ELECTRICAL CONTAINMENT SYSTEMS

Technical Guide | Cable Ladder, Tray, Basket, Trunking & Conduit

Practical engineering considerations for the design and installation of electrical containment on industrial and commercial sites.

01 | Choosing the right containment

Cable ladder: heavy power and large submain cables, with open ventilation and accessible cleating. **Perforated tray:** mixed power/control cable routes, subject to load and grouping. **Wire basket:** typically light-duty control, instrumentation and data cabling. **Trunking:** enclosed routes with accessible covers and appropriate segregation. **Conduit:** local protection, drops and final connections. Selection should consider cable mass, spans, access, corrosion, mechanical exposure and future changes.

02 | Loads, brackets and fixing design

Assess installed cable mass per metre, containment self-weight, future allowance and any concentrated loads. Check manufacturer safe working load data for the selected width, depth, span, joint position and mounting orientation. Fixings and brackets must suit the substrate and imposed load; verify anchor capacity and edge distances. Do not treat generic support-spacing figures as universally acceptable.

03 | Typical containment arrangements

Horizontal routes: trapeze or wall brackets with suitable restraints. **Vertical risers:** independently support cable weight and provide secure cleating. **Long runs:** allow for thermal movement and manufacturer-specified expansion arrangements. **Transitions:** use appropriate reducers, bends, tees and risers while preserving cable bend radius and support.

04 | Cable grouping, fill and ventilation

Containment dimensions must allow cables to be installed without damage and with appropriate bending radii. Grouping and ambient correction factors can reduce cable current-carrying capacity. Cable ladder may improve ventilation, but grouping and installation method still require calculation. Enclosed trunking should be checked for usable cross-section, heat dissipation and segregation.

05 | Large power and single-core cables

Large SWA and single-core AWA cable installations require suitable cleats, gland arrangements and mechanical support. For single-core AC circuits, assess conductor formation, magnetic effects in ferrous materials, phase grouping and short-circuit electromechanical forces. Cleats and supports should be selected for the prospective fault duty, not just normal cable weight.

06 | Routing and coordination

Agree routes with structural steel, pipework, ductwork, sprinkler systems, cranes, access equipment and maintenance zones. Avoid blocking plant access or escape routes. Establish penetration positions, bracket locations, high-level access and installation sequencing before fabrication or installation.

07 | Material and corrosion selection

Typical choices include pre-galvanised steel for suitable internal environments, hot-dip galvanised systems for more demanding exposure, stainless steel for selected corrosive or hygienic areas and non-metallic systems where appropriate. Match brackets, fasteners and accessories to the environment and consider dissimilar-metal corrosion. Verify coating specifications and manufacturer suitability rather than relying on appearance.

08 | Cable restraint and support

Select ties, saddles and cleats to suit cable type, diameter, loading and route. Support cables at changes of direction, drops and entries. Electrical wiring systems must be supported so they are not liable to premature collapse in fire; plastic ties alone should not be relied on where they would permit collapse.

09 | Earthing and electrical continuity

Metal containment does not automatically function as a protective conductor. Where proposed as a CPC, verify continuity, impedance, fault withstand and suitability of joints to BS 7671. Otherwise determine the need for protective bonding or earthing based on the installation. Manufacturer jointing systems and any required bonding links must be installed correctly.

10 | Separation of services

Review segregation between LV power, ELV/data, control, instrumentation and safety systems. Separation may be required for electrical safety, electromagnetic compatibility or system-specific standards. Use partitions, separate containment or spacing as appropriate; check the particular circuit insulation and system requirements before sharing routes.

11 | Penetrations and fire stopping

Containment passing through fire-resisting walls or floors requires a suitable fire-stopping solution compatible with the actual substrate, cables and containment. Coordinate penetration dimensions and future cable additions. Fire stopping should not be improvised with unverified materials; record concealed work where required.

12 | Installation details

Use correct brackets, splice plates, fasteners and torque values. Deburr cut edges, treat exposed coatings where required and fit protective bushes or edge trims at cable entries. Avoid unsupported overhangs, sharp bends and cover arrangements that prevent safe inspection. Provide labels for major cable routes and circuits where useful.

13 | Design inputs required

Key information includes cable schedule and outside diameters; cable weights; circuit ratings and grouping; fault levels for cleating; route drawings; mounting height and support substrate; environmental exposure; fire compartments; interfaces with other services; maintenance access and spare-capacity requirements.

14 | Inspection and verification

Before handover, inspect route alignment, bracket spacing, anchor installation, joint positions, cable support, separation, edge protection, corrosion protection and access. Verify electrical continuity or bonding where required. Confirm fire-stopping details and retain relevant manufacturer installation information.

15 | Typical technical specification checklist

A containment specification should define system type, material/finish, width/depth, manufacturer load class or verified SWL, support arrangement, fixings/substrate, cable capacity, required segregation, earthing strategy, fire-stopping interfaces and inspection records.

Design item	Key verification
System / dimensions	Cable type, loading, grouping, fill and future allowance
Span and supports	Manufacturer SWL, deflection, bracket and anchor capacity
Large power cables	Cleat spacing, fault restraint, single-core AC effects
Environment	Corrosion class, moisture, impact, temperature and UV
Earthing	CPC/bonding arrangement and joint continuity as required
Fire performance	Cable support against premature collapse; penetration seals
Interfaces	Other services, access, plant maintenance and structure
Handover	Inspection records, as-installed routes and product data

16 | Reference framework

The current edition of **BS 7671** governs electrical installation design and erection. Product standards may include **BS EN 61537** (cable tray and ladder systems), **BS EN 50085** (trunking and ducting) and **BS EN 61386** (conduit systems), as relevant. Manufacturer loading, fixing and accessory data remain essential to project-specific design.

The QUEST approach

QUEST Electrical delivers containment as part of complete industrial and commercial electrical installations, including LV switchgear, section boards, distribution boards, large submains, machinery supplies and controls. Containment routes are planned around the operational site, access requirements and future maintenance.

Important: This technical guide is general guidance, not a construction design or manufacturer specification. All dimensions, load ratings, support spans, fault restraint and protective measures must be verified for the project by competent persons.