

Electrical Insulation Material Selection Checklist

A practical guide for engineers, equipment manufacturers and panel builders

Selecting the right electrical insulation material involves more than checking dielectric strength. Operating conditions, mechanical loads, equipment design and applicable standards all influence material suitability.

Use this checklist to gather the essential information before specifying an insulation material for industrial electrical equipment, switchboards or other electrical applications.

Project / equipment: _____

Prepared by: _____ **Date:** _____

1. Application and Equipment Requirements

Identify where and how the insulation material will be used.

- ☐ Equipment or application identified
- ☐ Intended function confirmed (electrical separation, structural support, barrier or component insulation)
- ☐ Installation location identified (indoor, outdoor or specialised environment)
- ☐ Equipment operating voltage documented
- ☐ Expected service life and reliability requirements defined
- ☐ Consequences of insulation failure considered

Application notes: _____

2. Operating Conditions

Understand the environment and stresses the material will experience.

- ☐ Normal operating temperature identified
- ☐ Maximum and short-term peak temperatures identified
- ☐ Temperature cycling or thermal fluctuations considered
- ☐ Moisture, humidity or condensation exposure assessed
- ☐ Dust, dirt and potential contamination considered
- ☐ Exposure to oils, solvents, chemicals or cleaning agents assessed

- ☐ UV exposure and weather conditions considered, where applicable
- ☐ Vibration and other environmental stresses identified

Operating conditions / expected temperature range: _____

3. Electrical Performance Requirements

Confirm the electrical properties required for the application.

- ☐ Rated operating voltage documented
- ☐ Expected electrical stresses and transient over-voltages considered
- ☐ Required dielectric strength reviewed
- ☐ Insulation thickness requirements established
- ☐ Electrical clearance and creepage distances confirmed
- ☐ Tracking resistance or surface performance considered, where relevant
- ☐ Insulation coordination and testing requirements identified
- ☐ Electrical properties checked against the selected material's technical data

Voltage / electrical requirements: _____

4. Mechanical Performance Requirements

Determine whether the material must also provide structural support or withstand physical loads.

- ☐ Required mechanical strength identified
- ☐ Static loads and component weight considered
- ☐ Short-circuit forces assessed, where applicable
- ☐ Vibration, shock and movement considered
- ☐ Dimensional stability requirements established
- ☐ Impact resistance or other mechanical properties assessed, where relevant
- ☐ Mounting, fastening and support arrangements reviewed

Mechanical requirements: _____

5. Material and Fabrication Requirements

Match the material to the design, manufacturing process and intended application.

- ☐ Suitable material family identified

- ☐ Specific material grade confirmed
- ☐ Required sheet, board, tube or component form identified
- ☐ Required thickness and dimensions documented
- ☐ Cut-outs, holes, profiles and other machining requirements specified
- ☐ Dimensional tolerances confirmed
- ☐ Fabrication and assembly methods considered
- ☐ Material compatibility with adjacent components assessed
- ☐ Material availability and lead time checked, where relevant

Preferred material / grade, if known: _____

Dimensions and tolerances: _____

6. Applicable Standards and Verification

Confirm the requirements that apply to the complete equipment and insulation component.

- ☐ Applicable equipment standards identified
- ☐ Relevant material standards and test methods reviewed
- ☐ Required electrical, thermal and mechanical testing established
- ☐ Supplier technical datasheets reviewed
- ☐ Required certificates, test reports or material traceability confirmed
- ☐ Design clearances, creepage distances and insulation coordination verified
- ☐ Compliance requirements for the finished assembly confirmed

Applicable standards / specifications: _____

Required documentation or testing: _____

7. Long-Term Reliability and Maintenance

Consider performance throughout the expected service life.

- ☐ Expected ageing and degradation mechanisms considered
- ☐ Thermal and electrical stresses over time assessed
- ☐ Environmental exposure over the service life evaluated
- ☐ Inspection and maintenance requirements considered

- ☐ Replacement access and repairability reviewed, where applicable
- ☐ Critical failure modes and their consequences assessed
- ☐ Additional engineering review or testing arranged, if required

Reliability considerations: _____

8. Final Selection Review

Before approving the material specification, confirm that the key requirements have been addressed.

- ☐ Material properties meet the application requirements
- ☐ The selected grade is suitable for the expected operating conditions
- ☐ Electrical and mechanical design requirements have been verified
- ☐ Dimensions and fabrication requirements are confirmed
- ☐ Applicable standards and testing requirements are addressed
- ☐ Technical documentation has been reviewed
- ☐ Outstanding questions have been resolved with the supplier or design engineer
- ☐ Material selection approved by the responsible person

Selected material / grade: _____

Outstanding actions: _____

Approval / date: _____

Need Help Selecting an Insulation Material?

The right material depends on the application, operating environment and performance requirements. Gathering this information early can help narrow the options and support a more informed specification.

Insulect supplies electrical insulation materials and components for industrial applications.

Explore Insulect's [Industrial Products](#) to review available material options or discuss your application requirements.

Important: This checklist is a preliminary information-gathering tool, not a substitute for engineering assessment, material-specific technical data or verification against applicable standards. Not every item applies to every application.