

## SECTION 14 CABLE SUPPORT AND DUCT SYSTEMS

### 1 GENERAL

#### 1.1 RESPONSIBILITIES

##### General

General: Provide cable support, trunking and duct systems as documented.

#### 1.2 CROSS REFERENCES

##### General

Requirement: Conform to the following:

- *General Requirements.*

#### 1.3 SUBMISSIONS

##### Shop drawings

General: Submit shop drawings showing the following:

- In situ pits.
- Provision for expansion and ground movement.
- Fabricated columns.
- Footing for columns.

### 2 PRODUCTS

#### 2.1 CONDUITS

##### General

Standards: AS/NZS 2053 Parts 1, 2, 3, 4, 5, 6, 7 and 8.

##### Type

General: Rigid.

##### Sizes

Conduits:  $\geq 20$  mm.

Underground:  $\geq 25$  mm.

Conduits for telecommunications:  $\geq 25$  mm.

##### Fixings

Saddles: Double sided fixed.

##### Colour

Conduits for telecommunications systems: White.

##### Galvanized water pipe

Medium or heavy: To AS 1074.

#### 2.2 METALLIC CONDUITS AND FITTINGS

##### General

Standards: To AS/NZS 2053.7 or AS/NZS 2053.8.

##### Type

General: Screwed steel.

**Fixings**

Saddles:

- Internal: Zinc plated.
- External: Hot-dipped galvanized.

**Corrosion protection**

Steel conduits: Paint ends and joint threads with zinc rich organic primer to AS/NZS 3750.9.

**2.3 NON-METALLIC CONDUITS AND FITTINGS**

**General**

Standards: Non-metallic conduits and fittings: AS/NZS 2053 Parts 2, 3, 4, 5 or 6.

Solar radiation protection: Required for conduits and fittings exposed to sunlight.

**Flexible conduit**

General: Provide flexible conduit to connect with equipment and plant subjected to vibration. If necessary, provide for adjustment or ease of maintenance. Provide the minimum possible length.

**Associated fittings**

Type: The same type and material as the conduit.

Wall boxes on UPVC conduits: For special size wall boxes not available in UPVC, provide prefabricated earthed metal boxes.

**Inspection fittings**

General: Provide inspection-type fittings only in accessible locations and where exposed to view.

**Joints**

Type: Cemented or snap on joints.

**2.4 CABLE DUCT/TRUNKING**

**General**

Standards: To AS/NZS 4296.

**Cable duct**

Material: Metal.

Material finish: Metallic-coated to AS 1397 Grade G2, Coating Class Z275.

Construction: Solid.

Covers:

- Accessible locations: Screw-fixed or clip-on type removable only with the use of tools.

Accessories: Purpose-made to match the duct system.

Cable support: Except for horizontal runs where the covers are on top, support wiring with retaining clips at intervals of not more than 1000 mm.

**2.5 CABLE TRAY/LADDER SUPPORT SYSTEMS**

**General**

System: Provide a complete cable support system consisting of trays or ladders and including brackets, fixings and accessories.

Selection: Run cables < 13 mm diameter on cable trays or in ducts.

Standard: NEMA VE-1.

Type tests: To NEMA VE-1.

Manufacture: Provide proprietary trays, ladders, fittings and accessories from a single manufacturer for the same support system.

Selection: Select cable tray/ladder in conjunction with support system installation to achieve the documented loading and deflection requirements.

Spare capacity:  $\geq 50\%$ .

Support:

- Power cables: Trapeze or centre rail structure.
- Communications cables: Single sided.

Dimensions: To the preferred dimensions nominated in NEMA VE-1.

Material: Corrosion-resistant finished steel.

Material finish: Metallic-coated to AS 1397, Grade G2, Coating Class Z275.

Covers: Provide ventilated flat covers to cable trays/ladders installed in accessible locations.

## 2.6 CABLE PITS

### General

Cable draw-in pits: Provide. Sizes given are internal dimensions.

### Proprietary cable pits

Pits  $\leq 1200 \times 1200$  mm: Provide proprietary concrete or polymer moulded pits.

### In situ construction

Pits  $> 1200 \times 1200$  mm: Provide either:

- Proprietary cable pits.
- Construct walls and bottoms from rendered brickwork or 75 mm thick reinforced concrete. Incorporate a waterproofing agent in the render or concrete.

### Pit covers

General: Provide pit covers to suit external loads. Fit flush with the top of the pit.

Standard: To AS 3996.

Weight:  $< 40$  kg for any section of the cover.

Lifting handles: Provide a lifting handle for each size of cover section.

### Drainage

General: Provide drainage from the bottom of cable pits, either to absorption trenches filled with rubble or to the stormwater drainage system.

Absorption trenches: Minimum size 300 x 300 x 2000 mm.

## 2.7 COLUMNS

### General

Columns: Conform to the following for fabricated columns more than 2400 mm high which are designed to support accessories outdoors.

Standards: Comply with the following standards as appropriate:

- AS 1798 for public lighting poles.
- AS 3600-2009 for concrete structures.

- AS 4100 for steel structures.
- AS/NZS 4676 for structural design of columns.
- AS/NZS 4680 for hot-dipped galvanized (zinc) coatings on ferrous articles.

### 3 EXECUTION

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#### 3.1 UNSHEATHED CABLES – INSTALLATION

##### General

General: Provide permanently fixed enclosure systems, assembled before installing wiring. Provide draw wires to pull in conductor groups from outlet to outlet, or provide ducts with removable covers.

#### 3.2 CONDUIT SYSTEMS – INSTALLATION

##### Set out

General: If exposed to view, install conduits in parallel runs with right angle changes of direction.

##### Bends

General: Install conduits with the equivalent of  $\leq 2$  right angled bends per cable draw-in run.

##### Conduits in roof spaces

General: Locate below roof insulation and sarking. In accessible roof spaces, provide mechanical protection for light-duty conduits.

##### Inspection fittings

General: Locate in accessible positions.

##### Draw cords

General: Provide 5 mm<sup>2</sup> polypropylene draw cords in conduits not in use.

##### Draw-in boxes

General: Provide draw-in boxes as follows:

- Spacing: < 30 m.
- At changes of level or direction.

Underground draw-in boxes: Provide gasketed covers and seal against moisture. Install in accessible pits.

##### Expansion

General: Allow for thermal expansion/contraction of conduits and fittings due to changes in ambient temperature conditions. Provide expansion couplings as required.

##### Rigid conduits

General: Provide straight long runs, smooth and free from rags, burrs and sharp edges. Set conduits to minimise the number of fittings.

##### Routes

General: Run conduits concealed in wall chases, embedded in floor slabs or installed in inaccessible locations directly between points of termination, minimising the number of sets. Do not provide inspection fittings.

##### Conduits in concrete slabs

Route: Do not run in concrete toppings. Do not run within pretensioning cable zones. Cross pretensioning cable zones at right angles. Route to avoid crossovers and minimise the number of conduits in any location. Space parallel conduits  $\geq 50$  mm apart.

Minimum cover: The greater of the conduit diameter and 20 mm.

Fixing: Fix directly to top of the bottom layer of reinforcing.

##### Hollow-block floors

Locate conduits in the core-filled sections of precast hollow-block type floors.

### Columns

Conduits in columns:

- $\leq 4$  per column.
- $\leq 25$  mm diameter.
- Locate conduits centrally in each column.

Bends: Enter columns via  $\geq 150$  mm radius sweep bends. Do not use elbows.

Chasing: Do not chase columns.

## 3.3 CABLE TRAY/LADDER SUPPORT SYSTEMS – INSTALLATION

### General

Standard: To NEMA VE-2.

Design: Support cable trays/ladders to achieve the following:

- Concealed trays/ladders: Support spacing  $\leq$  length of tray/ladder section.
- Visible trays/ladders: Loaded deflection  $\leq$  span/350.
- Design load: Minimum safety factors and deflection are dependent upon product type, support and profile. It is common to state a minimum safety factor of 1.5 on ultimate strength (collapse load). If the documents are required to be fully detailed select a system from the manufacturers' published test data.

### Fixing to building structure

General: Fix supports to the building structure or fabric by means of  $\geq 8$  mm threaded rod hangers attached to hot-dipped galvanized U-brackets, or by means of proprietary brackets.

### Cable fixing

General: Provide strapping or saddles suitable for fixing cable ties.

### Bend radius

General: Provide bends with an inside radius  $\geq 12$  times the outside diameter of the largest diameter cable carried.

### Cable protection

General: Provide rounded support surfaces under cables where they leave trays or ladders.

### Access

General: Locate trays and ladders to provide  $\geq 150$  mm free space above and  $\geq 600$  mm free space on at least one side.

### Clearances

From hot water pipes:  $> 200$  mm.

From boilers or furnaces:  $> 500$  mm.

EMI: Locate support systems for electrical power cabling and communication cabling to minimise electromagnetic interference.

Exposure:

- Interior: For general purpose dry conditions specify zinc or zinc-aluminium coated steel, or non metallic materials.
- Exterior: For non corrosive environments specify non metallic materials or hot-dipped galvanizing (after fabrication).

- Special requirements: For marine environments PVC, fibreglass, 'marine grade' aluminium, stainless steel, or hot-dipped galvanized steel with a protective coating paint system may be used. Chemical or bacteriological exposure, or magnetic, conductive, safety or other special restrictions call for careful selection.
- Fire hazard properties: Where fire hazard properties are required in BCA A2.4, BCA C1.10 and BCA Spec C1.10.
- Specify a complying system using metal connectors and fasteners. Proprietary 'snap in' glass fibre-nylon connectors may be used in all other cases. Specify by location and/or BCA classification for mixed rated and non-rated systems. AS/NZS 1530.3 is cited at BCA Spec A2.4. Metal connectors require to be specified with all nuts, bolts and washers – single use only.

### **3.4 CABLES IN TRENCHES – INSTALLATION**

#### **Sand bed and surround**

General: Provide clean sharp sand  $\geq 150$  mm around cables and conduits installed underground.

#### **Sealing ducts and conduits**

General: Seal buried entries to ducts and conduits with waterproof seals. Seal spare ducts and conduits immediately after installation. Seal other ducts and conduits after cable installation.