

## The Safety of Medical Gas Cylinders when Stored and Used at High Ambient Temperatures

BOC are receiving many requests from customers about the safety of medical gas cylinders at the high ambient temperatures we are currently experiencing.

When cylinders are stored and used as instructed, they are **perfectly safe for use**. All cylinders are carefully controlled to ensure that they are filled to the correct pressure; this includes making sure we put enough gas in the cylinder for patient use as well as making sure we don't overfill them, so they remain safe under unusual climatic conditions.

The pressure of the gas in a cylinder is dependent on its temperature – as the temperature goes up, so does the pressure. The regulations that we work within to address this phenomenon ensure that cylinders are safe up to a maximum temperature that is likely never to be exceeded, even under extreme weather conditions.

All of our cylinders are designed to be filled to a maximum pressure when the gas in the cylinder is at 15°C – it does not mean that the pressure cannot go above this pressure if the gas is warmer, but it controls exactly how much gas we use to fill them. When we fill cylinders, we monitor both the pressure and temperature of the cylinders to ensure that we fill them with the correct amount of gas.

This maximum pressure at 15°C is referred to as the **Working Pressure** and is defined in the standards and regulations we work to.

These regulations require cylinders to have a **Design Pressure** of 1.5 times the **Working Pressure** and this ensures that cylinders are safe to temperatures of at least 60°C.

For Medical Oxygen, where we usually supply the cylinder at 230 bar, the design pressure is 345 bar. When deciding whether this is suitable for Medical Oxygen service, we calculate the developed pressure in the cylinder to ensure that it will not exceed 345 bar at the maximum temperature in the regulations.

We are often asked what happens when the temperature is allowed to exceed the maximum specified. The safety margins within the design calculations ensure that cylinders will be safe even if the temperature far exceeds those specified.

Our advice is that you should always store full medical gas cylinders under cover in a well-ventilated area and to keep them away from high temperature sources. It is important to avoid placing them near heating systems and boilers and to ensure that the room has adequate ventilation – this being necessary to ensure that should there be a leak, it will not accumulate in the storage area. We recommend that you ensure the storage area is maintained at temperatures below 60°C.