

Machine Vibration Diagnostic Report

Report ID	VIB-20260301-001	Date	01 March 2026, 20:53:17
Machine	Hairdryer — 1500 W	Location	Not specified
Analyst	Not specified	Acquisition Folder	20260301_20_53_17

Executive Summary

■ Overall Condition: ALARM (Zone C)

The hairdryer exhibits an RMS velocity of **1.94 mm/s**, placing it in **ISO 10816 Zone C (Alarm)** for small machines (<15 kW). This level of vibration is not suitable for long-term continuous operation. The dominant spectral energy is concentrated around **313–314 Hz**, consistent with the motor fan blade pass frequency or a rotor imbalance harmonic at operating speed. No impulsive or bearing-type signatures were identified. **Shaft speed (RPM) was not provided**, so shaft-order fault analysis (unbalance, misalignment, looseness) could not be performed. Maintenance investigation is recommended in the near term.

Measurement Details

Sensor	IIS3DWB MEMS Accelerometer (3-axis)
Sensor board	STEVAL-STWINBX1
Firmware	FP-SNS-DATALOG2
Mounting / position	Not specified
Sample rate (measured)	26,597 Hz (nominal 26,667 Hz)
Acquisition duration	9.85 seconds
Number of samples	262,000
Channels analysed	X, Y, Z
Shaft speed (RPM)	Unknown — not provided by operator
Operating load	Not specified

■ **Note — general engineering knowledge:** The measured ODR (26,597 Hz) is ~0.3% below the nominal 26,667 Hz. This is a normal hardware oscillator tolerance and does not affect the quality of the analysis.

Vibration Severity — ISO 10816

Per-Axis Signal Statistics

Axis	RMS (g)	Peak (g)	Crest Factor	Kurtosis	Interpretation
X	0.462	1.717	3.72	2.35	Moderate vibration, normal CF
Y	0.266	0.996	3.74	-0.07	Low vibration, no impulsive content

Z	1.052	2.482	2.36	-0.05	Highest axis — gravity + vibration component
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ISO 10816 Overall Assessment (X-axis, primary vibration axis)

Parameter	Value	Status
RMS Velocity (10–1000 Hz band)	1.94 mm/s	■ Zone C — Alarm
ISO Machine Group	Group 4 — Small machines (<15 kW)	
Baseline	Not available	—

Zone	Velocity Range	Meaning
■ A	0 – 0.71 mm/s	Good — typical for new machines
■ B	0.71 – 1.8 mm/s	Acceptable — suitable for long-term operation
■ C	1.8 – 4.5 mm/s	Alarm — investigate and plan maintenance
■ D	> 4.5 mm/s	Danger — risk of machine damage

Findings

#	Condition	Severity	Confidence	Action Required
1	Elevated vibration overall — Zone C on ISO 10816	■ Alarm	High	Investigate root cause; schedule maintenance
2	Dominant spectral peak at ~313 Hz — possible rotor / fan blade pass	■ Monitor	Medium	Confirm shaft RPM; check fan blade condition
3	Shaft-frequency analysis not performed (RPM unknown)	—	N/A	Provide shaft RPM for complete diagnosis

Detailed Analysis

Finding 1 — Elevated Overall Vibration (Zone C)

Aspect	Details
What was detected	The X-axis RMS velocity is 1.94 mm/s, which exceeds the Zone B threshold (1.8 mm/s) for small machines. This indicates the machine is vibrating at a level that is not suitable for long-term continuous operation.
Evidence	RMS velocity = 1.94 mm/s. RMS acceleration (X) = 0.462 g. Kurtosis = 2.35 (normal, non-impulsive). Crest factor = 3.72 (within normal range).
What it means	Continued operation at this level may accelerate wear of the motor bearings, fan, and housing. It does not indicate imminent failure but warrants investigation.
Recommended action	Inspect the hairdryer for mechanical looseness, blocked air vents, or accumulated debris. Measure again after cleaning and compare.

Finding 2 — Dominant Spectral Peak at ~313 Hz

Aspect	Details
What was detected	A clear spectral peak cluster is centred around 313–314 Hz on the X-axis. The peak amplitude is 0.109 g at 313.5 Hz.
Evidence (top FFT peaks)	313.3 Hz → 0.091 g 313.5 Hz → 0.109 g 313.6 Hz → 0.105 g 314.3 Hz → 0.059 g 314.5 Hz → 0.100 g
What it means	■ ■ General engineering knowledge: Hairdryer motors typically spin at 10,000–30,000 RPM. A dominant peak at ~313 Hz could correspond to: (a) the shaft fundamental frequency if the motor runs at ~18,780 RPM, or (b) a fan blade pass frequency (shaft frequency x number of blades). Without RPM data this cannot be confirmed from sensor data alone.
Recommended action	Record the motor RPM (from motor nameplate or tachometer) and re-run the full diagnosis to classify this peak as shaft order, blade pass, or resonance.

Finding 3 — Shaft-Frequency Analysis Not Performed

Shaft speed (RPM) was not provided at the time of measurement. As a result, the automated diagnosis pipeline could not compute shaft harmonics (1x, 2x, 3x) or classify faults such as unbalance, misalignment, or mechanical looseness. To obtain a complete fault diagnosis, please provide the shaft RPM and re-run the analysis.

Recommendations

Immediate Actions

1. Inspect the hairdryer for loose screws, worn motor mounts, or blocked air inlet/outlet vents.
2. Clean the air filter and fan assembly if accessible — debris buildup is a common cause of elevated vibration in small appliances.

Planned Maintenance

1. Obtain the motor nameplate RPM or measure with a tachometer during operation.
2. Re-run the vibration diagnosis with the RPM value to enable full shaft-order and bearing fault classification.
3. If vibration remains in Zone C after cleaning, consider bearing lubrication or motor replacement.

Monitoring Adjustments

1. Establish a vibration baseline measurement immediately after cleaning and maintenance.
2. Repeat measurement every 30 days to track trend.
3. Add a Y-axis comparison measurement from a different sensor mounting point for 3D characterisation.

Next Steps

Next measurement	Within 7 days — after cleaning and inspection
Additional tests	Tachometer RPM measurement; thermal imaging of motor housing
Missing data	Shaft RPM required for complete fault diagnosis
Notes	No baseline available — this is the first measurement; track trend going forward

