Test of fixed glass breaking devices

Test vehicle

Equipment under test

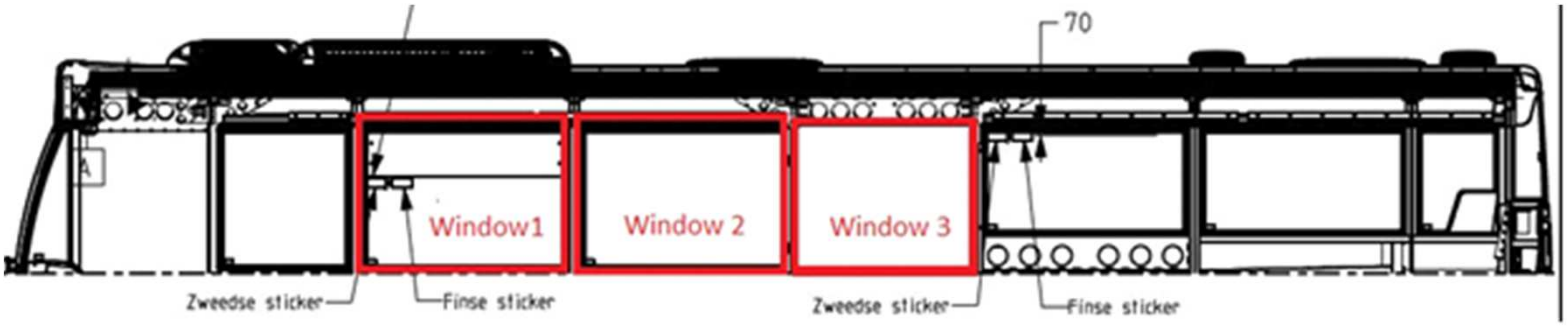
Force measurement

The details of the instrument used to measure the force:

Make	: Chatillon
Model	: DFGS-R-200
Range	: +/-1000N
Sample Frequency	: 5000 Hz

Frame for force application

Single glass



Tested windows:

Window [1]:

Description : Side window

Dimensions : 1685mm x 1387mm x 3,15mm

Window [2]:

Description : Side window

Dimensions : 1685mm x 1387mm x 3,15mm

Window [3]:

Description : Side window

Dimensions : 1425mm x 1387mm x 3,15mm

Single glass

Test results Window [1]:

Attempt	Applied force [N]	Applied by	Result
[1]	108	Frame and lever	None
[2]	260	Frame and lever	None
[3]	110	Frame and lever	None
[4]	442	Hand on the measuring device	None
[5]	554	Hand on the measuring device	None
[6]	661	Hand on the measuring device	None
[7]	Same force as previous strike without the measuring device	Hand (Fist)	None
[8]	Little bit more than previous strike	Hand (Fist)	None
[9]	Little bit more than previous strike	Hand (Fist)	None
[10]	“Really go for it”	Hand (Fist)	Window shattered

Single glass

Test results Window [2]:

Attempt	Applied force [N]	Applied by	Result
[1]	220	Frame and longer lever	None
[2]	260	Frame and longer lever	None
[3]	360	Frame and longer lever	None
[4]	460	Frame and longer lever	None
[5]	506	Frame and longer lever	None
[6]	500	Frame and longer lever	None
[7]	506	Frame and longer lever	None
[8]	818	Frame and hammer	None
[9]	>1000*	Frame and hammer	None
[10]	>1000*	Frame and hammer	None
*The instrument used to measure the applied force has a maximum of 1000N. The 2nd and 3rd attempt with a hammer on the guided pin resulted in a force higher than 1000N. The device showed “overload”.			

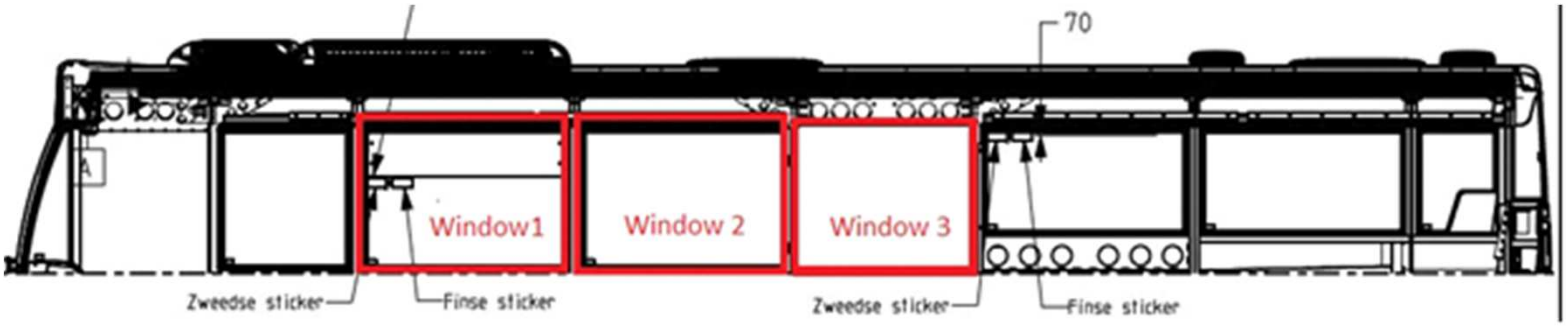
Since the force is higher than could be measured, the frame was removed and an emergency hammer was applied. With the first attempt using the emergency hammer, the window shattered. The required force was much lower than used for the fixed device.

Single glass

Test results Window [3]:

The same approach as on window 2 is applied on the 3rd window, to see if the dimensions of the window would make a difference. The required force was greater than 1000N. The emergency button then was operated to evaluate the force that is needed to break the window. It took three strikes to break the window, the first two strikes were without any results.

Double glass



Tested windows:

Window [1]:

Description : Side window

Dimensions : 1685mm x 1387mm x 20mm

Window [2]:

Description : Side window

Dimensions : 1685mm x 1387mm x 20mm

Window [3]:

Description : Side window

Dimensions : 1425mm x 1387mm x 20mm

Double glass

Test results Window [1]:

The emergency button on the first window was tested without pulling the safety label. The first glass shattered with a force greater than 1000N and the emergency button fell off the window.

Double glass

Test results Window [2]:

Attempt	Applied force [N]	Applied by	Result
[1]	167	Frame and longer lever	None
[2]	209	Frame and longer lever	None
[3]	304	Frame and longer lever	None
[4]	374	Frame and longer lever	None
[5]	920	Frame and hammer	1st window shattered
[6]	646	Frame and hammer	None
[7]	1027	Frame and hammer	None
[8]	>1000	Frame and hammer	None
[9]	>1000	Frame and hammer	2nd window shattered

Double glass

Test results Window [3]:

The force on the emergency button at window 3 was applied by hand to evaluate the force needed to break the glass. Again the force was increased to indicate how much force is required to break the glass. At the second attempt both glasses shattered in 1 strike. The required force was low and still very effective.

Conclusion

Single glass:

The required force on the emergency button to break a single glass window is too high and therefore this button is not acceptable.

Double glass:

The required force on the emergency button to break a double glass windows is higher than prescribed by the manufacturer, but acceptable. Though for an emergency device, the risk of a first strike shattering only the first window (e.G. due to forgotten seal removal or lack of force/improper use by the applier) is not acceptable when no device for the second window is available.

For both of the emergency buttons the force required to break the glass was excessively higher than specified by the supplier.

Recommendation

An emergency button can be used to break the glass, but the button is certainly not superior to the emergency hammer. We therefore would not support making permanently fixed devices like the emergency button mandatory and exclude the use of emergency hammers.