Company: Columbusmaskiner AB **Date:** 2024-12-17 **Measuring Personnel:** Jari Palosaari, Alexander Österström **Measuring Instrument:** Svantek 106 **ID No.:** 45142

Measured RMS, m/s ²					m/s²	
Riktn.	1	Riktn.	2	Riktn.	3	av
Х	0,369	Y	0,205	Z	0,35	0,5
Х	0,366	Y	0,341	Z	0,454	0,7
	Riktn. X X	M Riktn. 1 X 0,369 X 0,366 A 0,366	Measured Riktn. 1 Riktn. X 0,369 Y X 0,366 Y	Measured RMS, m, Riktn. 1 Riktn. 2 X 0,369 Y 0,205 X 0,366 Y 0,341 Image: Color of the second sec	Measured RMS, m/s² Riktn. 1 Riktn. 2 Riktn. X 0,369 Y 0,205 Z X 0,366 Y 0,341 Z Image: Color of the system Image: Color of the system Image: Color of the syst	Measured RMS, m/s² Riktn. 1 Riktn. 2 Riktn. 3 X 0,369 Y 0,205 Z 0,35 X 0,366 Y 0,341 Z 0,454 Image: Color of the second s

Machine Type: Wheel Spinner Manufacturer: Columbusmaskiner AB Model: SP85-HD Drive: Electric 400 V, 3-phase, 50/60 Hz Power: 25 Nm Weight: 58 kg

1. Test Equipment

- Vibration Meter: Svantek SV 106
- Accelerometer: Kuber for measuring hand-arm vibration in 3 directions (X, Y, Z)
- **Test Distance from the Machine:** Measurements were taken on the machine's handles, where vibration levels are most relevant to user exposure.
- **Test Position:** The accelerometers were placed on the specific handles of the machine where vibrations most likely affect the user. Photos are available in the file.

2. Test Procedure

- **Type of Test:** The test was performed with an idle run for approximately 1 minute.
- The test was also performed by spinning the wheel up to full speed (~80 km/h) and then braking. The test was repeated three times, and the results from both handles were identical.

Referenced ISO Standards:

- ISO 5349-1:2001 "Mechanical vibrations Measurement and evaluation of human exposure to hand-transmitted vibrations Part 1: General guidelines"
- EN ISO 20643:2010 "Mechanical vibrations Measurement and evaluation of hand-arm vibrations"

3. Measurement Results

- Equivalent vibration level (hand-transmitted vibration):
 - \circ Idle run (handle): 0.5 m/s²
 - Load spinning wheel (handle): 0.7 m/s²
- Maximum vibration levels:
 - Max vibration level (hand-transmitted): 0.7 m/s²
- **Test Conditions:** Indoor, Temperature: 19°C
- **Background vibration levels:** Vibration levels in the test area were below 0.2 m/s² and were considered not to affect the results.

4. Compliance with EU Regulations

- Machine Directive 2006/42/EC: The machine meets the basic health and safety requirements, including those related to vibrations. The measured vibration levels are below the maximum allowable value for hand-transmitted vibrations, ensuring that the machine does not pose a risk to the user.
- **Maximum allowed vibration level:** According to EN ISO 5349 and EN ISO 20643, hand-transmitted vibrations should not exceed 5.0 m/s² as an average value over an eight-hour working day. The maximum vibration level measured in the test is 0.7 m/s², ensuring that the machine does not pose a risk to the user.

5. Summary and Conclusions

- **Does the machine meet vibration requirements:** Yes, the machine meets the vibration requirements according to ISO 5349 and EN ISO 20643.
- **Maximum vibration levels:** 0.7 m/s² (Load spinning wheel)
- **Other observations:** No significant deviation was observed during the test. The vibrations were within acceptable limits for all operating modes.
- **Recommendations:** No action required, as the test results are within the approved limits, and the machine meets the vibration requirements for CE marking.

Uncertainty Contributions for Vibration Measurement:

- Instrument uncertainty (Svantek SV 106): ±5%
- Calibration uncertainty: ±2%
- Variability in repeated measurements: $\pm 5-10\%$
- Assembly method and operator influence: ±5%
- Environmental factors (temperature, background vibrations): ±2%

Total estimated uncertainty: The total measurement uncertainty is calculated according to standard methods and is estimated at $\pm 15\%$ (expanded uncertainty with a coverage factor k=2, corresponding to a 95% confidence interval).

Impact on results: Considering the total measurement uncertainty, this means:

- The maximum measured vibration level of 0.7 m/s² (at load/spinning wheel handle) could range between 0.68 0.92 m/s².
- Load spinning wheel (handle): $0.7 \pm 0.12 \text{ m/s}^2$
- Idle run (handle): $0.5 \pm 0.05 \text{ m/s}^2$

Conclusion: Despite the measurement uncertainty, the measured vibration levels are within the acceptable limits for hand-transmitted vibrations according to EN ISO 5349 and EN ISO 20643. As the machine operates in intervals where vibrations are short-term or periodic and do not exceed the limits for long-term exposure, no further workplace assessment is required.

6. Approval

- Test Leader (name, title): Jari Palosaari, Test Leader Date: 2024-12-17
- Responsible for the machine's CE marking: Alexander Österström, Technical Manager
 Data: 2024 12, 17

Date: 2024-12-17

Columbusmaskiner AB

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