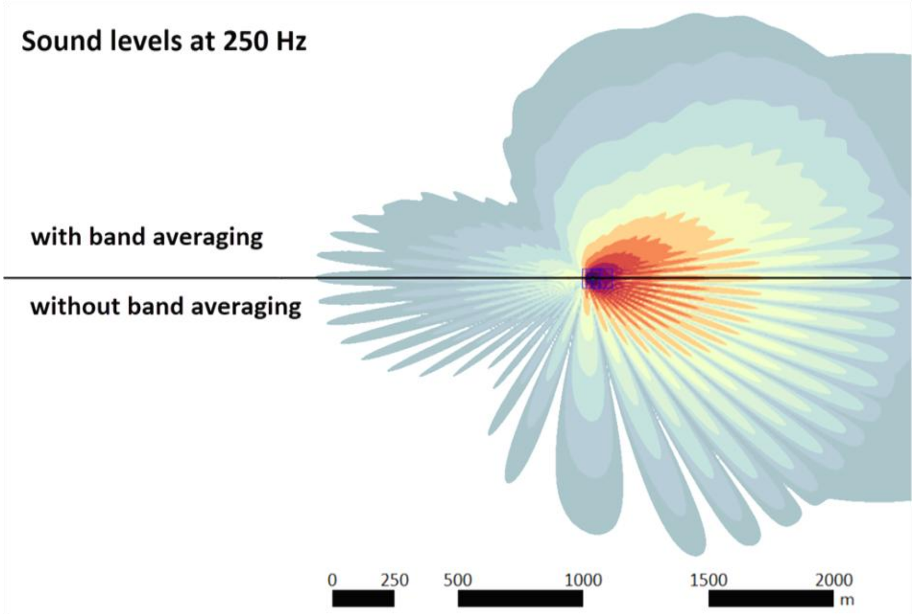
2.2.1 Decoherence Factor for Wind Fluctuations

When sound waves travel from their sources to a receiver, their coherence is influenced by wavelength and differences in path length. Along the way, varying wind conditions affect each propagation path differently, gradually reducing coherence. This effect becomes more pronounced as the distance between sources increases and at higher frequencies. Instead of an abrupt shift, measurements show a gradual decline in coherence.

For example, in a line array, closely positioned loudspeakers maintain higher coherence at higher frequencies and certain angles, whereas sound waves from more distant sources, such as separate line arrays, experience greater decoherence.

2.2.2 Third-Octave Band Averaging

To accurately represent phase effects, the variation in wavelength across a third-octave bandwidth is considered. Relying solely on the band’s center frequency would overemphasize interference effects. While band averaging is not inherently a decoherence factor, it functions similarly. This is illustrated in the following map, which shows the sound levels for the 1/3-octave band at 250 Hz for a main array. The lower section displays the results without band averaging, while the upper section includes band averaging, which smooths out interference effects, particularly at off-axis angles.

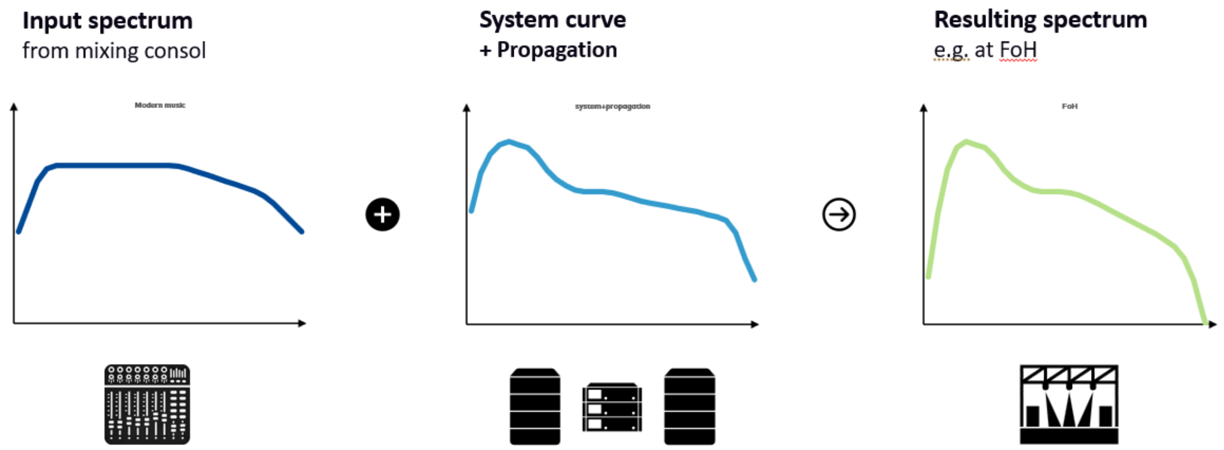


2.2.3 Calibration with an Input Spectrum

The frequency spectrum definition has been updated, shifting from an acoustic spectrum measured in the audience area to an input spectrum representing the signal fed into the sound system. This change improves accuracy by separating the signal from the system response, particularly in the low-frequency range, and by reducing the impact of acoustic interference, leading to fewer issues and more precise results.

The signal's spectral content is now treated independently from the system's transfer function. The overall frequency range, particularly in the low-end, is influenced by both the signal itself, determining whether low frequencies are present, and the system's response, which dictates whether those frequencies are reproduced. This approach allows for a direct comparison between different setups, such as sound systems with and without subwoofers, while keeping the input spectrum unchanged.

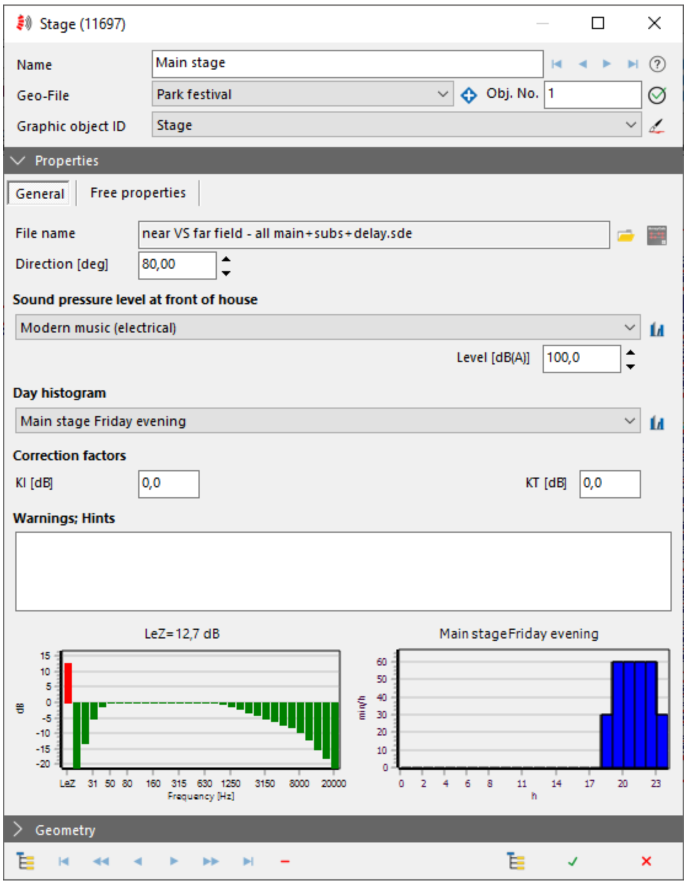
Acoustic spectra measured in the audience area are influenced by location-specific interference effects, including phase cancellations. Previously, the perceived spectral characteristics of the system varied depending on where the calibration point was placed. By defining the input spectrum as the unaltered signal sent from the mixing console - including any applied equalization - to the amplifiers and speakers, these interference effects are eliminated, ensuring a more consistent and accurate representation of the system's behavior.



3 Implementation in SoundPLANnoise 9.1

For the use of SDE in SoundPLANnoise, there are two relevant areas in the program. One is the model definition in the Geo-Database, and the other is the subsequent calculation. Please make sure that the current SoundPLANnoise 9.1 update is installed.

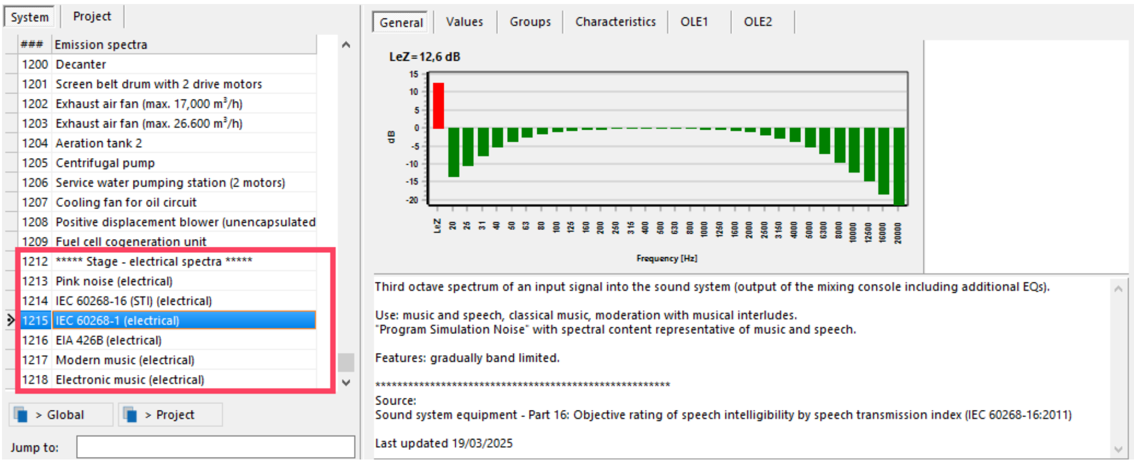
3.1 Stage Definition in the Geo-Database



By using the object type stage, we place the stage in our model. After the selection of the appropriate *.sde file in the stage properties, we rotate the stage around the definition point to incorporate it geometrically in our noise model.

In the next step we define the acoustical properties, consisting of an electrical input spectrum suitable for the event and the sound pressure level at the front of house.

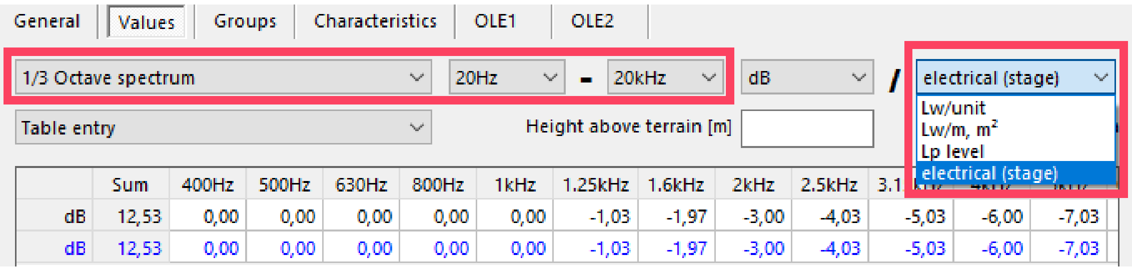
We have included several new spectra in the system emission library that can be used for the stage definition.



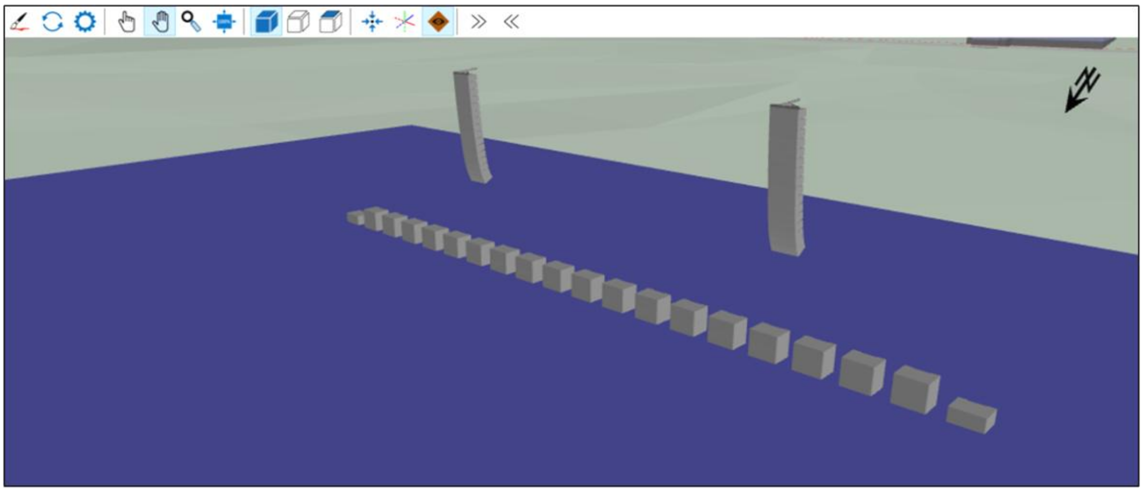
This table shows use and features of these spectra:

Name	**Use**	**Features**
Pink noise	academic purposes	equal energy distribution
IEC 60268-16 (STI)	speech, announcements	band limited to mid frequencies • low slope 250 Hz (6 dB/oct) • high slope 500 Hz (3 dB/oct)
IEC 60268-1	music and speech, classical music, moderation with musical interludes. "Program Simulation Noise" with spectral content representative of music and speech.	gradually band limited
EIA 426B	music with natural & electric instruments (with average bass)	• low cut 50 Hz • high slope 1 kHz (3 dB/oct) • high cut 8 kHz
Modern music	contemporary music, big show (with big subs)	• low cut 40 Hz (24 dB/oct) • high slope 1 kHz (3 dB/oct) • high cut 8 kHz (9 dB/oct)
Electronic music	electronic music, DJs, pronounced and extended bass	• low cut 30 Hz (24 dB/oct) • added bass +5 dB (40 - 63 Hz) • high slope 1 kHz (3 dB/oct) • high cut 8 kHz (9 dB/oct)

Either you use one of those spectra or you create your own spectrum in the project library. It is important to choose for the definition a 1/3 octave spectrum, with a minimum range from 20 - 20000 Hz and as reference electrical (stage).



All other parameters are the same as for industrial source definitions. In the 2D and the 3D the cabinets, the stage reference point, the FoH and the audience area are displayed.



3.2 Calculating a Stage in the Calculation Kernel

At the moment the propagation standards ISO 9613-2 from 1996 and 2024, CNOSSOS-EU and Nord2000 support the stage calculation with an SDE-file. In the standard settings a new tab sheet is available to set the two parameters influencing the decoherence due to wind fluctuation. The default settings are 5 m for the correlation length and 1 m/s for the standard deviation of the wind speed.