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SELECTION GUIDE 16 min read Updated May 2026

Station Post Insulator Selection Guide: Porcelain, Composite, and Glass

A step-by-step framework for specifying station post insulators by voltage class, pollution severity, cantilever load, and material — covering IEC 60168, ANSI C29.9, and IEC 61952.

TECHNICAL REFERENCE

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A station post insulator is a rigid, vertically or horizontally mounted insulator used in high-voltage sub switches while providing electrical isolation from grounded structures. Unlike suspension or strain ins loads simultaneously. They are manufactured in three primary materials — glazed porcelain, silicone r governed by distinct international standards and suited to different service environments.

This guide covers the five-step selection process for station post insulators: voltage class and system compliance. It applies to AC substations from 11 kV through 800 kV and references IEC 60168 (porcel (composite for DC). A pre-RFQ checklist is included at the end.

STEP 1 Voltage Class and System Type

The first parameter is the system's highest voltage for equipment, Um (kV), which determines the req voltage (LIWV). IEC 60168 organises station post insulators into voltage classes aligned with IEC 600 are:

UM (KV)	WET POWER-FREQ WITHSTAND (KV RMS)
12	28
24	50
36	70
72.5	140
123	230
245	460
420	630
550	—
800	—

For DC substations, reference IEC 62231 (composite) or consult IEC 60815-4 for insulation coordinatic typically 1.2–1.5× the AC value — because the absence of zero-crossing points accelerates pollution l

STEP 2

Pollution Severity Level

Pollution severity determines the minimum specific creepage distance (SCD) in mm/kV of Um. IEC 60

POLLUTION CLASS	ENVIRONMENT DESCRIPTION
A (Light)	Inland, low industrial activity, low traffic
B (Medium)	Mixed industrial/agricultural, moderate traffic
C (Heavy)	Coastal (3–50 km from sea), heavy industry, chemical plants
D (Very Heavy)	Direct coastal (<3 km), cement plants, salt flats

For MENA installations, coastal substations in Saudi Arabia and the UAE typically fall in class C or D d humidity may qualify as class B, but confirm with a site pollution severity measurement (ESDD/NSDD) after pollution events, which can allow one pollution class reduction in creepage specification — but t class (HTC).

STEP 3 Cantilever Load Class

Station post insulators must withstand the horizontal bending force applied at the conductor attachme and is specified as a minimum guaranteed value. IEC 60168 defines standard CBL classes: 4, 6, 8, 10,

> **CBL formula:** Design CBL = (Conductor tension + Wind load on conductor span + Short-circuit electroma

Short-circuit electromagnetic force is often the governing load in modern high-fault-current substatio exceed the combined conductor tension and wind load. Always calculate all three components and se assemblies (two or more posts in series), the bottom unit carries the full cantilever moment and must

STEP 4 Material Selection: Porcelain, Composite, or Glass

Each material has a distinct performance profile. The table below summarises the key differentiators f

PROPERTY	PORCELAIN	COMPOSITE (SILICON
Governing standard	IEC 60168 / ANSI C29.9	IEC 61952 / IEC 62231
Pollution performance	Good (glazed surface)	Excellent (hydrophobi
Mechanical strength	High compressive, moderate cantilever	High cantilever (FRP c
Weight	High	Low (30–50% of porc
Seismic performance	Moderate	Excellent
Vandalism resistance	Moderate (brittle fracture)	High (no brittle failure)
Service life	40–60 years	25–35 years (UV degr

PROPERTY	PORCELAIN	COMPOSITE (SILICON
Typical application	Inland substations, standard pollution	Coastal, seismic, high

Porcelain remains the dominant choice globally for inland substations at 72.5 kV and above due to its established type-test records under IEC 60168. Composite is the preferred choice for coastal MENA i of self-revealing damage — a cracked shed shatters and falls, making visual inspection straightforwa

STEP 5

Standards and Type Test Requirements

Specify the applicable standard in your RFQ and require the supplier to provide type test certificates f 60168 for porcelain station posts include:

TEST 01

Dry and Wet Power-Frequency Withstand

Confirms the insulator withstands the specified AC voltage under dry and artificial rain conditions wit

TEST 02

Lightning Impulse Withstand (LIWV)

15 positive and 15 negative impulses at the specified LIWV level; no more than 2 flashovers permitted

TEST 03

Cantilever Breaking Load

Horizontal load applied at the cap fitting until fracture; the measured CBL must meet or exceed the s

TEST 04

Thermal Mechanical Test (IEC 60168 Clause 10.4)

Simultaneous application of mechanical load and thermal cycling to verify cement joint integrity — cr

TEST 05

Porosity Test (Porcelain Only)

Verifies the fired porcelain body has zero open porosity, preventing moisture ingress and internal tra

For composite station posts under IEC 61952, additional tests include the water diffusion test, tracking request the original test report, not a summary certificate, and verify the test laboratory's accreditatio

Pre-RFQ Checklist

01 **System voltage Um (kV)** — confirm the highest voltage for equipment, not the nominal system voltage

02 **Insulation level** — specify LIWV (kV peak) and wet power-frequency withstand (kV rms) per IEC 60071

03 **Pollution class** — A / B / C / D per IEC 60815-1, with ESDD/NSDD measurement if available

04 **Minimum creepage distance (mm)** — calculated as SCD × Um

05 **Cantilever breaking load class (kN)** — calculated from conductor tension + wind + short-circuit force ×

06 **Material** — porcelain (IEC 60168), composite (IEC 61952), or glass; state preference and justification

07 **Mounting configuration** — single unit, stacked assembly, or horizontal mounting; specify cap and base

08 **Type test certificates** — require IEC 60168 or IEC 61952 type tests from KEMA / CESI / CPRI or equival

09 **Seismic zone** — if applicable, specify IEEE 693 or IEC 61463 seismic qualification level

10 **Quantity and delivery schedule** — station post insulators are typically made-to-order; allow 8–14 week

Content produced from heritage manufacturing knowledge of Zibo's insulator production cluster, incl documentation maintained continuously since 1998.

IN THIS ARTICLE

Step 1 — Voltage Class & System Type
Step 2 — Pollution Severity Level
Step 3 — Cantilever Load Class

FREQUENTLY ASKED QUESTIONS

Station Post Insulator Selection — Frequently Asked Questions

What is the difference between IEC 60168 and ANSI C29.9 for station post insulators? +

When should I choose composite station post insulators over porcelain? +

How do I determine the required cantilever breaking load for a station post insulator? +

What creepage distance is required for a 110 kV station post insulator in a coastal environment? +

Can station post insulators be used in DC substation applications? +

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