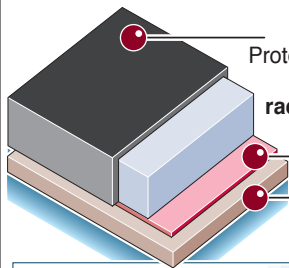


Thermal tiles linked to shuttle disaster

More than 20,000 thermal tiles protect the shuttle's fuselage and wings from the extreme heat of re-entry. Loose, damaged or missing tiles may have changed the aerodynamics of the ship and allowed heat to warp or melt the aluminium airframe, causing nearby tiles to peel off in a chain reaction

Friction with air during lift-off and re-entry creates surface temperatures above melting point of aluminium airframe (660°C). Thermal tiles are brittle and can crack if stressed

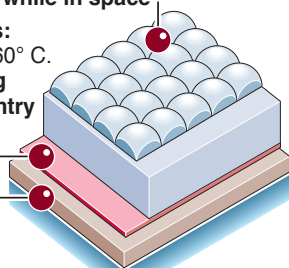
Low-temperature tiles:
Protect upper side to 660°C .
White ceramic coating reflects solar radiation while in space



High-temperature tiles:
Protect underside up to $1,260^{\circ}\text{C}$.
Black ceramic coating radiates heat during reentry

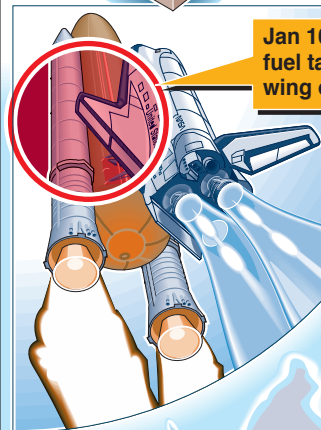
Silicone adhesive

Felt pad bonded to aluminium airframe



Jan 16: Chunk of insulation foam from main fuel tank peels away and smacks into left wing one minute after lift-off

Temperature during re-entry.
Vertical tail:
 $650^{\circ}\text{--}960^{\circ}\text{C}$



Columbia: Travelling at 13,200 mph at altitude of 40 miles

Upper surface:
 430°C

Reinforced Carbon Carbon (RCC).
Wing leading edges: $1,378^{\circ}\text{C}$
Nose cap: $1,430^{\circ}\text{C}$

- 1. 08.53 EST:** First indication of trouble. Loss of temperature sensors in trailing edge hydraulics systems
- 2. 08.56:** Temperature rises in landing gear well
- 3. 08.58:** Temperature sensors on left side of ship stop working.
08.59: Contact lost