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Hand-held pneumatic tools: Protect your ears and your hands

Isabelle Maguire

Pierre Marcotte

Hand-Held Pneumatic Tools

Protect Your Ears and Your Hands, 2nd Edition

Hand-held pneumatic tools generate noise and vibration that, over the years, can cause harmful effects on health.

The duration and intensity of exposure to noise can cause deafness, while the duration and intensity of exposure to vibration can result in Raynaud's syndrome (fingers that turn white) and musculoskeletal disorders.

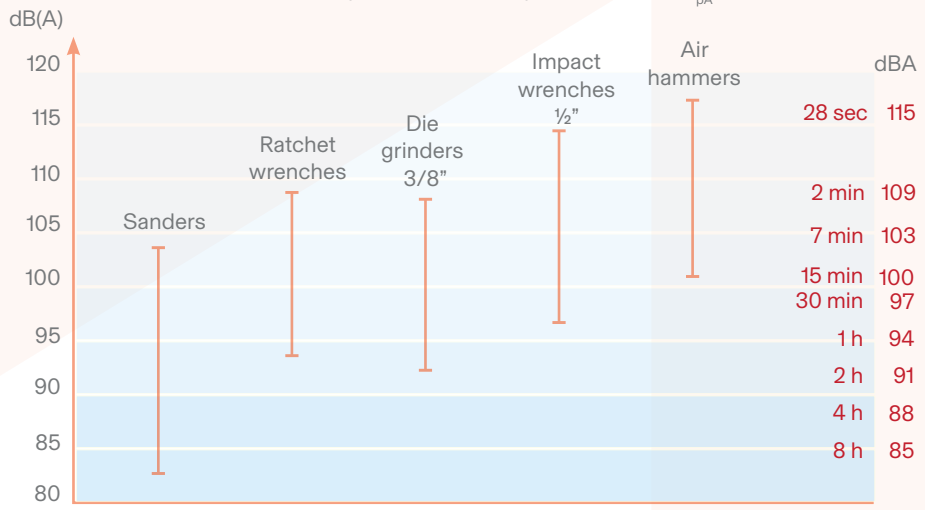
The IRSST has measured the noise and vibration levels of hand-held pneumatic tools used in automobile repair shops.

Noise

The figure below illustrates the range of noise levels for five types of tools used in automobile repair shops. These noise levels were measured close to the ears of mechanics working with their own tools in real-world working conditions.

The maximum noise levels that must not be exceeded based on different exposure durations are indicated in red in the figure below. In Quebec, since June 16, 2023, Order in Council 781-2021 has amended the *Regulation respecting occupational health and safety* (ROHS) such that workers may no longer be exposed to more than 85 dBA for eight hours, more than 88 dBA for four hours or more than 91 dBA for two hours.*

Noise ranges for each type of tool tested.
Values are expressed in sound pressure levels (L_{pA})



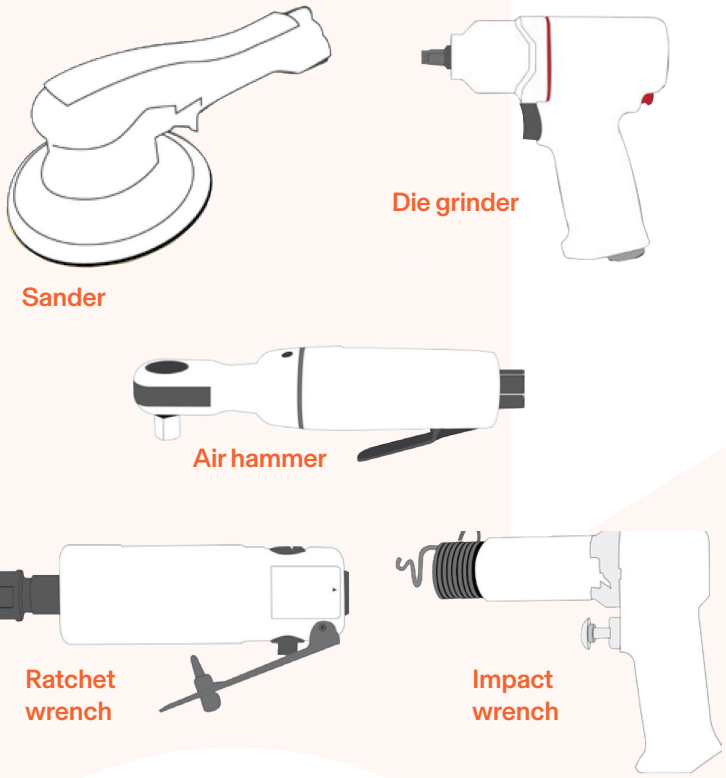
Caution: Manufacturers sometimes show sound power values, which cannot be compared to sound pressure values. These are different scales, even though both express values in dBA. The regulation uses sound pressure values.

*These values correspond to the equivalent continuous A-weighted sound pressure level for the given exposure time.

For the first three types of tools, sanders, die grinders and ratchet wrenches and also, to a lesser extent, impact wrenches, the main source of noise is air outlets. In their case, you can significantly reduce the noise level by obtaining models equipped with silencers or installing silencers on the tools you already have.

Consult the websites of manufacturers of add-on silencers and choose models with low airflow restriction and that do not get blocked over time, so that the tools' performance is not decreased.

In the case of air hammers (also called zip guns), the main source of noise comes from the tool's impact on the part being worked on.

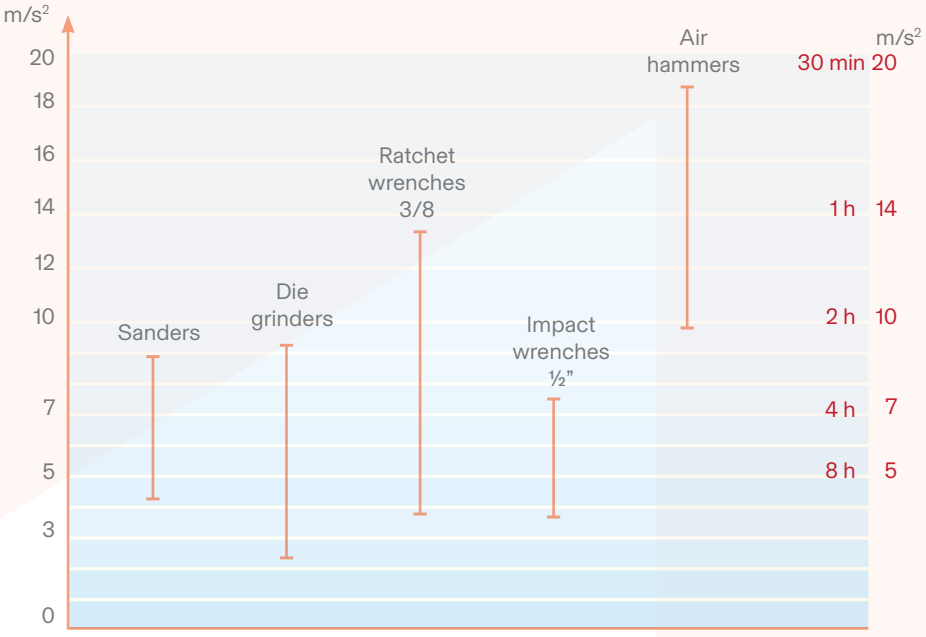


Vibration

The following figure illustrates the vibration levels produced by five types of tools used in automobile repair shops. These vibration levels were measured on the handles of tools used by mechanics in real-world working conditions.

In the absence of Quebec regulations, the vibration exposure limits set by European standards are indicated in red in the figure. According to European Union Directive 2002/44/EC, the vibration level must not exceed 5 m/s^2 for eight hours, 7 m/s^2 for four hours and 10 m/s^2 for two hours.

Vibration ranges for each type of tool tested.
Values are expressed in weighted acceleration levels (hand-arm weighting: W_h).



Purchasing low-vibration tools can decrease exposure to this risk factor.

Among their product lines, manufacturers provide models with mechanisms that reduce vibration, such as an auto-balance system or an anti-vibration handle. Ask your supplier for these models since they can reduce vibration levels substantially.

Protect your health

Work methods

- Wear hearing protectors and safety glasses while using hand-held pneumatic tools.
- Limit the duration of tool use as much as possible to reduce exposure to noise and vibration.
- Use a less noisy tool when possible (e.g., a grinder instead of an air hammer to cut a bolt) or buy a quieter model.
- Avoid working with your arms extended or in an unstable or awkward position:
  - Use an extension cord, a swivel joint or any other appropriate accessory;
  - Raise, lower or turn the part you are working on to adjust it to your height;
  - Use a bench, a step or a support to position yourself appropriately.
- Use only the minimum necessary grip force or pushing force on the tool to do the work safely.
- Keep your hands and fingers warm:
  - Wear cold-resistant gloves;
  - Install an insulating sleeve on the tool handle if it is made of metal;
  - Divert the cold air outlet away from your fingers.
- Never hit a tool or part with the palm of your hand, as there is a risk of developing a blood clot in the cubital artery (which can lead to finger amputation).

Maintenance

- Use tools with the manufacturer's recommended air pressure;
- Lubricate tools regularly according to the manufacturer's recommendations;
- Change accessories (grinding wheel, chisel, etc.) before they become too worn.

Environment

- Decrease reverberation in the area by applying an acoustical treatment.

Caution: Anti-vibration gloves do not protect against the impacts of hammer tools or against low-frequency vibration (lower than 200 Hz). They can be useful when using sanders and die grinders, but make sure that they comply with ISO 10819.

Learn more

References and useful links

Marcotte, P., Oddo, R., Boutin, J., Boilley, R., Nélisse, H., Boileau, P.-É., . . . Daigle, R. (2008). I*ndustrie de la réparation automobile : caractérisation du bruit et des vibrations émis par les outils portatifs* (Rapport n° R-554). IRSST. http://www.irsst.qc.ca/files/documents/PubIRSST/R-554.pdf

CCOHS. (2017). *Hand tool ergonomics*. http://www.cchst.ca/oshanswers/ergonomics/handtools/jobdesign.html

CCOHS. (2017). *Powered hand tools*. http://www.cchst.ca/oshanswers/safety_haz/power_tools/ergo.html

MultiPrévention. (2016). *Choisir des coquilles ou des bouchons?* multiprevention-fiche-technique-bouchons.pdf

INRS. (2019). *Vibrations mains-bras : guide des bonnes pratiques*. https://www.inrs.fr/media.html?refINRS=ED%206342

Réseau de santé publique en santé au travail. (2018). *Les risques d'exposition aux vibrations au système mains-bras.* https://www.santeautravail.qc.ca/documents/478605/918457/1552004_doc-9Ruwm.pdf

CNESST. (s.d.). *Calculette permettant d'évaluer le niveau d'exposition quotidienne au bruit.* https://servicesenligne.cnesst.gouv.qc.ca/prevention/calculette-bruit/index.aspx

CNESST. (2023). *Prise en charge des risques liés à l'exposition au bruit en milieu de travail : guide sur les moyens pour réduire l'exposition des travailleuses et des travailleurs.* https://www.cnesst.gouv.qc.ca/sites/default/files/documents/guide-exposition-bruit.pdf

Regulation to amend the Regulation respecting occupational health and safety, Regulation to amend the Safety Code for the construction industry, Regulation to amend the Regulation respecting safety representatives in establishments and Regulation repealing the Regulation respecting the quality of the work environment, Order in Council 781-2021 (G. O. II). https://www.publicationsduquebec.gouv.qc.ca/fileadmin/gazette/pdf_encrypte/lois_reglements/2021A/105088.pdf

Manufacturers' fact sheets

Chicago Pneumatic
Outils Pneumatiques - Chicago Pneumatic (cp.com)

Ingersoll-Rand
Outils électriques : outils sans fil et pneumatiques de qualité industrielle (ingersollrand.com)

Snap-on
Snap-on Incorporated (snapon.com)

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Tony Venditti et **Charbel Mouawad,** ASFETM

1st Edition
Writing

Louis Bousquet, IRSST
Pierre Marcotte, IRSST

2nd Edition
Revision

Isabelle Maguire, Knowledge Mobilization Advisor, IRSST
Pierre Marcotte, Researcher, IRSST

Collaboration

Marie-Andrée Paquet, conseillère en hygiène industrielle, Auto Prévention
Marianne Laforte, conseillère en prévention, Auto Prévention

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505 De Maisonneuve Blvd. West Montréal, Québec H3A 3C2 Telephone: 514 288-1551
publications@irsst.qc.ca www.irsst.qc.ca