



TEC1.7

Immissions control



Objective

Our objective is to minimise disruption to the immediate surroundings of the building due to sound and light emissions. In addition, we wish to prevent negative impacts on people and nature due to noise and light from buildings.

Benefits

Measures to prevent/reduce sound emissions and adverse light conditions have a positive impact on the health and well-being of users and the surrounding environment. This increases the productivity of building users and reduces absenteeism. Preventing light pollution supports the stability of ecosystems and can reduce the subsequent social costs incurred as a result of damage.

Contribution to overriding sustainability goals



	CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS (SDGS) OF UNITED NATIONS (UN)		CONTRIBUTION TO GERMAN SUSTAINABILITY STRATEGY	
<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; background-color: #0056b3; margin-right: 5px;"></div> <div style="font-size: 24px; font-weight: bold; margin-right: 5px;">1</div> <div style="font-weight: bold;">Low</div> </div>	3.4	Reduce mortality from non-communicable diseases and promote mental health	15.1	Biodiversity
	15.5	Protect biodiversity and natural habitats		



Outlook

Thanks to ever emerging new research and solutions, available technical options are becoming increasingly sophisticated and tailored more closely to the needs of people and nature. In the industrial sector, a large extent of impacts and immissions can already be partially contained or prevented (e.g. urban factory). DGNB monitors these developments and will update the indicators of this criterion as required.

Share of total score

	SHARE	WEIGHTING FACTOR
Office Education Residential Hotel	0.6%	1
Consumer market Shopping centre	1.4%	2
Department stores		
Logistics Production		
Assembly buildings	0.7%	1



EVALUATION

A total of two indicators are specified for the evaluation. There is a total of 110 points in this criterion, of which a maximum of 100 points can actually be awarded.

NO.	INDICATOR	POINTS											
1	Noise immissions – immissions guide values												
1.1	Noise pollution reduction measures	Max. 70											
	<table border="0" style="width: 100%;"> <tr> <td style="background-color: #e0e0e0;">Consumer market</td> <td style="background-color: #e0e0e0;">Shopping centre</td> <td style="background-color: #e0e0e0;">Department stores</td> <td style="background-color: #e0e0e0;">Logistics</td> <td style="background-color: #e0e0e0;">Production</td> </tr> <tr> <td style="background-color: #e0e0e0;">buildings</td> <td style="background-color: #e0e0e0;">Office</td> <td style="background-color: #e0e0e0;">Education</td> <td style="background-color: #e0e0e0;">Residential</td> <td style="background-color: #e0e0e0;">Hotel</td> <td style="background-color: #e0e0e0;">Assembly buildings</td> </tr> </table>	Consumer market	Shopping centre	Department stores	Logistics	Production	buildings	Office	Education	Residential	Hotel	Assembly buildings	
Consumer market	Shopping centre	Department stores	Logistics	Production									
buildings	Office	Education	Residential	Hotel	Assembly buildings								
	<ul style="list-style-type: none"> ■ Compliance with the immissions guide values in accordance with Technical Instructions on Protection against Noise (TI noise) throughout the day and the night. 20 ■ Immissions values that fall below the immissions guide values in accordance with TI noise by at least 6 dB throughout the day and the night. 40 ■ Immissions values that fall below the immissions guide values in accordance with TI noise by at least 10 dB throughout the day and the night. 70 												
2	Light pollution												
2.1	Light pollution reduction measures	Max. 30											
	<table border="0" style="width: 100%;"> <tr> <td style="background-color: #e0e0e0;">Consumer market</td> <td style="background-color: #e0e0e0;">Shopping centre</td> <td style="background-color: #e0e0e0;">Department stores</td> <td style="background-color: #e0e0e0;">Logistics</td> <td style="background-color: #e0e0e0;">Production</td> </tr> <tr> <td style="background-color: #e0e0e0;">buildings</td> <td style="background-color: #e0e0e0;">Office</td> <td style="background-color: #e0e0e0;">Education</td> <td style="background-color: #e0e0e0;">Residential</td> <td style="background-color: #e0e0e0;">Hotel</td> <td style="background-color: #e0e0e0;">Assembly buildings</td> </tr> </table>	Consumer market	Shopping centre	Department stores	Logistics	Production	buildings	Office	Education	Residential	Hotel	Assembly buildings	
Consumer market	Shopping centre	Department stores	Logistics	Production									
buildings	Office	Education	Residential	Hotel	Assembly buildings								
	<ul style="list-style-type: none"> ■ There is an implemented lighting concept that explicitly examines the issue of light pollution and its prevention, and focuses on minimising light trespass into neighbouring areas, for instance due to outdoor advertising, outdoor lighting, façade lighting and indoor lighting which has an external impact (excluding required safety lighting). +15 ■ At least 80% of all illuminants or lights with external impact are designed to prevent upwards and lateral light scattering. +5 ■ At least 80% of all illuminants or lights with an external impact are switched off or dimmed automatically or are equipped with motion sensors. +5 ■ For all illuminants, care has been taken to reduce distracting glare effects. +5 ■ A simulation has been carried out and the resulting potential for optimisation has been implemented +10 												



SUSTAINABILITY REPORTING AND SYNERGIES

Sustainability reporting

Appropriate key performance indicators (KPIs) for communication include using the lighting concept described in indicator 2.

NO.	KEY PERFORMANCE INDICATORS (KPIs)	UNIT
KPI 1	Over-fulfilment of the immissions control values in accordance with Technical Instructions on Protection against Noise (TI noise) (throughout the day and night)	[dB]
KPI 1	Share of the exterior illuminants where the issue of light pollution has been explicitly taken into account	[%]

Synergies with DGNB system applications

- **DGNB district:** Indicator 2 largely corresponds to indicator 8. "Light pollution reduction measures" in the criterion SOC1.9 Emissions/immissions for the Urban district scheme (UD16) and Business district scheme (BD16).



APPENDIX A – DETAILED DESCRIPTION

I. Relevance

The productivity and satisfaction of users and neighbours are closely linked to influences and sensory perceptions from the surrounding environment. To ensure highest possible user acceptance, lowest possible negative impact due to noise and distracting lights should be ensured.

II. Additional explanation

The existing statutory immissions regulations should be complied with whenever possible. In addition, potential improvements for optimisation should be evaluated.

Definition of emissions

In accordance with German Federal Immission Control Act (BImSchG), any air pollution, odours, noises and similar occurrences emanating from technical systems, commercial and industrial facilities or vehicles are referred to as emissions.

Definition of immissions

Conversely, immissions are defined by the Act as air pollution, noises, odours and similar environmental effects that affect people, animals and plants. In most cases, emissions also result in immissions.

III. Method

Indicator 1. Immissions guide values

The following values are taken into consideration:

- Noise emissions level NEL in dB(A)
- Sound power level SPL in dB(A)
- Sound power level with immission effect in dB(A)
- Operational period of the systems
- Assessed level as additional pollution
- Immissions guide value (IGV) in dB(A)

The evaluation is carried out via the difference established between the determined value and the immissions guide values from TI noise (Table 1). Noise protection measures that go beyond the minimum noise protection requirements result in a better evaluation for this criterion.

The difference between the determined value and the immissions guide value is determined via a noise protection expert report (noise immission projection) in accordance with TI noise.

Planning measures for minimising sound immissions include, for example, the positioning of sound sources in relation to neighbouring areas that require protection, the use of particularly quiet systems, and planning required additional structural measures, where necessary. Such measures include sound dampers, enclosures, encapsulation and noise protection walls and barriers.



Table 1: Immissions guide values from Technical Instructions on Protection against Noise

Expulsion	Daytime reference values (6:00 to 22:00)	Nighttime reference values (22:00 to 6:00)
Industrial area	70 dB(A)	70 dB(A)
Industrial estate	65 dB(A)	50 dB(A)
Urban area	63 dB(A)	45 dB(A)
Business, village and mixed area	60 dB(A)	45 dB(A)
General residential area	55 dB(A)	40 dB(A)
Residential area	50 dB(A)	35 dB(A)
Spa area, hospital and nursing home	45 dB(A)	35 dB(A)

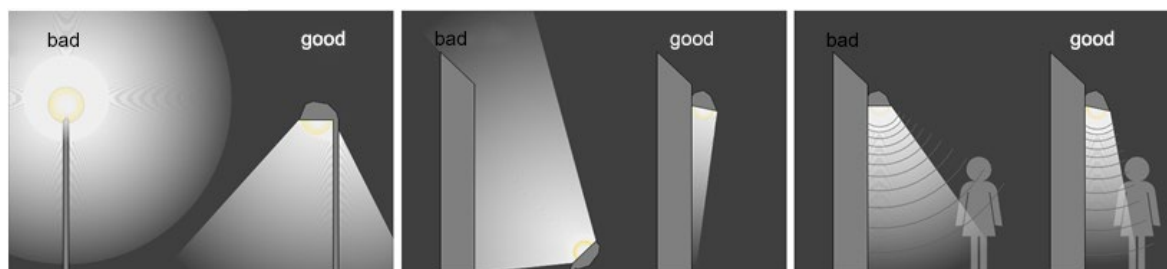
Indicator 2. Light pollution

Light pollution reduction measures

Light is defined as the intolerable illumination of a living or working area inside a building and increased illumination of outdoor areas by external light sources. Residential buildings in the immediate vicinity of a department store, for instance, are particularly affected by this.

Light pollution at the site is evaluated in qualitative terms. Outdoor lighting systems and indoor lighting systems with an external impact are evaluated. The objective is to prevent light from scattering upwards or laterally as far as possible. The illuminance should also be adjusted to the actual light conditions. Consequently, lights that feature low upwards and lateral light scattering and can automatically adjust their light intensity to suit the surrounding conditions are classified as good. In addition, motion sensors, for instance, should be positioned in such a way that unnecessary activation is prevented.

A lighting concept should explicitly examine the issue of light pollution and its prevention. The objective is to ensure the lowest possible illumination due to outdoor advertising, outdoor lighting, façade lighting and indoor lighting with an external impact (excluding required safety lighting), for example.



Lighting examples (source: Büro Faerber based on Przygoda)

It is not always possible to ensure sufficient illumination and also prevent disruptive effects. Adoption of different measures may lead to compliance with these comfort values. Measures to prevent direct lines of sight to light sources include selecting an appropriate site, ensuring that lights are positioned at optimal heights, ensuring that lights have suitable angles of inclination, implementing screening measures and more. Light emissions can also be reduced by limiting the times at which lights are switched on, using many distributed smaller lights in place of a single larger light or through dimming measures.

Details regarding wildlife conservation can also be found in the guidelines "Bird-Friendly Building with Glass and Light", Schmid, H., W. Doppler, D. Heynen & M. Rössler (2012): Bird-Friendly Building with Glass and Light. Second, revised edition., Swiss Ornithological Institute, Sempach"



Required safety lighting is excluded from these provisions.

IV. Usage-specific description

The DGNB assessment of this criterion for mixed use buildings can be done on behalf of only one use. If different schemes of the above mentioned mix-use building can be assigned to this one use (main or secondary use (s)).

APPENDIX B – DOCUMENTATION

I. Required documentation

Examples of possible documentation include the following items. The documentation submitted for the evaluation of individual indicators should comprehensively and clearly demonstrate compliance with the relevant requirements

Indicator 1. Immissions guide values

- Noise protection expert report
- Expert report regarding noise, in which the projected noise immissions from the building into neighbouring areas are specified as an assessed level in dB(A) and, if necessary, the additional pollution is determined. The report must state whether the minimum level of noise protection, i.e. the immissions guide values in TI noise, have been met or the extent to which the noise protection achieved falls below this minimum level.
- Declaration by an expert indicating that the immission locations are outside of the exposure zone of the system.

Indicator 2. Light pollution

- Documentation of measures against light pollution
- Proof of the lighting systems installed to date by means of data sheets and photo documentation
- Lighting concept
- If applicable, simulation results and presentation of the methodology



APPENDIX C – LITERATURE

I. Version

Change log based on version 2020

PAGE	EXPLANATION	DATE
all	General and evaluation: Scheme “Assembly buildings” has been added	16.09.2021
561	Usage-specific description: clarification on evaluation of the mixed-use buildings	16.09.2021

II. Literature

- German Federal Immission Control Act (Gesetz zum Schutz vor schädlichen Umwelteinwirkungen durch Luftverunreinigungen, Geräusche, Erschütterungen und ähnliche Vorgänge – BImSchG). 26th September 2002 (BGBl. I No. 71 published 04.10.2002, P. 3830), last amended by Article 1 of the Act published 21st July 2011 (BGBl. I P. 1474)
- Sixth General Administrative Regulation to the Federal Immission Control Act (Technical instructions on protection against noise), published 26th August 1998; Gemeinsames Ministerialblatt (Joint Ministerial Gazette), 49th year, no. 26, published 28th August 1998
- DIN ISO 9613-2. Attenuation of sound during propagation outdoors – General method of calculation. Berlin: Beuth Verlag. October 1999
- RLS-90: "Richtlinien für den Lärmschutz an Straßen" [Guidelines for noise protection on roads], published 1990, introduced via letter no. 8/1990 – StB 11/14.86.22-01/25 Va 90 by the Bundesminister für Verkehr (Federal Minister for Transport) on 10th April 1990.
- DIN EN 12354-4. Estimation of acoustic performance of buildings from the performance of elements – Part 4: Transmission of indoor sound to the outside. Berlin: Beuth Verlag. April 2001
- Przygoda, Carsten (2013): Leuchtmittel und Lichtlenkung [Illuminants and light redirection]. URL: <http://www.funnytakes.de/lichtverschmutzung/leuchtmittel-und-lichtlenkung.html>
- Bird-Friendly Building with Glass and Light, Schmid, H., W. Doppler, D. Heynen & M. Rössler (2012): Bird-Friendly Building with Glass and Light. Second, revised edition, Swiss Ornithological Institute, Sempach, ISBN no.: 978-3-9523864-0-8