



- 1 Fundamental coating design AR-hard® composed of symmetrical periods LHL.
- 2 Steelwool (0000) scratch test on polycarbonate with and without AR-hard® coating.
- 3 Transmission and reflection of coated and uncoated polycarbonate. This AR-hard® coating is providing UV protecting properties.

## ANTIREFLECTION COATING AR-hard® FOR PLASTIC SUBSTRATES

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### Motivation

Transparent plastics such as PMMA polycarbonate (Makrolon) and polycyclo-olefines (Zeonex, Zeonor) are widely used for optical and opto-electronical applications. Interference coatings are commonly deposited on the surfaces to reduce reflection losses. However, those coatings can be used also to improve the mechanical resistance of the soft plastic substrates.

### Our solution

Multifunctional antireflection coatings with improved abrasion resistance are developed based on the patented coating design AR-hard®. Coating composition and deposition parameters have to be optimized for each kind of plastic. The total thickness of coating can be adapted in the range from 500 nm to 3 µm.

### Coating technology

Plasma ion assisted deposition (Plasma-IAD) is applied for coating deposition of silicon dioxide and high-index oxide layers. The plasma parameters are tuned to control the layer densification. As a result coating stresses and environmental properties are optimized. Coatings for polycarbonate can be equipped with an additional UV-protection function. In addition, a hydrophobic top-coating with easy-to-clean function is available for all AR-coatings.

### Coating properties

- Adhesion test, ISO 9211-02-03:  
(tape-test, snap) no ablation
- Environmental resistance, ISO 9022:
  - PMMA, 1 µm, -20°C to +40°C
  - Zeonex E48R, 3 µm, -20°C to +100°C
  - Makrolon, 1.5 µm, -20°C to +110°C