Edge Protect Technical Information

Due to the way windshields are manufactured and mounted in vehicles, the amount of stress around the outer 50 mm perimeter is significantly greater than inside that area and will fracture 2.5 times easier than the rest of the windshield. Most replacements are from an Edge Crack, which occurs because the first 50 mm around the outer perimeter of windshields have 2 manufacturing stress areas.

During the manufacture of a windscreen, controlled compressive stresses are introduced along the perimeter of the glass. This makes it more resistant to mechanical stresses e.g. during installation or body twisting of the vehicle and to thermal stresses applied to the glass as a result of thermal fluctuations.

Unfortunately the compressive stresses are balanced by inboard tensile stresses. This tensile zone is the weakest area of a glass and breaks/cracks very easily when damaged. The tensile zone extends from, depending on the windscreen and the processing conditions, from approximately 3mm to approximately 50 mm from the edge. The first one is "residual stress" which is created during the moulding and annealing process. This tensile stress is created by rapid, differential rates of cooling to the perimeter of the windshield during the annealing process. The edge or perimeter of the windshield sits on a metal frame as it comes out of the oven into room temperature after being moulded. While the edge starts to cool the metal frame is still extremely hot, while the glass cools on the other side of the frame at another rate. These three temperature clashes at the 50 mm edge area, cause the cross linked molecules to split and is called Edge Compression. This has now become the weakest area of the windshield and will fracture 2.5 times easier than the rest of the windshield.

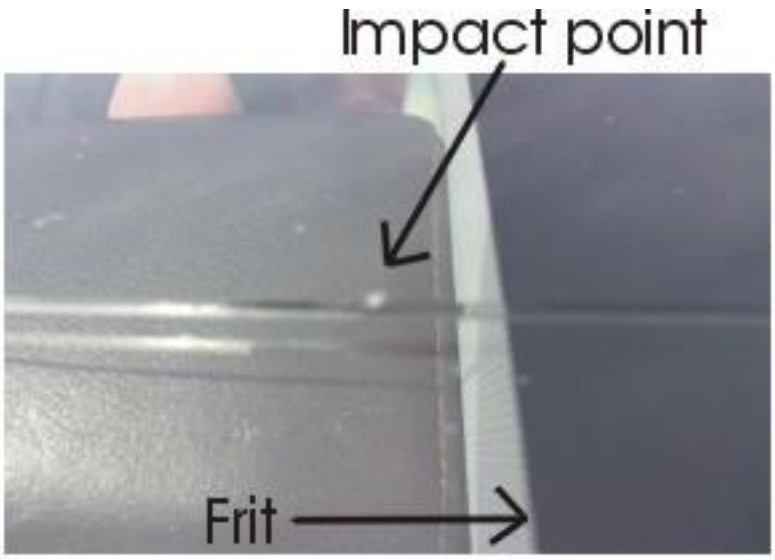
The second defect, “induced stress” is additional stress added to the already weak area when the windshield is installed into the vehicle body. The added stress is enough that when an object, such as a pebble, hits this weakened area during the windshield’s normal, intended and foreseeable use, it can cause a pinhead size fracture to crack to over 130 mm in length almost immediately. These cracks cannot be repaired to the original windscreens structural integrity.

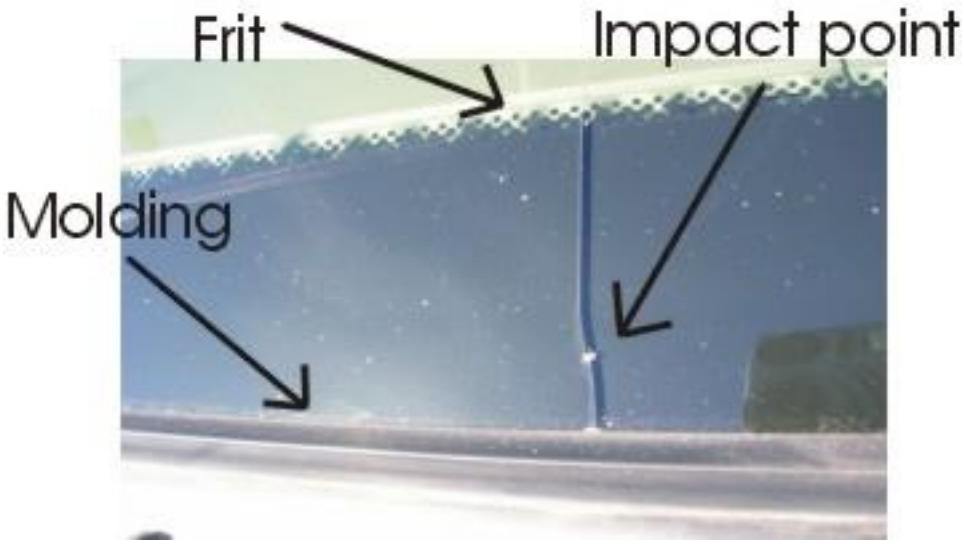
These stresses within the windscreens naturally seek to be relieved. One way this can be accomplished is by cracking - the greater the stress, the easier it is to crack the material. When a piece of road debris strikes your windshield, it may or may not crack the glass - it all depends on the energy the debris transmits to the glass and the amount of stress inherent it the area it strikes. Because the outer 50 mm perimeter of the windshield has a much higher concentration of stress than the inner portion, the likelihood of a given piece of debris causing a crack is significantly greater when it hits the outer perimeter compared to the centre.

See Diagram

The first one is "residual stress" which is created during the moulding and annealing process. This tensile stress is created by rapid, differential rates of cooling to the perimeter of the windshield during the annealing process. The edge or perimeter of the windshield sits on a metal frame as it comes out of the oven into room temperature after being moulded. While the edge starts to cool the metal frame is still extremely hot, while the glass cools on the other side of the frame at another rate. These three temperature clashes at the 50 mm edge area, cause the cross linked molecules to split and is called Edge Compression. This has now become the weakest area of the windshield and will fracture 2.5 times easier than the rest of the windshield.

The second defect, “induced stress” is additional stress added to the already weak area when the windshield is installed into the vehicle body. The added stress is enough that when an object, such as a pebble, hits this weakened area during the windshield’s normal, intended and foreseeable use, it can cause a pinhead size fracture to crack to over 130 mm in length almost immediately. These cracks cannot be repaired to the original windscreens structural integrity.




These stresses within the windscreens naturally seek to be relieved. One way this can be accomplished is by cracking - the greater the stress, the easier it is to crack the material. When a piece of road debris strikes your windshield, it may or may not crack the glass - it all depends on the energy the debris transmits to the glass and the amount of stress inherent it the area it strikes. Because the outer 50 mm perimeter of the windshield has a much higher concentration of stress than the inner portion, the likelihood of a given piece of debris causing a crack is significantly greater when it hits the outer perimeter compared to the centre.