DRONE-BASED VERTICAL PRESSURE WASHING ANALYSIS

OVERVIEW

This document outlines the operational efficiency of a drone equipped with a high-pressure washing attachment (180 bar), used to clean vertical surfaces (e.g., building façades). The focus is on estimating the area cleaned per battery and per hour at different heights (10 m, 20 m, 30 m), accounting for hose weight and reduced flight time.

BASELINE ASSUMPTION

Parameter	Value
Pressure	180 bar
Spray width	0,7 meters
Battery Life (Base)	18 minutes (1,080 s)
Surface Orientation Vertical (e.g., wall)	
Height Impact Rule	10% battery reduction per 10 m of hose carried
Battery Swap Time	3 minutes

CLEANING SPEED RANGE ASSUMPTION

Speed Level	Speed (m/s)	Description
Slow	0.3 m/s	Cautious cleaning, heavy buildup
Moderate	0.4 m/s	Standard dirt
Fast (Original) 0.5 m/s n	0.5 m/s	Light dirt, optimal condition

CLEANING AREA PER BATTERY

Height	Time (s)	Area @ 0.3 m/s (m²)	Area @ 0.4 m/s (m²)	Area @ 0.5 m/s (m²)
0 m	1,080 s	227 m²	302 m²	378 m²
10 m	972 s	204 m²	272 m²	340 m²
20 m	864 s	181 m²	242 m²	302 m²
30 m	1756 s	159 m²	212 m²	265 m²

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UPDATED CLEANING AREA PER HOUR

Cycle time = Flight Time + 3 min
Number of Cycles = 60 ÷ Cycle Time
Area/hr = Cycles/hr × Area per Battery

Height	Flight Time (min)	Cycle Time (min)	Cycles/hr	Area/hr @ 0.3 m/s	Area/hr @ 0.4 m/s	Area/hr @ 0.5 m/s
Up to 10 m	16.2	19.2	~3.13	~639 m^2	~851 m^2	~1,064 m^2
Up to 20 m	14.4	17.4	~3.45	~624 m^2	~835 m^2	~1,042 m^2
Up to 30 m	12.6	15.6	~3.85	~612 m^2	~816 m^2	~1,020 m^2

DISCLAIMER

The performance figures and efficiency estimates provided in this document are based on theoretical calculations and standardized assumptions. Actual cleaning performance may vary significantly due to a range of site-specific conditions and operational variables, including but not limited to:

- Operator skill and control precision
- Surface material and level of soiling
- Environmental factors such as wind, temperature, and humidity
- Hose management and water supply configuration
- Battery condition, payload weight, and drone model variations

These values should be used as general guidance only and not as guaranteed performance benchmarks. Field testing under actual operating conditions is strongly recommended to validate performance in a specific use case.

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