



# MANUFACTURING QUALITY OF TOUGHENED GLASS INSULATORS

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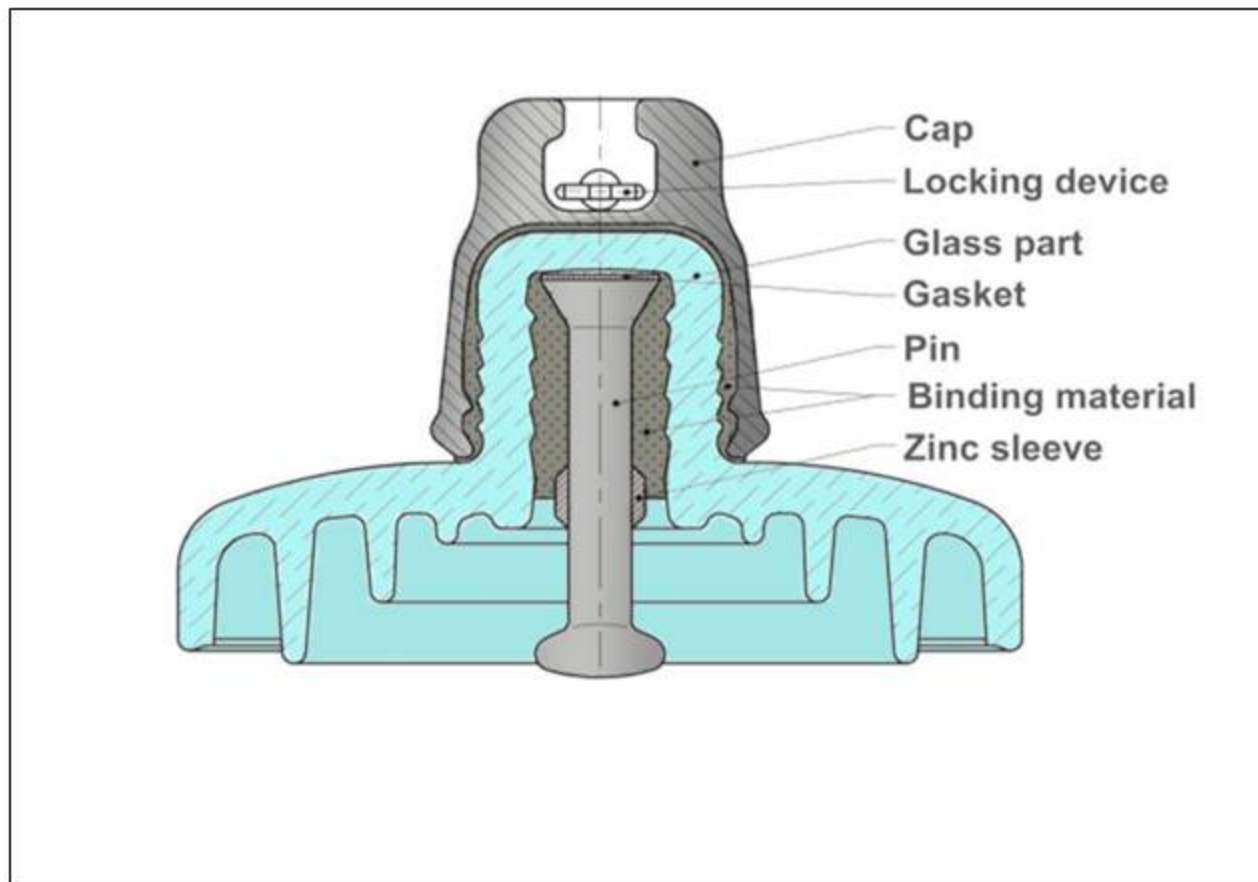
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## MANUFACTURING OF TOUGHENED GLASS



### MFG Steps

- 1) Shell Manufacturing
- 2) Cap & Pin Assembly



## SHELL FORMING



Automated Shell Forming Process

## SHELL MARKINGS

- Test value
- M&E rating
- Product ID
- Cavity #
- Date code
- **Factory ID**



## TOUGHENING PROCESS

- Homogenization Furnace
- Rapid Compressed Air Cooling
- Transfer to Thermal Cycle



# THERMAL CYCLE

## Stage 1

- Positive Thermal Shock – Increase temperature 300°C
- Negative Thermal Shock – Air Cooled

## Stage 2

- Positive Thermal Shock – Increase temperature
- Negative Thermal Shock – Water Cooled



## SHELL MANUFACTURING COMPLETE



## CAP & PIN ASSEMBLY

### CAP

- Ductile Iron socket fitting, galvanized
- Product Markings



- Alumina Cement
- Hot Cure Cycle



### PIN

- Forged steel, galvanized
- Zinc sleeve
- Bituminous tar coating



## TESTING

### Routine Testing

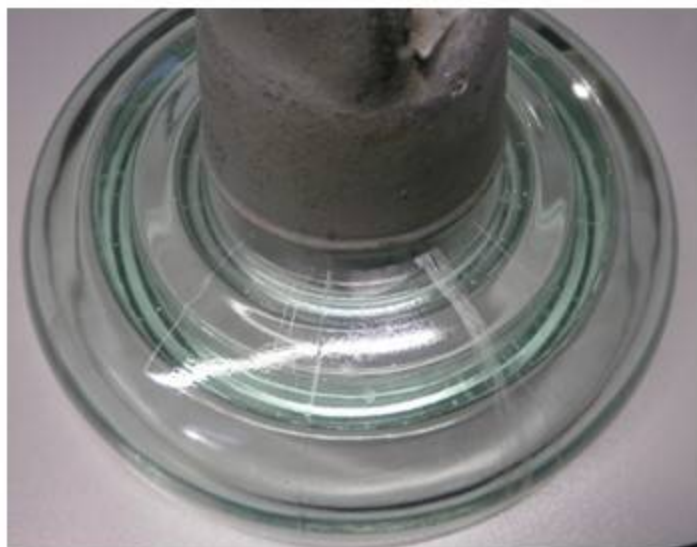
- 100% on all insulators
- Electrical – continuous flash-over for 4 minutes.
- Mechanical – held at 50% of SML rating for 1 minute

### Sample Testing

- By Lot
- Visual & dimensional test.
- Galvanizing test
- Puncture Test (Impulse Test).
- Locking system validation
- M&E Test

### Validation & Test Reports

- Design tests per standards
- Customer required tests
- Design testing must take into account both location of shell manufacturing and assembly location.



## REVIEW & CONCLUSION

### Quality of Toughened Glass Insulators

- Control of Raw Materials & Furnace
  - Control of Shell Forming & Toughening
  - Thorough Thermal Cycle Process
  - Factory ID on the shell
  - Cap & Pin Assembly
  - Routine & Sample Testing
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- Test Reports specific to Factory MFG





**THANK YOU**

FOR ADDITIONAL INFORMATION  
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