



**Electrostatic Chuck for High Flatness.**

**Enabling a High Yield in High-Performance Applications.**

# Electrostatic Chuck for High Flatness.

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Electrostatic chucks (ESC or e-chuck) may be used in many semiconductor processes to hold the wafer during processing. They employ an electrostatic field to clamp the wafer under vacuum conditions.

Five reasons to choose electrostatic chucks made by Berliner Glas:

1. No wafer sticking
2. Very low particle generation of the ESC
3. High global and local flatness
4. Homogeneous clamping force over the entire holding area
5. High temperature uniformity

## Applications

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- EUV Lithography and E-Beam Lithography
- Inspection (E-Beam and defect review)
- Metrology
- Display manufacturing

## Chuck Design

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- E-chucks up to 18 inch wafer size or for reticles
- Other customer-specific formats up to 400 x 500 mm<sup>2</sup>
- Integrated cooling and/or heating
- Single sided or double sided chucking
- Flexible electrode design
- Materials matched to thermal expansion of Silicon: Silicon-Carbide, SiSiC & Borosilicate glass
- "Zero"-expansion materials: Zerodur, ULE & Cordierite
- Nitride or Carbide wear resistant coating
- Highest purity of all materials (SEMI standard)
- High stiffness of up to 380 GPa (41 MPsi)

## Basic Features

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- Typical global flatness: 100 nm PV (D = 300 mm)
- Typical local flatness: 10 nm PV (20 x 20 mm<sup>2</sup>)
- Higher flatness for individual parts feasible by fine correction
- Clamping pressure up to 0.5 bar
- Down to 0.1 seconds chucking and de-chucking time
- Standard clamping voltages 1–3 kV (possible > 10 kV)

## Microstructures

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- Structures (burls) reduce contact area between wafer and chuck by a factor of 100 (1 % contact area)
- Structure sizes down to 300 µm diameter
- Leads to less sticking & less particle sensitivity

## Test & Qualification

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- Interferometric flatness qualification up to 24" in diameter
- Functional interferometric flatness qualification with chucked reference wafers or reticles by means of a 12" vertical interferometer (optionally in vacuum)
- Application of custom (local) flatness evaluation algorithms
- Chucking force measurement
- Residual gas analysis (RGA)
- High voltage functional test

## Controller Units

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Five reasons to choose controllers made by Berliner Glas:

1. Single supplier for ESC and customized controller ensures good system performance
2. Improved ESC operation with minimized de-clamping time
3. Uniform and constant clamping force during wafer processing
4. Wafer charging control to minimize wafer sticking and particle generation
5. Standard interfaces to machine and heater control

## Basic Features

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- Monitoring and full control of clamping voltage and current
- Short circuit and overvoltage/-current protection (interlock)
- Plug & Play including peripheral wiring
- CE, RoHS and EM certified
- Additional multi zone heater control
- Clean room ready housing

## Performance - Typical Values

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- Bipolar voltage supply
- Output voltage: up to ±5 kV per channel
- Output current: up to 4 mA per channel
- Capacitance resolution: down to 10 pF
- Ramp rate: up to 6 kV/s