

# Powered Air-Purifying Welding Respirators

**W**EARING an air-purifying respirator under a welding helmet can sometimes be uncomfortable. For technicians with facial hair, it is also ineffective. One option is a supplied-air welding helmet system. Another option is a powered air-purifying respirator (PAPR) unit (see Figure 1). These systems not only protect against the welding fumes, but provide flowing, breathable air for more comfortable welding.

The Fronius® unit shown in Figure 2 features an auto-darkening welding helmet and a belt pack containing a nickel-metal hydride battery and an air-purifying filter. Filtered air is pumped into the helmet.

The unit shown in Figure 3 from 3M® has similar features. In addition, there is a loading indicator on the particulate filter. The Adflo® welding PAPR is powered by a rechargeable, removable nickel-metal hydride battery from the belt unit (see Figure 4). A low battery charge is indicated by a visual and audible alarm. The air-purifying filter is a high-efficiency particulate air (HEPA) filter, characterized by the required magenta colour (see Figure 5). The filter-loading indicator is also both an audible and visual alarm on top of the belt unit. Outer light-emitting diodes (LED) light up green until the filter requires changing, when the red LEDs light up and the alarm sounds (see Figure 6). In normal operation, the fan in the belt unit sends filtered air to the welding helmet.

The PAPR unit can be used for more than welding. A clear helmet lens is available, allowing the same unit to be used for operations such as grinding or sanding.

## Welding Respirator Requirement

### Clarification

There is some confusion in the industry regarding the requirements for respiratory protection when GMA (MIG)



FIGURE 1

*A powered air-purifying welding respirator provides breathable air directly to the welding helmet.*



FIGURE 2

*The Fronius unit has a belt pack containing a filter and a battery, and an auto-darkening welding helmet.*



FIGURE 3

The 3M PAPR welding respirator unit includes a belt unit and an auto-dark welding helmet.



FIGURE 4

The nickel-metal hydride battery can be removed for recharging or replacing.



FIGURE 5

The magenta-coloured band on the filter indicates the high-efficiency particulate air classification.



FIGURE 6

The red light in the centre, and an audible beep alarm, indicate that the filter is full and requires changing.



FIGURE 7

Welding respirators normally are spark resistant and contain a layer that traps nuisance vapors and ozone.

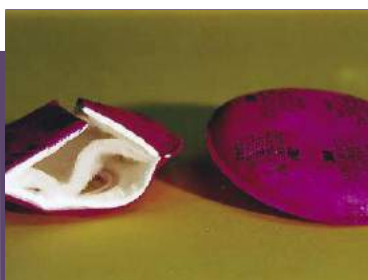


FIGURE 8

A HEPA particulate filter contains several thick absorbent layers to trap particulates.

welding. Fumes from welding are made up of microscopic particles, or particulates, so a particulate respirator is required for protection. The National Institute for Occupational Safety and Health (NIOSH) classifies particulate respirators as non-oil resistant (N), oil resistant (R), oil proof (P), and percent of efficiency (95, 99, or 100). The minimum particulate respirator classification for most collision repair welding operations is the lowest rated respirator, N95, with non-oil resistant filters and a 95% efficiency rating. An N95 particulate respirator will protect against fumes when welding uncoated or zinc-coated steel and aluminum alloys. An N95-rated respirator will also protect against the manganese in many welding electrodes. Manganese fume has been linked to the development of Parkinson's disease. Welding-specific respirators are rated at N95. Many dust masks are also rated at N95, but welding respirators have a spark-resistant outer layer to make them more appropriate for the task. Some also feature an activated carbon inner layer to absorb nuisance vapours and ozone when welding (see Figure 7).

Of course, a higher-rated particulate respirator, such as a HEPA filter, will also protect against welding fumes (see Figure 8). A vapour air-purifying respirator, which has an activated charcoal cartridge, can be used if there's nothing else available at the time, provided that there is a pre-filter over the cartridge. The pre-filter is rated at N95. Often, however, it's difficult to fit a vapour air-purifying respirator under a welding helmet.

## Conclusion

Collision repair technicians with facial hair or who are bothered by wearing a respirator under a welding helmet now have another option, a portable, powered air-purifying unit that provides filtered air to an auto-darkening welding helmet. A special feature of the unit available from 3M is a loading indicator for the particulate filter.

## I-CAR

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