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agenda item 5)

# **Panoramic Sunroof Issue**

**OICA/CLEPA-comment on the national defect investigation and the proposed amendments to toughened glazing by the Republic of Korea**

OICA, CLEPA  
2014-09-25



# Motivation



- At last GRSG-106, the Republic of Korea presented the results of a national defect investigation on panorama sunroofs which are made from toughened glazing (GRSG-106-21).
- As a consequence, the Republic of Korea proposed amendments to GTR No. 6 on safety glazing (GRSG-106-10) and ECE-R 43 (GRSG-107-06).
- During the discussion at GRSG-106, OICA, CLEPA and also other experts raised concerns that the proposed amendments to the ball drop test were not justified and appropriate.
- All experts were invited to prepare further comments.
- The aim of these OICA/CLEPA-slides is to present the industry position on this topic and to give more detailed background information on toughened glazing panoramic sunroofs to all involved stakeholders.

- Vehicle manufacturers currently provide optional panoramic sunroofs for all limousine/station wagons/SUVs to the markets worldwide.
- The glass panes are made of safety glazing (especially toughened glazing).
- The technology of toughened glazing has been used successfully for more than 20 years for sunroof applications.
- As the principle technology has not been changed over the past years, we cannot identify a direct link to the reported increase of alleged sunroof occurrences.



2001: Mercedes-Benz Sports Coupé CL 203



2007: Ford SUV Edge



2008: Renault Samsung SUV QM5

- The Republic of Korea reported a “sharp increase in consumer complaints (33 cases in 2013)”

## Market situation in Korea (2013)

Vehicles with panorama glass roofs: ~ 650.000

They are produced by:

- National manufacturers: ~ 520.000
- Imported vehicles: ~130.000

## Conclusion

- The occurrence rate in the field is extremely low: 0.00005 → a general, systematic or design issue can not be concluded based on this figure.
- No harmful injuries were reported.
- There are no known concerns for panoramic sunroofs outside Korea



# Specifications Sunroof



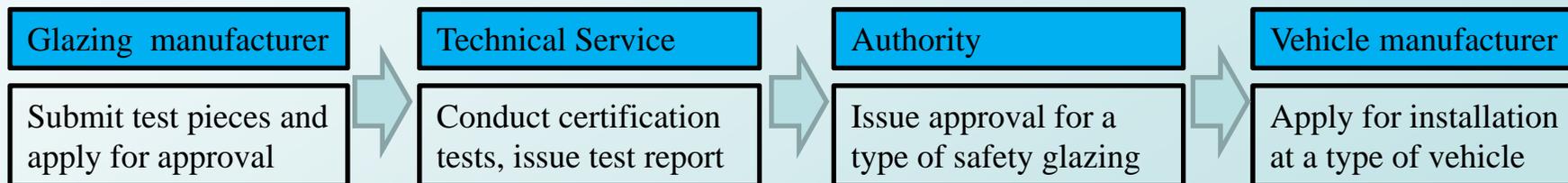
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- Legal Standards and safety requirements (Certification Tests)
- Additional OEM specific requirements include e.g.
  - Acoustics (e.g. operating noise, rattling)
  - Endurance tests (e.g. climate, wind)
  - Water management (e.g. no water entry during shower tests)
  - Temperature and climate tests (e.g. high temperature tests)
  - Specifications on ceramic coating include anti stick, shade, high opacity, chemical resistance, perfect bonding properties, etc.

## **Conclusion**

- Due to high complexity of sunroofs including its toughened glazing with ceramic coating, all OEMs demand extensive specs beyond legal requirements to assure best product quality and high passenger safety.

- Certification Tests to be passed by toughened glass according to ECE-R 43 and other international regulations:
  1. Fragmentation test → to avoid injuries by sharp edges of a broken glass
  2. Light Transmission
  3. Mechanical strength (227 g ball-impact test) → to ensure that objects (e.g. stone chipping) do not penetrate into the occupant compartment
- ECE-certification approval process



## Conclusion:

- Tests are conducted by independent labs to ensure reliable procedures.



# Conformity of Production



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- General requirement: Glazing manufacturer must implement procedures to guarantee effective control of the conformity of the produced glazing with respect to the approved type.
- Special provisions for toughened glass according to ECE-R 43:
  1. Fragmentation test (permanent records of fragmentation are required)
  2. Light transmission
  3. ~~Mechanical strength (227 g ball-impact test)~~

## Conclusion

- Since every glass will break if a certain stress is applied, the most important safety aspect is to avoid any sharp edges of the broken glass.
- Relevant in terms of safety is the fracture pattern after breakage which is not impacted by the ceramic inks.
- This aspect is verified by the fragmentation test which is required both for approval-tests and for Conformity of Production.

# Technology of Toughened Glazing and Ceramics

- Figure 01 shows a typical glazing structure. Underneath the glass pane (inner face) a ceramic layer is located.
- Figure 01 is typical for each glazing element and not only for sunroofs. It is also representative for backlites, sidelites, etc.

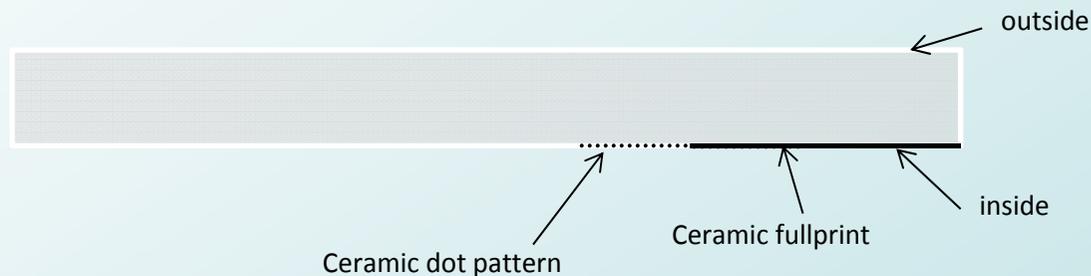


Figure 01: structure of a printed glass



# Advantages Ceramic Area



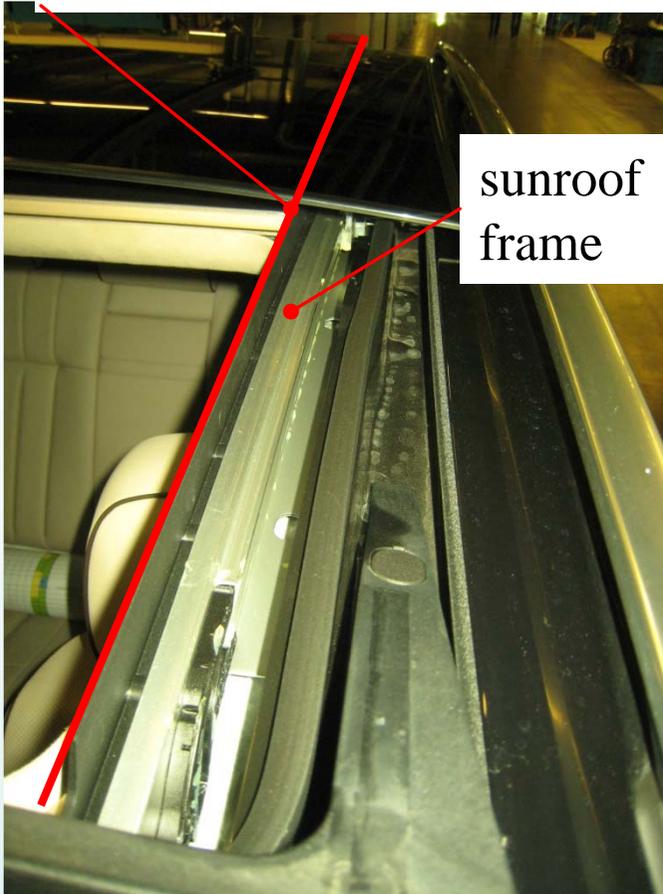
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- The ceramic area has both a design and a protection function
- **Design Character**
  - Ceramic area covers and hides hardware behind the glass such as parts of the vehicle body and assembled trim parts.
- **Ceramic protects**
  - Protects against UV Radiation: Important for organic materials like polyurethanes (encapsulation material) and the adhesive bead/glue which connects the glazing with the roof frame.

## Conclusion

- Ceramic protects adhesives and therefore are an important safety feature to guarantee the strength of the whole passenger compartment.
- Therefore, the use of ceramics is essential.

limitation ceramic area



## Size:

- Design aim is to keep the ceramic area as small as possible to provide customers a maximum large transparent area.
- Ceramic area is limited to cover hardware such as vehicle body and interior trim parts.

## Conclusion

- Objects which impact the coated area cannot intrude into the vehicle cabin, because hardware such as vehicle body and interior trim parts are covered.
- If the glass breaks, it fragments into small harmless pieces.

# 227 g Ball Impact Test

- The ball drop test which is foreseen in UNECE, Japan, USA and GTR6 and KMVSS (revised in 2010 to include GTR requirements) is **based on ISO 3537 (since 1975)**.
- Excerpt from GTR 6 (Statement of Technical Rationale and Justification):

Test	UNECE No. 43	JAPAN Article 29	USA FMVSS 205	GTR 6
Impact test 227 g Ball	Test method: <b>ISO 3537</b> · Drop heights: thickness < 3.5 mm – 2.0 m thickness > 3.5 mm - 2.5 m · Flat 300 x 300 mm test pieces or finished products	· Test method <b>ISO 3537</b> · Drop heights as ECE R43 · Flat 300 x 300 mm test pieces	· Test method: <b>ISO 3537</b> · Drop height: 3.05m · Flat 305 x 305 mm test pieces	<b>As UNECE            Regulation No. 43</b>  Standard drop height: 2.0 m

- ISO 3537 has been revised recently in August 2014 by all ISO members of ISO/TC 22/ SC 11 “Safety glazing materials”. There are no changes concerning the ball drop test!

# 227 g Ball Point of Impact

**ISO 3537:** „The point of impact shall be within 25 mm of the **geometric center of the test piece**”

**UNECE:** Geometric center of the test piece or Geometric center of the finished product

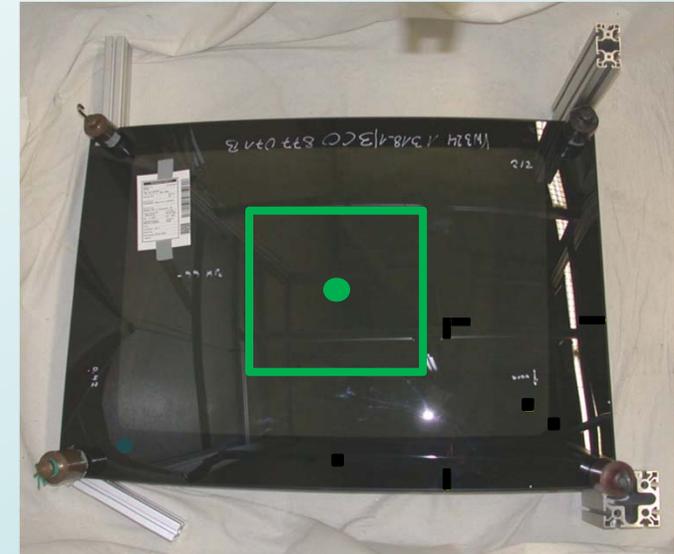
**FMVSS:** (Geometric) Center of the Test Piece

**GTR 6:** As UNECE  
Center of supported area (error on Page 34  
→ wording needs to be corrected)

**KOR Proposal :** Center of the supported Area (**GRSG 106-10, GRSG 107-06**)

## Conclusion:

- According to international standards, the point of impact is the geometric center of the test piece
- The Korean proposal includes the typing error from GTR 6





# Proposal of Korea



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- The proposals to GTR No. 6 (GRSG-106-10) and ECE-R 43 (GRSG 107-06) concern the 227 g ball impact test which is internationally standardized by ISO 3537.
- **Key points:** Both proposals address the point of impact: Aim to replace “geometric centre of the test piece” by “centre of the supported area” which is the wording error from GTR No. 6.
- **Consequence:** These proposals would lead to a ban of printed toughened glass, roof lights and all other toughened glazing, with ceramic area of more than approx. 120 mm width and therefore be more design restrictive.

## **OICA/CLEPA position:**

- There is no reasonable indication given to get the regulations changed as proposed by the Republic of Korea (especially other glazing).
- The Korean proposal is not a standardized test and is not included in ISO 3537.
- There is no added value in modifying this well-established worldwide test procedure.



# Proposal of OICA/CLEPA



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1. The wording error on #6 of GTR 6 should be amended:
  - Replace “centre of the supported area” by “geometric centre of the test piece”.
  - Justification: Corrigendum of GTR 6 with respect to the technical rationale of GTR6 (impact test procedure same as ISO 3537/UNECE).
2. Industry is ready to discuss on any clarification in UNECE regarding the application of ceramic coating for toughened sunroof glazing, if needed.



# Summary



- OICA/CLEPA support the approach to align GTR 6 and UNECE No. 43.
- From OICA/CLEPA perspective, it's important to avoid any design restrictive requirements which may ban certain technologies that are well performing today.
- OICA/CLEPA therefore support the approach to remain performance based requirements based on standardized procedures (ISO).