Underground Distribution Construction Manual

Section C1 – Conduits

Approved by: A Smith-de Perez

MANUAL 00305

CIVIL WORKS

SECTION C1 - CONDUITS

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A	ORIGINAL ISSUE					
B	DATE 31/5/11	APPD R. ENGLISH	CKD D. TAYLOR	DRN A. SYMONDS	ADDITIONAL SHEET ADDED FOR CONDUIT DETAIL IN SUB. SECT. 2.	

energex

UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
CONDUITS
SECTION INDEX

APP'D	R. ENGLISH
DATE	10/10/08
RECD	
CKD	P.BARNEY
DWN	F.AMANPOOR

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6229-A4 B

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C1	0

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FILE UDC-C1-0-1B.DWG

Main Index

CONDUITS

1. Conduit Specification

All conduits, associated fittings and bends shall comply with the requirements of AS/NZS 2053 and all above ground shall be U.V. stabilised

CONDUITS

11kV Feeders

- 125mm min LD orange PVC

LV Feeders

- 80mm LD Orange PVC - Limited use for 3 pillar radials
- 100mm min LD orange PVC - standard use (for entry to 3 way pillars use 80mm bends & reducer if req'd)
- 40mm HD orange PVC (Streetlight circuits only).

Communication Circuits

- 100mm MD White PVC (Bends to match Power Circuits)

	Nominal Size (mm)	Minimum Bend Radius (mm)	Bend Angle (Degrees)	Typical Use
STREETLIGHT (S/L)	*40	130	90	Electricity supply cable entry conduits. Public lighting cable conduits. All changes of direction.
LOW VOLTAGE	*80	690	45	Electricity supply pillar entry.
	*100	750 1200	90 45	
	80-100	1830	15-30-45	Deviations to main line conduit installations.
HIGHVOLTAGE	125	1830	45	Deviations to main line conduit installations.

* Typically used for pillars

2. Conduit Bends

To provide for a change in direction of conduits, bends shall be installed. Bends can be cut to suit the particular deviation angle required.

Conduit bends shall be of the same class and colour as the conduits.

Refer to Section C1-2 for the range of available conduit bends. All conduit couplings shall be fitted in accordance with the manufacturer's instructions.

3. Supply Pillar Entry

Conduit (bends) rising into supply pillar bases shall:

- typically use a 45 or 90 degree sweep
- be cut off parallel and terminate 50mm above the internal sand level.

Conduit bends shall be used as entries into all new pillars.

A	ORIGINAL ISSUE				
C	DATE 20/8/15	APPD A.Smith de Perez	CKD -	DRN J.LANSLEY	UPDATE POINT 3 ADD 1200MM 45 DEG BEND

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CIVIL WORKS
CONDUITS
GENERAL REQUIREMENTS

APP'D	R. ENGLISH
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4. Draw Rope

A continuous length of 6mm braid polypropylene draw rope, having a minimum breaking strength of 1.0 kN, shall be left in the full length of conduits to enable the hauling rope to be pulled in.

5. Cleaning and Testing of Conduit

After completing the laying and backfilling of each section of conduit, the bore of the conduits shall be cleaned of dirt or other substances and tested for obstructions.

6. Sealing of Conduits

The ends of conduits shall be sealed using ENERGEX approved methods to prevent the entry of foreign material.

7. Conduit Entry to Permanent Structures

Where conduits are entrant to any permanent construction such as a pit or a substation building, the conduit entry aperture is to be resealed. The exposed ends of all conduits shall be squarely cut and plugged.

8. CONDUITS THAT CROSS

Where conduits cross, 100 mm or greater diameter conduits shall always pass under 80 mm or less diameter conduits.

9. CONDUITS CROSSING UNDERGROUND SERVICES

Where practical, conduits shall pass underneath other underground services with a minimum clearance of 300 mm.

10. CONDUITS CROSSING FOOTPATHS

Where practical conduits shall cross footpaths at 90 degrees with exception for road crossings and where there are obstructions.

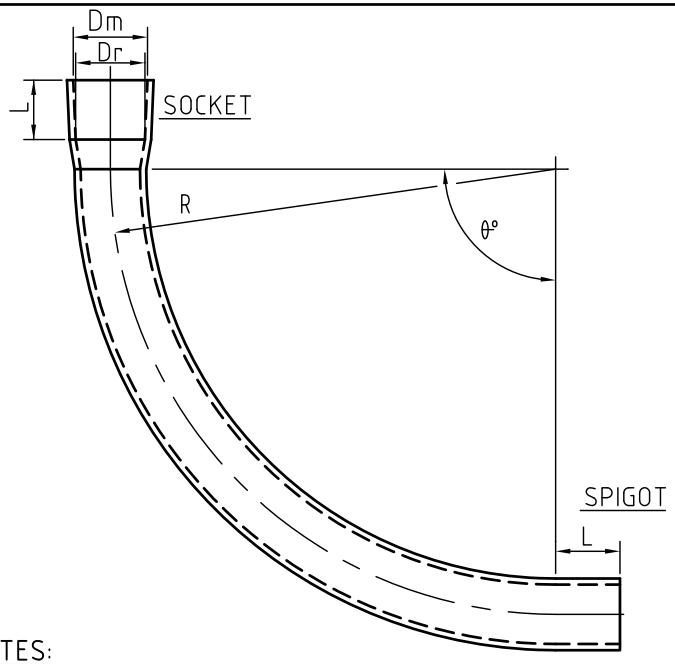
11. CONDUITS CROSSING ROADS

Where practical conduits shall be placed on a line between real property survey pegs or service pillars and road crossing markers ("E" markers) shall be placed in the kerbs on each side of the road.

FIBRE REINFORCED CEMENT OR CONCRETE CONDUITS

Where Fibre Reinforced Cement conduits are placed in layers, the collars in adjacent layers shall be staggered and 50 mm clearance shall be maintained between the conduit barrels. Any spacers used to establish the vertical spacing shall be removed during compaction of the bedding material.

A ORIGINAL ISSUE		energex	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL CIVIL WORKS CONDUITS GENERAL REQUIREMENTS	APP'D R. ENGLISH DATE 10/10/08 RECD CKD P.BARNEY DWN F.AMANPOOR	CAD 6229-A4 A SECTION C1 SUB-SECT. 1 SHT 2 OF 2 FILE UDC-C1-1-2A.DWG



NOTES:

1. Post formed bends may be made from conduit meeting the requirements of Australian Standard AS/NZS 2053 and ENERGEX Technical Specification TS 270 as applicable.
2. All dimensions are in millimetres,
3. Tolerance on angle of bends ± 2°.
4. Tolerance on radius of bends ± 5.
5. All dimensions are taken from figures 101 and 102 from AS/NZS 2053.2.
6. Outside diameter of shaped pipe not to be less than the minimum diameter for the spigot. Maximum diameter of shaped pipe not to exceed allowable minimum by more than 10 percent.
7. Additional single and double ended socketed bends not included in the adjacent chart (see Clause 1 of TS 270 for full list) shall comply with AS/NZS 2053.2 and the requirements of TS 270.

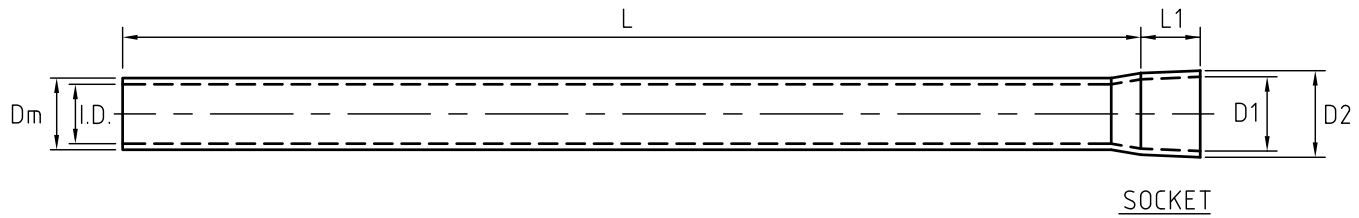
Stock Code	Nominal size	Class pipe or conduit	Angle Deg (0°)_	Radius R	Spigot		Socket Root Dia. Dr				Socket Mouth Dia. Dm				Spigot O.D.	
					Number	Effective length L Min.	Mean Dia		Including Ovality		Mean Dia		Including Ovality		Mean Dia	
							Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Bends to suit Orange Conduits																
06514	40	HD	90	300	0	32	39.4	39.7	39.2	39.9	40.1	40.4	39.9	40.6	39.7	40.0
17030	40	HD	90	600	0	32	39.4	39.7	39.2	39.9	40.1	40.4	39.9	40.6	39.7	40.0
06518	80	LD	30	1830	1	73	88.3	88.6	88.1	88.8	89.2	89.5	89.0	89.7	88.7	89.1
06519	80	LD	45	1830	1	73	88.3	88.6	88.1	88.8	89.2	89.5	89.0	89.7	88.7	89.1
16674	80	LD	45	1200	1	73	88.3	88.6	88.1	88.8	89.2	89.5	89.0	89.7	88.7	89.1
12475	80	LD	90	450	1	73	88.3	88.6	88.1	88.8	89.2	89.5	89.0	89.7	88.7	89.1
17513	80	LD	90	750	1	73	88.3	88.6	88.1	88.8	89.2	89.5	89.0	89.7	88.7	89.1
16621	100	LD	45	1200	1	99	113.5	113.8	113.3	114.0	114.8	115.1	114.6	115.3	114.1	114.5
06520	100	LD	15	1830	1	99	113.5	113.8	113.3	114.0	114.8	115.1	114.6	115.3	114.1	114.5
06521	100	LD	30	1830	1	99	113.5	113.8	113.3	114.0	114.8	115.1	114.6	115.3	114.1	114.5
06522	100	LD	45	1830	1	99	113.5	113.8	113.3	114.0	114.8	115.1	114.6	115.3	114.1	114.5
17514	100	LD	90	750	1	99	113.5	113.8	113.3	114.6	114.8	115.1	114.6	115.3	114.1	114.5
16620	125	LD	45	1200	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
15266	125	LD	30	1830	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
15265	125	LD	45	1830	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
16618	125	LD	15	1830	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
23778	125	HD	15	1830	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
23775	125	HD	30	1830	1	115	139.4	139.7	139.1	139.9	140.8	141.1	140.5	141.3	140.0	140.4
06523	150	LD	45	1830	1	124	159.4	159.7	159.1	160.0	160.8	161.1	160.5	161.4	160.0	160.5
Bends to suit White Conduits																
18072	50	LD	90	300	1	40	49.4	49.7	49.2	49.9	50.1	50.4	49.9	50.6	49.7	50.0
18073	50	LD	90	800	1	40	49.4	49.7	49.2	49.9	50.1	50.4	49.9	50.6	49.7	50.0
21477	100	MD	15	1830	1	99	113.5	113.8	113.3	114.6	114.8	115.1	114.6	115.3	114.1	114.5
21478	100	MD	30	1830	1	99	113.5	113.8	113.3	114.6	114.8	115.1	114.6	115.3	114.1	114.5
21479	100	MD	45	1830	1	99	113.5	113.8	113.3	114.6	114.8	115.1	114.6	115.3	114.1	114.5
21480	100	MD	90	750	1	99	113.5	113.8	113.3	114.6	114.8	115.1	114.6	115.3	114.1	114.5

A	ORIGINAL ISSUE				
D	DATE 20/8/15	APPD A.Smith de Perez	CKD -	DRN J.LANSLEY	125MM HD BENDS ADDED

UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
CONDUITS
CONDUIT SPECIFICATION AND BENDS

APP'D	R. ENGLISH	CAD	
DATE	10/10/08	6229-A4	D
RECD		SECTION C1	SUB-SECT. 2
CKD	P.BARNEY	SHT 1	OF 2
DWN	F.AMANPOOR	FILE UDC-C1-2-1D.DWG	



STOCK CODE	NOMINAL SIZE	CLASS	COLOUR	LENGTH (L) (m)	MEAN O.D. (Dm)	WALL THICKNESS	MEAN I.D.	MEAN SOCKET I.D. (D1)	MEAN SOCKET O.D. (D2)	SOCKET LENGTH (L1)	CONDUIT MARKED
18131	40	HD	ORANGE	4	40	3.1	33.8	40	46.2	32	ELECTRICITY SUPPLY CABLES
30083	50	LD	WHITE	4	50	2.8	44.4	50	55.6	40	COMMUNICATIONS CONDUIT
18129	80	LD	ORANGE	4.5	89	2.4	84.2	89	93.8	76	ELECTRICITY SUPPLY CABLES
30078	80	LD	ORANGE	6	89	2.4	84.2	89	93.8	76	ELECTRICITY SUPPLY CABLES
18128	100	LD	ORANGE	4.5	114	3.0	108	114	120	102	ELECTRICITY SUPPLY CABLES
30079	100	LD	ORANGE	6	114	3.0	108	114	120	102	ELECTRICITY SUPPLY CABLES
20641	100	MD	WHITE	6	114	4.5	105	114	123	99	COMMUNICATIONS CONDUIT
18127	125	LD	ORANGE	4.5	140	3.7	132.6	140	147.4	127	ELECTRICITY SUPPLY CABLES
19931	125	LD	ORANGE	6	140	3.7	132.6	140	147.4	127	ELECTRICITY SUPPLY CABLES
18126	150	LD	ORANGE	4.5	160	4.2	151.6	160	168.4	127	ELECTRICITY SUPPLY CABLES
22830	100	MD	WHITE (SPLIT)	3	114	4.5	105	114	123	40	COMMUNICATIONS CONDUIT
23339	125	HD	ORANGE	4	140	7.7	124.6	140	140.8	115	ELECTRICITY SUPPLY CABLES

Stock Code	Conduit PVC Plug
13165	40 mm
04915	80 mm
19596	100 mm
15790	125 mm

Stock Code	Reducer
20286	50-40 mm
11006	100-80 mm
16626	125-100 mm
06054	AC adaptor to 100mm PVC

NOTES:

1. Conduit to meet the requirements of Australian Standard AS/NZS 2053 and ENERGEX Technical Specification TS 270 as applicable.
2. All dimensions are in millimetres unless shown.

A	ORIGINAL ISSUE				
D	DATE 20/8/15	APPD A.SMITH DE PEREZ	CKD -	DRN J.LANSLEY	ADDED 125HD CONDUIT & AC ADAPTOR

UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
CONDUITS
CONDUIT SPECIFICATION AND BENDS

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CKD	D. TAYLOR	SHT 2	OF 2
DWN	A. SYMONDS	FILE UDC-C1-2-2D.DWG	

SPECIAL PURPOSE CONDUITS

1. **Electricity Communication Conduit**

1.1 Conduit

ENERGEX communication conduit shall be white, Medium Duty (MD), UPVC to AS/NZS 2053.1 and AS1345.

Conduit couplings shall comply with all the above requirements.

1.2 Tracer/Draw Rope

The electricity communications conduit when installed shall be fitted with a continuous metallic tracer/draw rope suitable for passing an electricity current through to accurately identify the conduit.

1.3 Installation

ENERGEX communication conduit installation:

- 100 mm conduit shall be located adjacent to the top Low Voltage conduits on the kerb side of the trench, between the LV conduits and any Public Lighting conduit.

A ORIGINAL ISSUE		energex	UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL	APP'D R. ENGLISH	CAD
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1. CONDUIT FOR INSTALLATION USING DIRECTIONAL BORING

1.1 Conduit

Conduits used in directional boring for the purpose of electric cable installation shall comply with the following:

- The conduit used shall comply with, or have superior performance to the requirements of rigid orange light-duty conduit to AS/NZS 2053 for compressive strength, electrical conductivity and mechanical rigidity.
- Except for short under crossings of driveways, where the standard UPVC conduits may be used, the minimum size of conduit shall be 118/140 OD Polypipe; PN10 for PE80 to AS/NZS 4130. Higher strength Polypipe may be required for deep long bores.
- All raw materials used for manufacture, shall comply with AS/NZS 4131.
- Coloured orange (entire external surface) or black with an orange stripe.
- Marked in accordance with AS/NZS 2053.

Fittings

Commercially available adaptor fittings shall be used for the transition of polyethylene pipe to PVC conduits and polyethylene conduit joints. Fittings used shall not produce a step or lip in the internal bore so there is a smooth internal transition from one conduit to the next.

1.2 Installation

Conduits installed in footways using directional boring techniques shall be installed at a depth of 10 times the overall outside diameter of the conduit to be installed and a minimum of 900 mm below ground level.

Conduits installed in roadways using directional boring techniques shall be installed at a depth of 12 times the overall outside diameter of the conduit to be installed.

Installation shall be in accordance with WCS61.1 - Underground Trenchless Technology. Polypipe shall be supplied in continuous lengths having no greater than 2 joints in any 100m length. All joints to be "butt fused" welded.

A	ORIGINAL ISSUE					
B	DATE 20/8/15	APPD A.SMITH DE PEREZ	CKD -	DRN J.LANSLEY	1. Installation notes updated.	

UNDERGROUND DISTRIBUTION CONSTRUCTION MANUAL

CIVIL WORKS
CONDUITS
CONDUITS USED IN DIRECTIONAL BORING

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