

Can you rely on a personal breathalyser to tell when you're over the legal limit?

**M**ost people are well aware of the danger of drinking alcohol and driving. But if you've had just a couple of drinks you might wonder if you're still safe to drive. How do you know whether you're over the legal limit of 0.05 g per 100 mL of blood alcohol concentration (BAC)?

Several personal breathalysers are available that claim to simply and reliably measure your BAC — though at the same time they also say their results can't be relied on as a conclusive measure. We put six of them to the test: two disposable models that only tell you whether you're over or under 0.05, and four reusable ones that give a digital readout to two (or even three) decimal places.

### FIELD TESTING

Three male and three female volunteers, of varying ages and weights, trialled the breathalysers. After drinking no alcohol for 24 hours they first rated each breathalyser for its instructions and ease of use — and then had lunch and started drinking.

To keep the trial realistic, we let them drink

as much as they wanted, pouring the amounts they'd normally pour, because most people don't drink strictly according to standard drink servings. However, we did measure how many standard drinks each trialist consumed, in order to give a useful comparison to government advertised safe drinking guidelines (see *How many drinks?*, page 40).

After about three hours each trialist waited for 20 minutes to allow any mouth alcohol to disappear, then took a BAC reading from each device. They also had blood samples taken at the same time. After another hour of drinking, a second round of readings and blood samples were taken. The blood samples were analysed for BAC at a professional pathology lab, and we used the results as a benchmark for the breathalysers.

### USING THEM

Our trialists found all the electronic breathalysers easy to use (even after a few drinks): you generally just press a button and blow into the mouthpiece for a few seconds, and the device gives a reading almost immediately.

### IN A NUTSHELL

- On test: six personal breathalysers priced up to \$120.
- They're pretty unsatisfactory — over-cautious to the point of losing their usefulness, or less accurate than they appear to be.

## How many drinks?

Blood alcohol concentration, or BAC, is usually expressed as the number of grams of alcohol per 100 millilitres of blood. It's just a measurement: different people will have a different BAC after drinking the same amount, and will be affected differently by it. But for legal purposes it's useful for setting limits.

In Australia, it's illegal to drive with a BAC of 0.05 or over. (That's one twentieth of a gram of alcohol in each 100 mL of blood.) Most states and territories have further limitations as well, such as zero or 0.02 limits for learners, probationary and commercial vehicle drivers. These vary from state to state so if you're not sure, check with your state government.

A commonly accepted guide for staying under 0.05 BAC is:

- **Men:** Two standard drinks in the first hour and one per hour after that.
- **Women:** One standard drink per hour. (But see below for more on standard drinks.)

Generally, it takes one hour for your body to completely process the alcohol from one standard drink. Exercise, drinking coffee or eating food won't speed this up. This is only a general guide, as many factors affect your individual BAC:

- **Body size and build.** Lean muscle tissue contains more water (and can therefore take up more alcohol) than fatty tissue, so the more lean muscle you have, the less concentrated the alcohol in your blood is and the lower your BAC. So for the same amount of alcohol consumed, a larger person will tend to have a lower BAC than a smaller person, and a lean person will have a lower BAC than someone of the same weight but with more body fat.
- **Gender.** A woman who drinks the same amount as a man of the same size will usually have a higher BAC. Women tend to have a higher proportion of body fat than men, plus have fewer of certain enzymes that break down alcohol.
- **Food consumption.** Food in your stomach slows alcohol absorption and reduces your peak BAC. However, most of the alcohol will reach your bloodstream eventually.
- **General health.** If you're in poor health, your liver will be less able to deal with the

alcohol you drink and it will remain in your blood for longer. Some medicines can also increase the effects of alcohol, so be careful about drinking if you're on any medication.

### WHAT'S A 'STANDARD DRINK'?

A standard drink is a measure used to define safe drinking levels. It's basically any drink that contains approximately 10 grams of alcohol — the amount the average body can process in one hour. Common standard drink sizes include:

- 425 mL of light beer (2.7% alcohol/vol).
- 285 mL of full-strength beer (4.9% alcohol/vol).
- Small glass of wine (100 mL, 12% alcohol/vol).
- Nip of spirits (30 mL, 40% alcohol/vol).

Most people don't in fact pour standard drinks. Many people's idea of a glass of wine, for example, is more like 200 mL. That's two standard drinks in one glass; even more if the wine is stronger than 12%, as many are. If you're drinking anything other than precise bar measures you're likely to be drinking more than a standard drink.

The graph on the right shows the number of drinks our trialists poured vs the number of standard drinks they would count as.

Both the disposable breathalysers consist of a glass tube with chemical crystals inside. With the **BREATHSCAN**, you break the seal and breathe directly into the tube for 12 seconds. With the **REDLINE**, you breathe into a plastic bag, slot the tube into the bag and then slowly squeeze the air out through the tube (the idea being to ensure the right amount of breath passes steadily through the tube). The trialists found the **REDLINE** rather fiddly to use.

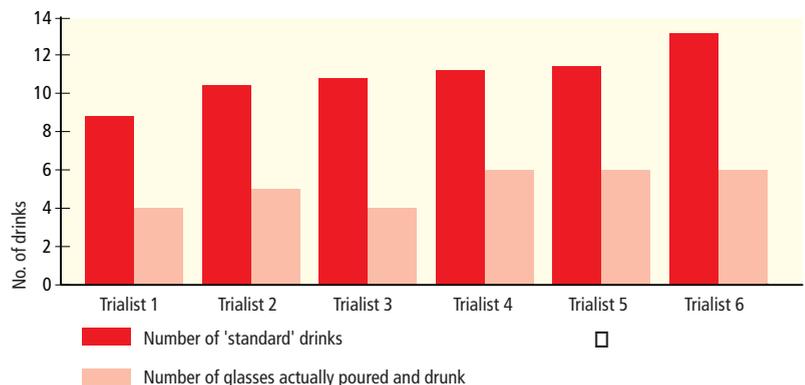
With both of these products, the crystals in the tube change colour if you're over the limit. The chemical reaction takes about two minutes. However, with the **BREATHSCAN** the colour change isn't very dramatic — it changes from yellow to pale bluish-green. The instructions recommend that if you're unsure, you should compare the used tube with an unused one — not very helpful if you've just used the last one in the pack!

### THE RESULTS

Different people might want different things from a breathalyser. If all you want to know is whether you're over or under 0.05, the disposable products on test are aimed at you, because that's all they claim to tell you.

However, if you want to know what your BAC is (so you'd know how long you needed to wait before you could drive, for example), you'd probably choose a breathalyser with a digital readout.

Breathalysers measure breath alcohol rather than blood alcohol, and while there's an accepted ratio between the two, it can vary slightly from person to person. Breathalysers are therefore generally calibrated to err on the



*This graph shows how many glasses our trialists poured and drank over a period of four hours, compared with the number of standard drinks they'd correspond to. Most people probably give themselves a lot more than a standard drink when they pour.*

side of caution. Because of this we decided it was OK for a BAC of 0.045 or more to give a reading of 0.05 or more, or 'over the limit', depending on the type of breathalyser.

The good news is that for about 85% of the readings we took, all the tested breathalysers correctly showed whether our trialists were over or under 0.05. In the cases where they were wrong, all but one reading said our trialists were over the limit when they were under. Only the **SAFE DRIVE** measured one person who was over the limit (with a BAC of 0.057) as under (0.03–0.04).

The bad news? The lack of any better accuracy than that, for both types of breathalyser:

■ The two 'blow and throw' disposable breathalysers only showed 'under the limit' when the BAC was in fact below 0.02. While they won't have you thinking you can drive when you can't, you might just as well stick to one drink as pay out for a device that doesn't discriminate any better than that.

These two models are labelled as complying with the voluntary Australian standard, and our trial wasn't a standard test. However, the standard requires a higher level of accuracy than the two breathalysers achieved in this test. They could be very accurate when used exactly to instructions in a lab, but our trial indicates it's hard to get accurate results in practice.

■ Of the four models that give results to two or three decimal places, none was accurate to within 0.01 for the majority of our readings. We had nine specific blood alcohol readings from our trialists (the other three were only given as 'less than 0.02'); the **ALCOSCAN AL-2500** got to within 0.01 of the measured blood alcohol content two out of nine times, the other three digital breathalysers only one out of nine.



The tested models from left to right: the reusable Fit 168R, Alcoscan AL-2500, Safe Drive (with keyring) and Alcoscan AL-5000 (with pouch); and the disposable Breathscan and Redline.

## THE VERDICT

While this was a small trial, based on its results we wouldn't recommend buying any of the six tested models.

If all you want to know is whether you're over or under the limit, the two disposable models err so far on the side of caution that they'll tell you you're over after about one drink, whether you really are or not.

If you want a more precise result, you won't get it accurately from any of the four electronic models tested. While they tend to give a more reliable 'over or under' reading than the disposable ones, you'd need to use one fairly often to make it worth the money — otherwise a cab might be cheaper.

There might be more accurate personal breathalysers out there, but finding one you can trust could be pretty hit-and-miss. ■

## WHAT WE TESTED

Brand / model (in alphabetical order within groups)	Where you can buy it	Price (\$)*
<b>Devices that give results to two or more decimal places</b>		
<b>ALCOSCAN</b> AL-2500	www.igadget.com.au, www.halifaxandgeneral.com.au (C)	99.00
<b>ALCOSCAN</b> AL-5000	www.igadget.com.au, www.halifaxandgeneral.com.au (C)	119.00
<b>FIT</b> Digital Alcohol Tester FIT168R	www.mrgadget.com.au	49.00 (D)
<b>SAFE DRIVE</b> Personal Alcohol & Gas Detector (A)	www.photo.net.au	49.00
<b>Devices that give just an 'over or under 0.05' result</b>		
<b>BREATHSCAN</b> .05	Petrol stations, auto shops, www.pocd.com.au	4.30 (E)
<b>REDLINE</b> Self Test Breathalyser (B)	Petrol stations, www.firstaid.com.au	4.95 (F)

\* Recommended or average retail, as advised by distributors in September 2005, unless noted otherwise. (A) Gave one false negative, measuring someone with a BAC of 0.057 as 0.03–0.04. (B) Also marketed as Check 05. (C) Also for sale on other websites. (D) The price we paid in July 2005. (E) \$13 for a pack of three. (F) \$59 for a pack of 12.