

# Self-sealing fuel tank

**Self-sealing fuel tanks** are an aviation technology that saw widespread use during [World War II](#), when it quickly became apparent that [fighter aircraft](#) lacked adequate protection. The design prevents a plane whose fuel tank has been shot from leaking and igniting, destroying the plane. In addition to [armor](#), self-sealing [fuel tanks](#) protect both [pilot](#) and [aircraft](#).

## Construction

Self-sealing tanks are made by having two layers of rubber, one [vulcanized](#) and one not. If a fuel tank is punctured the leaking fuel will spill over the different layers and cause them to swell and expand<sup>[clarify](#)</sup>, thus sealing the hole.

## World War II

In the newer generations of pre-war and early-war aircraft, self-sealing tanks were tanks used to minimise the potential damage from leaking or burning [fuel](#). A conventional fuel tank, when hit by enemy fire, would leak fuel rapidly. This would not only reduce the aircraft's effective range, but was also a significant fire hazard. Damaged fuel tanks can also rupture, destroying the [airframe](#) or critically affecting [flight characteristics](#).

Early attempts at protecting fuel tanks consisted of metal tanks, covered inside or outside by a material that expanded after being pierced. Research revealed that the *exit* of the projectile, rather than the entry, was the problem, as it tumbled and created a large exit hole.

The solution was to create a flexible container, made of a self-sealing material like [vulcanized rubber](#) and with as few seams as possible. As early tests showed that the impact could overpressure a fuel tank, the self-sealing fuel cell is suspended, allowing it to absorb shocks without rupture. [U.S. Navy](#) fuel tanks during the war were able to withstand [.50 caliber](#) (12.7 mm) bullets and, on occasion, [20 mm cannon](#) shells.

Not all fighters were fitted with the relatively new invention. Those that were, regularly took more punishment than those without self-sealing fuel tanks. Victory ratios in the [Pacific](#) showed that the heavily protected [American](#) aircraft could take far more damage than the lightly armored [Japanese](#) designs without self-sealing fuel tanks.

## Modern use

Most [jet fighters](#) have some type of self-sealing tanks. High altitudes require the tanks to be pressurized, making self-sealing difficult. Newer technologies have brought advances like inert foam-filled tanks to prevent detonation and self-healing designs.

## References

1. Gustin, Emmanuel (1999). [Fighter Armour](#). Retrieved Aug. 4, 2005.