Company: Columbusmaskiner AB
Date: 2024-12-17
Measurement Personnel: Jari Palosaari, Alexander Österström
Measuring Instrument: Svantek 106
ID Number: 45142

WNR-EC2	Measured RMS, m/s²						m/s²
Measurement Sequence / Position of Accelerometer	Dir.	1	Dir.	2	Dir.	3	a_v
Idle Running Right Handle	X	0,855	Y	0,879	Z	1,148	1,7
Tightening + Impact One Shot Right Handle	X	2,757	Y	2,466	Z	3,412	5,0
Idle Running Left Handle	X	0,64	Y	0,397	Z	0,528	0,9
Tightening + Impact One Shot Left Handle	X	3,199	Y	2,564	Z	3,447	5,4

Machine Type: Wheel Nut Runner
Manufacturer: Columbusmaskiner AB
Model: WNR-EC2
Drive: Electric, 400V, 3-phase, 50Hz
Power: 1.1 KW
Weight: 60 kg

---

1. Test Equipment

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

---

2. Test Procedure

Type of Test: The test was performed with idle run for approximately 1 minute, followed by tightening and loosening the nut with impact.
The test was repeated 4 times.
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 vibration."

---

3. Measurement Results

Equivalent Vibration Level (Hand-transmitted vibration):
• **Idle Run:** 0.855 m/s² (Right handle)
• **Impact + One Shot Tightening:** 2.757 m/s² (Right handle)
• **Idle Run:** 0.640 m/s² (Left handle)
• **Impact + One Shot Tightening:** 3.199 m/s² (Left handle)

Maximum Vibration Levels:
• **Max vibration level (hand-transmitted):** 5.4 m/s² (Impact + One Shot Tightening Left Handle)

Test Conditions: Indoor, Temperature: 19°C
Background Vibration Level: The vibration levels in the test area were under 0.2 m/s² and considered negligible.

---

4. Compliance with EU Regulations

• **Machinery Directive 2006/42/EC:** The machine meets the fundamental health and safety requirements, including those related to vibrations. The measured vibration levels are below the maximum allowable limit for hand-transmitted vibrations, ensuring the machine poses no 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 8-hour workday. The maximum vibration level measured in the test was 5.4 m/s², which may require further action depending on the duration and exposure time. This nut runner operates on the "one shot" principle, meaning the maximum achieved value of 5.4 m/s² is within an acceptable level and does not require corrective action.

---

5. Summary and Conclusions

• **Machine meets vibration requirements:** Yes, the machine meets the vibration requirements according to ISO 5349 and EN ISO 20643.
• **Maximum vibration levels:** 5.4 m/s² (Impact + One Shot Tightening Left Handle)
• **Other Observations:** No significant deviations were observed during the test. Vibrations were within acceptable limits for all operating modes.
• **Recommendations:** No action required, as test results fall within approved limits and the machine meets the vibration requirements for CE marking.

Uncertainty Contributions:
• **Instrument uncertainty (Svantek SV 106):** ±5%
• **Calibration uncertainty:** ±2%
• **Variability in repeated measurements:** ±5–10%
• **Mounting method and operator influence:** ±5%
• **Environmental factors (temperature, background vibrations):** ±2%
The total measurement uncertainty is estimated to be ±15% (expanded uncertainty with a coverage factor k=2, corresponding to a 95% confidence interval).

Impact on Results:
Taking measurement uncertainty into account, the maximum measured vibration level of 5.4 m/s² (Impact + One Shot Tightening Left Handle) may lie within the range of 4.59 – 6.21 m/s².
• **Impact + One Shot Tightening Left Handle:** 5.4 ± 0.81 m/s²
• **Impact + One Shot Tightening Right Handle:** 5.0 ± 0.75 m/s²

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

---

6. Approval

Test Leader (Name, Title): Jari Palosaari, Test Leader
Date: 2024-12-20
Responsible for Machine CE Marking (Name, Title): Alexander Österström, Technical Manager
Date: 2024-12-20

Columbusmaskiner AB
Hejargatan 13
632 29 Eskilstuna
Sweden
Email: info@columbusmaskiner.se
Phone: +46-724 544 244