Three kinds of nuclear weapons

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Image
US soldiers watch the H-bomb test in 1952 - AFP
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The world's nuclear arsenals have typically comprised two types of warheads: atomic bombs (A-bombs) such as those dropped on Hiroshima and Nagasaki, and much more powerful hydrogen or thermonuclear bombs (H-bombs).

A third category of "enhanced radiation" (ER) warheads, once dubbed "neutron bombs", was developed using the thermonuclear principle but they are not considered to be widely deployed by the nine countries believed to possess nuclear weapons.

- The A-bomb -
Atomic bombs work on the principle of nuclear fission in which energy is released by splitting atoms of enriched uranium or plutonium encased in the warhead.

The first test of an A-bomb took place in July 1945 in the US state of New Mexico and immediately revealed the weapon's awesome power. Hiroshima was destroyed by one A-bomb with a uranium-fuel warhead that had the power of 15 kilotons (0.015 megaton).

Nagasaki was destroyed three days later by a plutonium A-bomb with the power of 21 kilotons, or the equivalent of 21,000 tons of TNT. The Soviet Union tested its first atomic bomb in August 1949 in the desert of Kazakhstan.

- The H-bomb -
The hydrogen or thermonuclear bomb works on the principle of fusion of two nuclei and generates temperatures on the order of those found at the sun's core. When an H-bomb is detonated, chemical, nuclear and thermonuclear explosions succeed each other within milliseconds. The nuclear explosion triggers a huge increase in temperature that in turn provokes the nuclear fusion.

The first US test of an H-bomb was on November 1, 1952 in the Marshall Islands, a chain in the Pacific Ocean. A year later the Soviet Union tested its own H-bomb. The largest blast to date took place on October 30, 1961, when the Soviet "Tsar Bomba" exploded in the Arctic with a force of 50 megatons.

No H-bomb has been used in a conflict so far but the world's nuclear arsenals are comprised for the most part of such weapons.

Britain, France, China, India, Israel, Pakistan, Russia and the United States have nuclear weapons and North Korea has carried out tests, though it is not clear that Pyongyang possesses operational warheads.

- ER warheads -
These weapons are based on the thermonuclear principle of the H-bomb but are designed to generate more radiation than energy, thus targeting people while limiting damage to buildings, bridges and other infrastructure.

The warhead was developed to stop tanks and other armoured vehicles by killing or incapacitating their crews. "The design maximizes the lethal effects of high-energy neutrons produced by the fusion of deuterium and tritium," notes Hans Kristensen from the Federation of American Scientists. A public outcry in Europe in the 1980s limited their deployment by US forces there. Conceived for use in short- and medium-range missiles and artillery shells, in most cases "the yield is low (around 1 KT)" or one kiloton, according to Kristensen.

While these bombs have been scrapped by major nuclear powers, "most of the thermonuclear warheads in service today have so-called 'dial-a-yield' options that allow for low explosive yields (less than 10 KT) with a considerable fraction of that yield derived from fusion reactions that effectively make them enhanced radiation warheads," notes Shannon Kile of the Stockholm International Peace Research Institute (SIPRI).

The United States developed them in the 1960s but dismantled its warheads or terminated research programmes by the late 1990s. Russia developed the technology in the 1970s but little information is available on the programme's current status, Kristensen said. France tested the weapons but did not deploy them; China has also tested but is not thought to have deployed, he added.

There is considerable speculation, but no clear evidence, that Israel has also developed ER warheads, both specialists note.

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- Up
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