

# TRANSPARENT ARMOR BULLETIN

## Capabilities Overview



In state-of-the-art aerospace transparency manufacturing facilities located in Sylmar, California and Huntsville, Alabama, PPG Aerospace - Transparent Armor & Specialty Products produces a wide variety of ballistic transparent laminates for the military vehicle, military marine and rail industries.

PPG leverages its expertise in manufacturing aerospace transparencies and high performance coatings to develop ballistic laminates. Examples of the unique aerospace technologies are thin film heating technology, proprietary aliphatic urethane interlayer technology and highly controlled autoclave processes.

PPG's heated laminates are manufactured with proprietary transplant metal film technology which does not distort when powered and provides improved optics as compared with wire mats.

The following is a description of PPG's unique capabilities that will enable your company to meet your customers' needs for ballistic transparent armor.

### Maximum Dimensions

- Max Width – 120"
- Max Height - 60"
- Large radius bent glass and complex shapes possible
- Thickness dependant on ballistic or blast threat rating – no restrictions in thickness

### Ballistic Threats Capabilities

- UL Levels: 1-8
- NIJ 0108.01 levels: 1-4
- AEP-55, Vol. 1 / STANAG 4569 Levels: 1-3\*
- EN Standard: BR1 – BR7 and SG1, SG2
- FRA I & II
- ATPD 2352P classes: 1-3\*
- LTAS Threshold\*

\*Higher levels would require further development

### Available Materials

- Clear Glass (all commercial thicknesses)
- Water White Ultra Clear Glass (all commercial thicknesses)
- All tinted glass (all commercial thicknesses)
- Polycarbonate (all commercial thicknesses) – coated and uncoated
- Aliphatic Urethane Interlayer
- PVB Interlayer

### Glass Strengths

- Annealed Glass
- Heat Strengthened Glass
- Semi Tempered Glass
- Full Tempered Glass
- Chemical Tempered Glass
- Chemical Temper Lithium Glass

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## Heating Capabilities

- AC Voltage Range – All standard voltages
- DC Voltage Range – All standard voltages
- Power density up to 400 Watts per square foot and 25 amps.
- Imbedded temperature sensors for feedback control
- Available Heating Elements:
  - ITO deposited on glass substrate
  - ITO film
  - Gold film
  - Wiggle Wire

## Engineering/Development Capabilities

- Rapid prototyping
- Design and test cross sections tailored to ballistic requirements:
  - Shot pattern
  - Statistical confidence
  - Testing under environmental extremes
- Environmental testing:
  - Temperature
  - Humidity
  - Shock & Vibration
  - UV exposure
  - Light transmission
  - In-house labs for mechanical and material properties testing

## Miscellaneous

- EMI and EMP Shielding Coatings
- Heated windows allow Night Vision Goggle use

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