

SURVEY ON AIRCRAFT NOISE LIMITS, GOALS AND GUIDELINES IN NORDIC COUNTRIES

N-ALM Noise sub-group meeting, date 10 May 2016, Copenhagen (date of the table:2016-06-23, assembled by Eva Nielsen)

1. Country	Norway	Denmark	Sweden	Finland	Iceland
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3. Used metrics and explanation	<p><b>L<sub>den</sub></b> Day.Evening-Night periods 07-19, 19-23, 23-07. Calculated on a yearly basis.</p> <p><b>L<sub>Aeq</sub>, L<sub>p,A24h</sub></b> Equivalent level for a 24 hour period.</p> <p><b>L<sub>night</sub></b> Equivalent level for the 8 hour night period 23-07. Is not a part of the regulation.</p> <p><b>L<sub>5AS</sub></b> Statistical max-unit (5 % percentage level of the aircraft noise events) (comparable to the old MFN)</p>	<p><b>L<sub>DEN</sub></b> in connection with take-off and landing, including taxiing to and from aircraft stands. Calculation is based on the three peak month of a year.</p> <p><b>L<sub>Amax</sub></b> Maximum value for take-offs and landings at night (2200-0700). Calculation is based on the most noisy aircraft (for a single operation)</p> <p><b>L<sub>Amax</sub></b> Maximum level for taxiing in connection with start and landings at night (2200-0700).</p> <p><b>L<sub>eq</sub></b> The equivalent A-weighted sound pressure level from other activities than take-off and landings including taxiing, for instance engine testing and other activities at the terminal area.</p> <p><b>TDENL</b> <b>Number of dwellings affected by noise more</b></p>	<p><b>L<sub>DEN</sub> = FBN = FBN<sub>EU</sub></b> Noise during an average 24 hours of a calendar year. FBN is an abbreviation of FlygBullerNivå and it is defined in the same way as L<sub>DEN</sub>. Index EU is used to mark the difference from the old Swedish definition of FBN, nowadays called FBN<sub>TBU</sub>.</p> <p><b>Leq</b> Equivalent level during a specified time period.</p> <p><b>L<sub>night</sub></b> Equivalent level night time, 8 hours, yearly average).</p> <p><b>L<sub>Amax</sub></b> Maximum level from one flight, SLOW Maximalnivå= The N'th highest maximum level (Remark N differ depending on decision in the environmental permit).</p> <p><b>TFBN = TDENL</b> General: all noise calculations are based on the</p>	<p><b>L<sub>den</sub></b> Day.Evening-Night periods 7-19, 19-22, 22-7</p> <p><b>L<sub>Aeq7-22</sub></b></p> <p><b>L<sub>Aeq22-7</sub></b></p> <p><b>L<sub>Aeq24h</sub></b></p> <p><b>L<sub>ASmax</sub></b></p>	

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		<b>than the limits</b>	flight phases from take-off until reversal thrust during landing.		
4. Definition of day, evening and night	Day: 07-19 Evening: 19-23 Night: 23-07	According to the Environmental Protection Agency's recommendation no. 5/1994:  Day: 07-19 Evening: 19-22 Night 22-07	According to EU: day 06-18, evening 18-22, night 22-06 .  Some older environmental permits refer to the older definition day 07-19, evening 19-22 and night 22-07.	Day: 07-19 Evening: 19-22 Night: 22-07	
5. List of authorities deciding and publishing goals, limits and guidelines	Miljøverndepartementet, Klima- og forurensningsdirektoratet, Luffartstilsynet	Danish Environmental Protection Agency  Goals, limits and guidelines are described in " <a href="#">Vejledning fra Miljøstyrelsen nr. 5/1994</a> "	Swedish Environmental Protection Agency (EPA) <a href="http://www.naturvardsverket.se/Documents/foreskrifter/nfs_2008/nfs_2008_06.pdf">http://www.naturvardsverket.se/Documents/foreskrifter/nfs_2008/nfs_2008_06.pdf</a>  Governmental decision (GD)  Public Health Agency of Sweden  <a href="https://www.folkhalsomyndigheten.se/documents/publicer-att-material/foreskrifter1/fohmfs-2014-13.pdf">https://www.folkhalsomyndigheten.se/documents/publicer-att-material/foreskrifter1/fohmfs-2014-13.pdf</a>  Swedish National Board of Housing (NBH)  <a href="http://www.boverket.se/Globa/IT/Webbokhandel/Dokument/2010/Flygbuller.pdf">http://www.boverket.se/Globa/IT/Webbokhandel/Dokument/2010/Flygbuller.pdf</a>  Environmental court (EC) + appeal body	Ministry of the Environment  Ministry of the Social affairs and Health (inside dwellings)  Regional State Administrative Agencies (env. permits)  Trafi, Finnish Transport Safety Agency (goals)	
6. Long term	For new buildings:	No specified long term goals	FBN 55 dB(A) outdoors	Indoors:	

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goals – dwellings (specify indoors or outdoors)	Outside at living spaces and outside windows: $L_{den}$ 52 dBA Indoor from outdoor source: Living and bedroom: $L_{p,A24h}$ 30 dBA Bedroom: $L_{p,AFmax}$ 45 dBA		$L_{Amax}$ 70 dB(A) outdoors, which may be exceeded N times. N=16 during average day/evening and 3 during average night according to a government regulation "Förordning (2015:216)" <i>Bromma Stockholm is excluded from the N=16 regulation day/ evening.</i> $L_{eq,24h}$ 30 dB(A) indoors $L_{Amax}$ 45 dB(A) indoors	$L_{Aeq7-22}$ 35 dB(A) $L_{Aeq22-7}$ 30 dB(A) Outdoors: $L_{Aeq7-22}$ 55 dB(A) $L_{Aeq22-7}$ 50 dB(A), new areas 45 dB(A) $L_{den}$ 55 dB (land use planning)	
7. Long term goals for other places (specify indoors or outdoors)		No specified long term goals	Outdoors, where silence is important, for example recreation areas: FBN 40 dB(A) Indoors in hospitals, schools, offices, hotel and restaurants according to Swedish standard SS 25268:2007 Hospitals: $L_{eq}$ 26-45 dB(A) and $L_{Amax (Fast)}$ 41-60 dB(A) depending on type of room and noise class Schools: $L_{eq}$ 26-45 dB(A) and $L_{Amax (Fast)}$ 35-60 dB(A) depending on type of room and noise class Offices: $L_{eq}$ 30-45 dB(A) and $L_{Amax (Fast)}$ 45-60 dB(A) depending on type of room and noise class Hotel and restaurants: $L_{eq}$	<b>Outdoors</b> Residential areas 55 dB ( $L_{A(07-22)}$ ), 50 dB ( $L_{A(22-07)}$ ), Recreation areas in conglomerations and areas in their proximity 55 dB( $L_{A(07-22)}$ ), 50 dB ( $L_{A(22-07)}$ ), Areas serving nursing or educational institutions 55 dB ( $L_{A(07-22)}$ ), 50 dB( $L_{A(22-07)}$ ), New residential and recreation areas and areas serving institutions 55 dB ( $L_{A(07-22)}$ ), 45 dB ( $L_{A(22-07)}$ ), Holiday settlements (camping sites, etc.) 45 dB ( $L_{A(07-22)}$ ), 40 dB( $L_{A(22-07)}$ ) <b>Indoors</b> Dwellings, sickrooms, guest rooms in accommodation businesses 35 dB ( $L_{A(07-22)}$ ), 30 dB( $L_{A(22-07)}$ ), Educational and conference facilities 35	

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			26-45 dB(A) and $L_{Amax}$ (Fast) 41-60 dB(A) depending on type of room and noise class	dB( $L_{A(07-22)}$ ), Business and office facilities 45 dB ( $L_{A(07-22)}$ )	
8. Limits in existing environment – dwellings (specify indoors or outdoors)	For existing buildings: Living and bedrooms: $L_{p,A24h}$ 42 dBA	<u><math>L_{DEN}</math> - (outdoor)</u> <i>Residential area and noise sensitive buildings used for public purposes (schools, hospitals, old peoples home):</i> 45 dB general aerodrome 55 dB airport/military air base <i>Scattered houses in open land.</i> 50 dB general aerodrome 60 dB airport/military air base <u><math>L_{Amax}</math> for take-offs and landings at night – (outdoor)</u> <i>In residential areas and recreative areas with overnight accommodation the maximum value should not exceed:</i> 70 dB general aerodrome 80 dB airport/military air base As a starting point, new residential areas ought not to be planned where noise exposure is over 55 dB or the maximum value $L_{MAX}$ is over 70 dB	FBN 60 dB(A) outdoors (according to Swedish Transport Administration ) FBN 55 dB(A) outdoors in later decisions from EC. $L_{eq,24h}$ 30 dB(A) indoors Maximalnivå 70-90 dB(A) outdoors depending on the traffic situation (N="regularly" according to GD). The level of maximalnivå and N have been interpreted differently of different EC/Airports. Maximalnivå 45 dB(A) indoors (N differs depending on different decisions from EC)	No exact national limits apply. Some environmental permits include regulations regarding restrictions to significantly increase the forecasted noise contour to housing areas ( $L_{den} > 55$ dB, outdoors).	
9.Limits in existing environment for other		<u><math>L_{DEN}</math> - (outdoor)</u> <i>Liberal profession (hotel, offices etc.):</i>	Indoors in hospitals, schools, offices, hotel and restaurants according to Swedish	No exact national limits apply.	

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places (specify indoors or outdoors)		60 dB general aerodrome 60 dB airport/military air base <i>Recreational areas with                      sleeping possibility                      (summerhouses, allotments                      etc.):</i> 45 dB general aerodrome 50 dB airport/military air base <i>Other recreational areas                      without sleeping possibility:</i> 40 dB general aerodrome 55 dB airport/military air base <u>L<sub>Amax</sub> for take-offs and                      landings at night – (outdoor)</u> <i>Recreational areas with                      sleeping possibility:</i> 70 dB general aerodrome 80 dB airport/military air base  Special noise limits for heliports for ambulance flights are added in 2013.	standard SS 25268:2007 - See row 7 above.		
10. Last update		<i>Eva Nielsen 31-05-2016</i>	<i>Marie Hankanen/Stefan Granbäck 23-06-2016</i>	<i>Tuomo Leskelä 9.5.2016</i>	