



SPECIFICATION 1391

SERVICE CONDUITS

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SPECIFICATION 1391 – SERVICE CONDUITS

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| 1391 SERVICE CONDUITS |
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1 GENERAL

1.1 RESPONSIBILITIES

Objectives

General: Provide electrical and telecommunication conduits and pits as documented.

Performance

Selections: As documented.

1.2 CROSS REFERENCES

General

Requirement: Conform to the following:

- 0136 General requirements (Construction)
- 0161 Quality (Construction).

1.3 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

Standards

| | |
|---------------------|---|
| AS 1074-1989 | Steel tubes and tubulars for ordinary service |
| AS 1289 | Methods for testing soils for engineering purposes |
| AS 1289.5.4.1-2007 | Soil compaction and density tests—Compaction control test— Dry density ratio, moisture variation and moisture ratio |
| AS 1345-1995 | Identification of the contents of pipes, conduits and ducts |
| AS 1379-2007 | Specification and supply of concrete |
| AS/NZS 1477:2006 | PVC pipes and fittings for pressure applications |
| AS/NZS 2032:2006 | Installation of PVC pipe systems |
| AS/NZS 2053:Various | Conduits and fittings for electrical installations |
| AS/NZS 2053.1:2001 | General requirements |
| AS/NZS 2053.2:2001 | Rigid plain conduits and fittings of insulating material |
| AS/NZS 2053.3:1995 | Rigid plain conduits and fittings of fibre-reinforced concrete material |
| AS/NZS 2053.4:1995 | Flexible conduits and fittings of insulating material |
| AS/NZS 2053.7:2002 | Rigid metal conduits and fittings |
| AS/NZS 2053.8:1995 | Flexible conduits and fittings of metal or composite material |
| AS/NZS 2648 | Underground marking tape |
| AS/NZS 2648.1:1996 | Non-detectable tape |
| AS/NZS 3000:2007 | Electrical installations (known as the Australian/New Zealand Wiring Rules) |
| AS/NZS 3750 | Paints for steel structures |
| AS/NZS 3750.9:2009 | Organic zinc-rich primer |
| AS 3996-2006 | Access covers and grates |
| SAA HB 243:2007 | Communications cabling manual - Module 1: Australian regulatory arrangements |

Other publications

CCM Communications Cabling Manual 2007 Vol.1 Handbooks, codes and regulations, Vol.2 Standards

1.4 STANDARDS

General

Electricity conduits and pit installation: To AS/NZS 3000 and the requirements of the local electricity network distributor.

Telecommunication conduits and pit installation: To SAA HB 243.

PVC pipe systems installation: To AS/NZS 2032.

1.5 INTERPRETATIONS

Definitions

General: For the purposes of this worksection the following definitions apply:

- Space factor: Ratio of the sum of the cross sectional areas of the installed cables to the internal cross sectional area of the conduit.

1.6 SUBMISSIONS

Acceptance criteria

General: All submissions will be subject to the approval of the Superintendent.

Documents

Submit the following for approval:

- Materials: Certificates of conformance of all materials and components before delivery to site.
- Calculations: Survey set out of service conduit works and quantity calculations.
- Work-as-executed drawings: Include service conduit system information sheets and works.
- Components: Conduits and fittings.
- Samples: For conformity testing to relevant standards.
- Technical data: Product information.
- Execution details: Refer to **HOLD POINTS**.

Shop drawings

General: Submit shop drawings showing the following:

- Layout of underground conduits, pits and drainage trenches.
- Invert levels for underground conduits.
- Depth of burial for cables and conduits.
- In situ pits.
- Provision for expansion and ground movement.
- Fabricated columns.
- Footing for columns.

Technical data

General: Submit technical data for the following:

- Ducted wiring enclosure systems.
- Proprietary pits.
- Proprietary columns.

General

Notices and fees: Pay all fees and charges and arrange for all inspections and tests required by the relevant Authority.

1.7 INSPECTION

Notice

General: Give notice so that the inspection may be made of the following:

Summary of HOLD POINTS

| Clause title/Item | Requirement | Notice for inspection | Release by |
|-----------------------------|---|-----------------------|----------------|
| MATERIALS | | | |
| Conduits | | | |
| General - Components | Provide certificates | Before delivery | Superintendent |
| EXECUTION | | | |
| Conduit installation | | | |
| General - Bedding | Bedding thickness and compaction verification | 1 working day | Superintendent |
| Completion | | | |

| | | | |
|---------------------------|-------------------|----------------|----------------|
| General - Backfill | Backfill conduits | 2 working days | Superintendent |
|---------------------------|-------------------|----------------|----------------|

Summary of WITNESS POINTS

| Clause title/Item | Requirement | Notice for inspection |
|-----------------------------|---------------------|-----------------------|
| EXECUTION | | |
| Conduit installation | | |
| Marking | Marking tape, kerbs | 1 working day |
| Completion | | |
| General | Clean, lids | 3 working days |

2 PRE-CONSTRUCTION PLANNING

2.1 SCHEDULING

Program of works

General: Program the works as follows:

- Materials: Arrange the program for compliance and usage of component and materials.
- Authorities: Arrange approvals and conform with the local environmental requirements.

3 MATERIALS

3.1 CONDUITS

General

Components: Provide certificates of conformance for all materials and components. This is a **HOLD POINT**.

Size of conduit: Unless otherwise shown on the drawings:

- Space factor < 0.5.
- Flexible conduit: 25 mm.
- Conduit (under road): 80 mm.
- Conduit (general underground): 50 mm.
- Telecommunications: To Austel specifications.

Draw cord: Provide polypropylene draw cord in conduits not in use.

Conduit colour: Conform to the following:

- Telecommunications: White.
- Electrical: Orange.

UPVC priming fluid and solvent cement: To AS 3879.

Marker tape: To AS 2648.1.

Fixings Saddles: Double sided fixed.

Metallic conduits and fittings

Rigid plain conduits and fittings: To AS/NZS 2053.7.

Flexible conduits and fittings of metal or composite material: To AS/NZS 2053.8.

Heavy duty galvanised steel tube: To AS 1074.

Type: Screwed steel.

Saddles: Conform to the following:

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

Corrosion protection of steel conduits: Paint ends and joint threads with zinc rich organic primer to AS/NZS 3750.9.

Non-metallic conduits and fittings

Heavy duty rigid UPVC: To AS/NZS 2053.2.

Flexible conduit: To AS 2053.4.

Joints: Cemented or snap on.

3.2 PITS**General**

Pits: Provide cable draw-in pits as shown on the drawings. Sizes given are internal dimensions.

Plastic materials: Must be UV stabilised.

Proprietary pits

Pits: Provide proprietary concrete or polymer concrete moulded pits in conformance with the

Proprietary pit schedule.**Proprietary pit schedule**

| Pit number | Type | Size (l x b x d) | Cover marking | Cover type | Security |
|------------|------|------------------|---------------|------------|----------|
| | | | | | |
| | | | | | |
| | | | | | |

In situ construction

Pits: Construct walls and bases from rendered brickwork or 75 mm thick reinforced concrete. Provide a waterproofing agent in the render or concrete.

Concrete: To 0319 Minor concrete works.

Pit covers

Access covers and frames: Conform to AS 3996 and the **Access covers and frames schedule**.

Ductile iron covers size: Width parallel to the lifting ends and undercut. Length is parallel to the direction of cover removal.

Infill material: Bond tile or paver to the concrete bed with an epoxy mortar.

Proprietary products: To the manufacturer's recommendations.

Marking: Mark all covers permanently on the inside of the pit and on the cover by casting, engraving or moulding in bold letters 30 mm high for pit use e.g. Electrical, Telecommunications.

Access covers and frames schedule

| Requirements | A1 | A2 | A3 | A4 |
|-------------------|----|----|----|----|
| Cover number | | | | |
| Load class | | | | |
| Size | | | | |
| Aesthetics | | | | |
| Security | | | | |
| Seals | | | | |
| Cover orientation | | | | |
| Handling | | | | |

4 EXECUTION**4.1 PROVISION FOR TRAFFIC****General**

Control of traffic: Conform with the following:

- Worksection 1101 Control of traffic.
- **Traffic Guidance Scheme** in 1101 Control of traffic.

4.2 CONDUIT INSTALLATION

General

Requirement: Lay conduits in straight lines parallel or normal to the carriageway and avoiding unnecessary bends.

Identification: Identify all conduits in conformance with AS 1345 and AS/NZS 3000.

Drawing cables: Install all conduits and fittings before commencing drawing in of cables.

Conduits not in use: Provide a draw cord for the full length of the conduit and 1 m past either end coiled.

Layout of each conduit within the trench: In conformance with the underground services shared trench agreement between the respective service authorities and AS/NZS 3000 clause 3.11.

Conduits under roads and other objects: > 1 m beyond the obstruction.

Cap conduits: Provide a non perishable removable cover before backfilling.

Conduit installation tolerance: Conform to the following:

- ± 50 mm of design line.
- + 20 mm of minimum cover.

Entry into pits and footings : Provide large sweep bends for entry into junction pits and light pole footings. Do not provide more than 180° total change of direction in any run of conduit between pits. Install conduits with ≤ 2 right angled bends for each cable draw-in run.

Termination of conduit in post concrete footings: Terminate > 25 mm inside the recess in the concrete footing.

Cover: > 600 mm and < 800 mm below finished level. If > 600 mm can not be achieved encase in concrete in conformance with AS/NZS 3000 Clause 3.11.4.4.

Bedding: Compacted sand > 50 mm thickness. This is a **HOLD POINT**.

Surround: Provide clean sharp sand ≥ 150 mm around cables and conduits installed underground.

Marking

Marking tape: Lay at approximately 50% of the depth of the conduit and at conduit bends.

Marks in kerb: Route a mark in the face of kerb on both sides of the road indicating the location of the conduit crossing in conformance with the following: This is a **WITNESS POINT**.

- Electrical: The letter 'E'.
- Telecommunications: The letter 'T'.
- Height of lettering: ≥ 75 mm.

Temporary markers: If kerb and gutter construction has not commenced, install temporary timber post markers at the conduit crossings so that markings in the face of kerb can be made at the correct locations at the time of kerb and gutter construction.

Joints

Non metallic: Ensure joints are clean of dirt and grease and burrs before cementing together. Provide a solvent cement weld as recommended by the manufacturer.

Metallic: Provide threaded couplings with a minimum 25 mm length of thread on the end of a conduit or conduit bend.

Flexible conduit: Provide proprietary fittings.

4.3 PIT INSTALLATION

General

Termination for conduits to pits: Provide a drilled hole into the pit < 10 mm larger than the outside diameter of the conduit. Turn end of conduits upwards and protrude 50 mm into the pit. Seal around the conduit with an approved flexible sealant. Smooth and free from burrs the end of the conduits.

Pits: Install pits to conform with the following:

- Set flush with the finished level of the surrounding area.
- Shape surrounding area to prevent ponding within 1 m of the pit.
- Numbered.

Location of electrical pits: As shown on the drawings and the following as required:

- Within 4 m of service points for earthing.

- At all junctions and sharp changes in direction of conduits.
- Adjacent to poles.
- Draw in pit every 50 \ m.

Pit collars: Provide for circular pits before compaction of the backfill material.

Pits installed on batter slopes: Do not install pits on slopes steeper than 3H:1V unless otherwise shown on the drawings.

Bedding: 5 mm nominal size screened aggregate of > 150 mm thick.

Drain: Provide drainage in each pit as follows:

- Drain type: UPVC drain.
- Diameter: 50 mm.
- Grade: Grade the drain to a stormwater drainage pit or discharge through an embankment batter.

4.4 COMPLETION

General

Backfill: Do not commence backfill until conduit system has been inspected. This is a **HOLD POINT**.

Backfill over the conduit shall be compacted so that the relative compaction as determined by AS 1289.5.4.1 is not less than 100%.

Work-as-executed drawings: Record the locations of all conduits.

Pits: Clean of debris and fit lids securely. This is a **WITNESS POINT**.

Testing

Ovality: Test completed conduits for ovality at least 14 days after compaction of completed backfill.

Ovality tolerances to manufacturers requirements.

4.5 LIMITS AND TOLERANCES

Application

Summary: The limits and tolerances applicable to this worksection are summarised in **Summary of limits and tolerances table**.

Summary of limits and tolerances table

| Activity | Limits/Tolerances | Worksection clause/subclause |
|---|--|------------------------------|
| Conduit position generally | ± 50 mm | Conduit installation |
| Cover to conduit | Minimum specified – 20 mm | Conduit installation |
| Size of conduits - Space factor - Flexible conduit - Under road - General underground - Telecommunications | - ≥ 0.5 - 25 mm - 80 mm - 50 mm - Austel | MATERIALS Conduits |
| Conduit termination inside footing | > 25 mm | Conduit installation |
| Cover below finished level | > 600 mm and < 800 mm | |
| Bedding - Compacted sand - Surround | > 50 mm ≥ 150 mm | |
| Kerb Letting height | ≥ 75 mm | Marking |
| Pre drilled hole | ≤ 10 mm larger than outside diameter of conduit | Pit installation |
| Bedding - Aggregate - Thickness | - 5 mm -> 150 mm | |

| Activity | Limits/Tolerances | Worksection clause/subclause |
|----------------|-------------------|------------------------------|
| Drain diameter | 50 mm | Pit installation |

5 MEASUREMENT AND PAYMENT

5.1 GENERAL

Payment shall be made for all the activities associated with completing the work detailed in this worksection and shown on the drawings, in accordance with provisions made in Contract Document.