Thermal cracks.

Mechanical stresses in the glass resulting from the heat (in the case of single-glass or glass units) occur when there is a temperature difference between the two glass surface points. Reasons influencing the temperature difference are:
• Sunlight.

• Indoor air conditioning and heating.
In theory, the sun's rays should not affect glass thermal stress, if the glass plane is evenly lit by the sun and the temperature is equally distributed around the glass area. However, in practice this is rarely the case, because the glass units are fixed in the frame glazing groove and/or partially get into shadow. That's why heat-strengthened or tempered glass should only be used in the opaque glazing areas.

Heating and air-conditioning equipment is usually installed near the window and, therefore, creates hot or cold zones on the glass surface, which becomes the cause of thermal stress.

Glass unit thermal crack risk factors

Cause	Stress source	Factors influencing thermal cracks	Suggested thermal crack risk reduction measures
Sun rays	Frame	Risk increase depends on: 1. Frame material 1. wood or PVC; 2. dark aluminium with thermal distribution; 3. dark heavy metal; 4. light aluminium with thermal distribution; 5. light aluminium; 6. concrete. 2. Frame type 1. fixed light frame without pressure spacers; 2. fastened, opening air-vents 3. horizontal sashes; 4. sliding; 5. fixed or opening frame with pressure spacers.	• Insulate frame from brick wall. • Apply smaller or no more than 45 mm edge covering on the sides.
Cause	Stress source	Factors influencing thermal cracks	Suggested thermal crack risk reduction measures
	Facade element shadows from outside	Thermal crack risk increases if: 1. vertical projection; 2. horizontal projection; 3. outdoor curtains.	Maintain at least 2 cm distance from curtains along their height for natural ventilation. Under no circumstances curtains can come in contact with the glass.
	Paint on the glass (inside or outside)	Risk of thermal crack increases significantly.	Try to avoid.
	Paper or plastic shields (from inside or outside)	Risk of thermal crack increases significantly.	Try to avoid.
	Internal curtains	Risk of thermal crack increases significantly, if curtains are opaque and there is no ventilation.	Gap between the glass and curtain inside the premises shall be ventilated.

	Items supported onto the glass	Risk of thermal crack increases significantly.	Try to avoid.
Heating and air-conditioning units	Heaters	The closer the heater is to the glass or the higher is the heating temperature, the higher is the risk.	Heaters and heating pipes shall be no closer than 20 cm away from the glass. Hearing medium temperature shall not exceed 65 °C.
	Air circulation units	Real danger exists if air flow is directed directly at the glass. Risk increases if there gap between the circulating air flow and the glass is too small (even if air flow is parallel to the glass).	Flow shall go in parallel to the glass, preferably deep in the premises. Input valve shall be no closer than 20 cm away from the glass.
	Stoves, portable heaters	The real danger of thermal crack.	Units shall be no closer than 30 cm away from the glass, depending on the unit capacity.
	Fireplaces	The real danger of thermal crack.	Install a protective shield between fire and glass.

Basing upon the above-mentioned features and factors, when the risk of thermal crack is high, the customer must use the units with heat-strengthened or tempered glass (depending on the thermal crack risk level).