

Appendix B Terrestrial Laser Scanner Specifications

Table B 1. Performance specifications for RIEGL VZ-1000 and VZ-4000. Highlighted boxes indicate the settings used in the study.

	VZ-1000 ¹			VZ-4000 ²		
		$\rho \geq 90\%$	$\rho \geq 20\%$		$\rho \geq 90\%$	$\rho \geq 20\%$
Maximum measurement range (natural targets) ³	70 kHz	1,400 m	700 m	30 kHz	4,000 m	2,300 m
	100 kHz	1,200 m	600 m	50 kHz	4,000 m	2,300 m
	150 kHz	950 m	500 m	150 kHz	2,700 m	1,450 m
	300 kHz	450 m	350 m	300 kHz	2,000 m	1,000 m
Peak laser pulse repetition rate (PRR) in meas/sec	70 kHz	29,000		30 kHz	23,000	
	100 kHz	42,000		50 kHz	37,000	
	150 kHz	62,000		150 kHz	113,000	
	300 kHz	122,000		300 kHz	222,000	
Beam divergence	0.3 mrad 30 mm every 100 m			0.12 mrad 12 mm every 100 m		
Laser beam footprint	7 mm at exit			18 mm at exit		
Vertical angular stepwidth	0.0024° ≤ Δθ ≤ 0.288° between consecutive laser shots			0.002° ≤ Δθ ≤ 0.280° between consecutive laser shots		
Horizontal angular stepwidth	0.0024° ≤ Δφ ≤ 0.5° between consecutive scan lines			0.002° ≤ Δφ ≤ 3° between consecutive scan lines		
Angular measurement resolution	Better than 0.0005° (1.8 arcsec)			Better than 0.0005° (1.8 arcsec)		
Raw range accuracy	8 mm at 100 m			15 mm at 150 m		
Raw positional accuracy	5 mm at 100 m			10 mm at 150 m		
Laser wavelength	1550 nm (Near infrared)			1550 nm (Near infrared)		
Laser class	Class 1 (IEC 600825-1)			Class 1 (IEC 600825-1)		
Vertical scanner field of view	Total 100° (+60° / -40°)			Total 60° (+30° / -30°)		

1. (RIEGL Laser Measurement Systems 2017a)

2. (RIEGL Laser Measurement Systems 2017b)

3. Values based on average conditions with flat targets scanned at a perpendicular angle of incidence with atmospheric visibility at 23 km (RIEGL Laser Measurement Systems 2017a)