

MATERIALS USED IN SPACE RE-ENTRY VEHICLES

ABSTRACT

Atmospheric reentry is the process by which vehicles that are outside the atmosphere of a planet can enter that atmosphere and reach the planetary surface intact. The space shuttle thermal protection system is the barrier that protects the space shuttle orbiter during the searing 3000° f heat of atmospheric reentry. The TPS covers racing is in essentially the entire orbiter surface, and consists of seven different materials in varying locations based on amount of required heat protection. The main selection criterion is using the lightest weight reduction capable of handling the heat in a given are. The AFRSI blankets were primarily adopted because of reduced maintenance. Much of the shuttle is covered with silica tiles, made from essentially very pure quartz sand. The insulation prevents heat transfer to the underlying orbiter aluminum skin and structure. High-temperature reusable surface insulation tiles provide protection against temperatures up to 2300° f. there are 20548 HRSI tiles which cover the landing gear doers, external tank umbilical connection doors, and the rest of the orbiters under surfaces. The black high-temperature reusable insulation tiles provide improved strength, durability, resistance to coating cracking and weight reduction. Toughened one-piece fibrous insulation tiles come in high temperature black versions for use in the orbiters underside, and lower temperature white versions for use on the upper body. Low temperature reusable surface insulation—these tiles protect areas where reentry temperature is below 1200° F.A secondary goal is protecting from the heat and cold of space while on orbit