

Materials Used in Different TV Display Technologies

1. LED / LCD TVs (Most Common)

Layers:

- Protective cover glass (Soda-lime or Aluminosilicate glass)
- Polarizer film (PVA polymer)
- TFT glass substrate
- Liquid crystal layer
- Color filter resin
- Rear glass substrate
- Diffuser sheets (PET plastic)
- LED backlight
- Aluminum rear chassis

Key Points:

- Two glass substrates (~0.4–0.6 mm each)
- Plastic frame + aluminum body
- Strong mechanical resonance

2. QLED TVs (LCD with Quantum Dot)

Layers:

- Same LCD structure as LED/LCD TVs
- Additional Quantum Dot Enhancement Film (CdSe/InP nanoparticles in PET)

Key Points:

- Mechanically identical to LCD
- Extra optical film only
- Acoustic behavior same as LCD

3. OLED TVs

Layers:

- Front cover glass (aluminosilicate)
- OLED organic emissive layers
- TFT glass backplane
- Thin metal cathode (Aluminum/Silver)
- Polyimide encapsulation
- Plastic rear support

Key Points:

- Single or dual glass
- Thinner panel
- Lower stiffness than LCD
- Higher damping

4. Mini-LED TVs

Layers:

- Same LCD glass stack as LED/LCD
- Dense Mini-LED backlight array

Key Points:

- Glass structure same as LCD
- Only backlight changes
- Mechanical behavior identical to LCD

Summary Table:

TV Type	Glass Count	Main Materials
LED/LCD	2	Glass + LC + plastic
QLED	2	LCD + quantum dot film
OLED	1–2	Glass + organic
Mini-LED	2	LCD + dense LEDs

Shipping Damage Reality:

- Usually TFT glass substrate cracks
- Rarely optical films
- OLED organic layers almost never fail mechanically

Engineering Insight:

All modern TVs still rely on glass panels. Crack detection via acoustic resonance works universally.

OLED requires separate calibration due to lower stiffness.