

ISO 17201-4:2025-07 (E)

Acoustics - Noise from shooting ranges - Part 4: Calculation of projectile sound

Contents		Page
Foreword		iv
Introduction		v
1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	Projectile sound	5
4.1	General	5
4.2	Regions	5
4.3	Spectrum of an N-wave	6
5	Source description	7
5.1	Source point	7
5.2	Source sound exposure level for streamlined projectiles	7
5.3	Source sound exposure level for non-streamlined projectiles	8
5.4	Spectrum of the source sound exposure level	11
6	Calculating the sound exposure level at a receiver location	11
6.1	Basic formula	11
6.2	Calculation of the attenuation terms	12
6.2.1	Geometric attenuation	12
6.2.2	Non-linear attenuation	14
6.2.3	Non-linear shift of the spectrum	15
6.2.4	Atmospheric absorption, excess attenuation and barrier effects	16
7	Uncertainty in source description and propagation	16
7.1	Overview	16
7.2	Uncertainties in source description	17
7.2.1	General	17
7.2.2	Source point location	17
7.2.3	Broadband source sound exposure level for streamlined projectiles	17
7.2.4	Source sound exposure level for non-streamlined projectiles	18
7.2.5	Characteristic frequency of the N-wave	19
7.2.6	Spectrum of the source sound exposure level	19
7.3	Uncertainties in determining the sound exposure level at a receiver location	19
7.3.1	General	19
7.3.2	The uncertainties at a receiver location for non-streamlined projectiles	19
	Annex A (informative) Derivation of constants and consideration of barrier and other effects	20
	Annex B (informative) Calculation of projectile sound for projectiles on ballistic trajectories	24
	Annex C (informative) Estimation of projectile velocity change	27
	Annex D (informative) Calculation examples	30
	Bibliography	41