ROLEX

HELIUM ESCAPE VALVE

MASTERING PRESSURE

The helium escape valve works to protect the Sea-Dweller and the Rolex Deepsea, watches created for the deep. Developed and patented by Rolex in 1967, this ingenious safety valve allows excess pressure built up in the watch case to escape during a diver's decompression phase in a hyperbaric chamber, without compromising the waterproofness of the watch. This innovation has played a key role in the conquest of the deep since the late 1960s, accompanying a new professional diving technique: saturation diving.

DIVING DEEPER, FOR LONGER

The 1960s marked a new phase in the development of deep-sea diving, with aspirations of diving ever deeper, and spending more time living and working underwater. The evolution of saturation diving techniques, combined with new breathing mixes that helped to avoid the toxic effects of compressed air, allowed divers to venture ever deeper, for longer.

SATURATION DIVING

Saturation diving allows divers to circumvent the harmful effects of underwater pressure on their bodies. This technique relies on breathing mixes containing a significant proportion of helium – up to more than 90%. The aim is to keep divers at the same pressure as their working environment. To do this, they live for a period of several days or weeks in a pressurized habitat, or hyperbaric chamber, from which they carry out dives. At the end of the mission, the divers must complete only one decompression procedure to gradually release the helium absorbed by their bodies. Depending on the length of time spent underwater and the depth reached, the decompression process can last from several hours to several days.

THE ROLEX-PATENTED HELIUM ESCAPE VALVE

In a hyperbaric chamber filled with special breathing gases, divers' watches gradually fill with helium, just as human bodies do. This is because helium atoms, which are extremely small, slowly enter the watch via the gaskets. During decompression phases, helium is eliminated from human tissue at a faster rate than it can escape from a watch, causing significant pressure to build up inside the watch case.

To allow the gas to escape without compromising the waterproofness of the watch, Rolex designed and patented the helium escape valve in 1967. This unidirectional valve is activated automatically above a certain level of internal pressure.

AUTOMATIC PISTON

The helium escape valve is fitted through the side of the watch case, and is made up of a hermetic cylinder, housing a piston that is surrounded by a spring. The piston remains closed, i.e. hermetically sealed against the cylinder, whilst the difference between the watch's internal pressure and the outside pressure is less than 2.5 bar. Beyond this point, the piston slides automatically outwards to let the excess internal pressure escape.