



Ergon Energy Corporation Limited

Technical Specification for Electricity Conduits and Associated Materials

ETS-14-05-01

Technical Specification for Electricity Conduits and Associated Materials

Contents

1. Purpose and Scope	4
2. References	4
2.1 Applicable Standards	4
3. Drawings	4
3.1 Drawings by the Purchaser	4
4. Service Conditions	4
5. Design and Construction	5
5.1 Classification.....	5
5.2 Dimensions and Form.....	5
5.3 Colour	6
5.4 Marking	7
6. Performance and Testing	7
6.1 Conduits and Fittings	7
6.2 Polymeric Cable Protection Covers	7
6.3 Underground Marking Tape	7
7. Risk Assessment	7
8. Quality Assurance	7
8.1 Purchasers Policy	7
8.2 Documentary Evidence.....	7
9. Samples	8
9.1 Production Samples.....	8
9.2 Sample Delivery	8
10. Packaging and Marking	8
10.1 Acceptable Packaging	8
10.2 Marking of Packages	8
11. Service Performance	8
12. Reliability	8
12.1 Service Life	8
12.2 Evidence in Support of Reliability.....	9



Technical Specification for Electricity Conduits and Associated Materials

13. Training	9
14. Environmental Considerations	9
15. Information to be Provided	9
15.1 Specific Technical Requirements.....	9
15.2 Checklist of Supporting Documentation	9
16. Attachment 1 – Technical Details (A)	10
17. Attachment 2 – Technical Details (B)	11
18. Attachment 3 – Technical Details (C)	12
19. Attachment 4 – Technical Details (D)	13
20. Attachment 5 – Technical Details (E)	14
21. Attachment 6 – Technical Details (F)	15
22. Attachment 7 – Technical Document Checklist	16
23. Drawings	17

Technical Specification for Electricity Conduits and Associated Materials

1. Purpose and Scope

This Specification sets out the requirements for the manufacture, testing and delivery of conduits, conduit fittings, polymeric cable-protection cover and polymeric marker tape for the installation and protection of cables in electrical underground sub-transmission and distribution systems.

2. References

2.1 Applicable Standards

All items offered shall be designed, manufactured and tested in accordance with the relevant parts of the following standards/draft standards and all amendments issued from time to time except where varied by this specification.

Standard	Title
AS 1345	Identification of the contents of pipes, conduits and ducts.
AS/NZS 2053	Conduits and fittings for electrical installations.
AS/NZS 2648	Underground marking tape
AS 2700	Colour standards for general purpose.
ISO 9002	Quality systems - Model for quality assurance in production, installation and servicing.
DR94102	Polymeric cable-protection cover.

3. Drawings

3.1 Drawings by the Purchaser

The following drawings are attached and form part of this specification:

Drawing No.	Drawing Title
QESI 04-05-01	Unplasticised PVC (UPVC) Conduit Bends.

4. Service Conditions

The conduits and fittings will be exposed to the following underground and above ground environmental conditions. Polymeric cable-protection covers and polymeric marker tape will be exposed to the following underground environmental conditions:

Underground

Ground Temperature Range (at 1 metre depth)	25oC summer day time 15oC winter night time
---	--

Above Ground

Air Temperature Range	45°C summer daytime -5°C winter night time
------------------------------	---

Technical Specification for Electricity Conduits and Associated Materials



Solar Radiation Level	1,000 Wm ⁻² with high ultraviolet content
Precipitation	Tropical summer storms with gust wind speeds exceeding 160 km/h and an annual rainfall in excess of 1500mm
Humidity	Extended periods of relative humidity in excess of 90%
Pollution	Areas of coastal salt spray and/or industrial pollution with equivalent salt deposit densities in the range 2.0 to 3.0 gm ⁻²

5. Design and Construction

5.1 Classification

The conduits and fittings shall be rigid non-threadable of insulating material in accordance with the requirements of AS/NZS 2053 Part 2 or Part 6.

The polymeric cable-protection covers shall be in accordance with DR 94102.

The marking tape shall be in accordance with AS/NZS 2648 Part 1.

5.2 Dimensions and Form

5.2.1 Conduits and Fittings

The dimensions of conduit and fittings shall be in accordance with the requirement of AS/NZS 2053 Part 2 or Part 6 and Table 1 below.

Table 1:

NOMINAL CONDUIT DIAMETER	MECHANICAL CLASSIFICATION
32	HD
40	HD
50	HD
80	LD
100	LD
125	LD
150	LD

5.2.1.1 Sockets

Each length of the rigid conduit shall have a socket permanently moulded to one end, which will comply with the requirements of AS/NZS 2053. The socket shall be an integral part of the pipe and suitable for jointing with solvent cement.

5.2.1.2 Short Length Coupling or Adaptor

Couplings or alternatively adaptors are required to join cut lengths of conduit and shall be a double-ended socket arrangement. The couplings shall be as short as possible with sockets which comply with Clause 5.2.1.1 above. The coupling or adaptors shall comply with the requirements of AS/NZS 2053 Part 2.

Technical Specification for Electricity Conduits and Associated Materials

- 5.2.1.3 End Caps
End caps are required to seal the conduit pipe from ingress of mud and soil. The caps shall be press fit onto the conduit and suitable for securing with solvent cement.
- 5.2.1.4 End Plugs
End plugs are required to seal the conduit pipe from ingress of mud and soil.
- 5.2.1.5 Bends
Bends are required to provide for change of direction in the conduit installation and shall comply with details on Drawing No. QESI 04-05-01.

5.2.2 Polymeric Cable-Protection Covers

The dimensions of polymeric cable-protection covers shall be in accordance with DR94102 and Table 3 below

Table 3:

POLYMERIC CABLE-PROTECTION COVERS	
NOMINAL WIDTH (mm)	NOMINAL LENGTH (m)
150	2.0 m slabs and 20 m rolls
300	

5.2.3 Marker Tape

The dimensions and manufacture of marker tape shall be in accordance with AS2648. The marker tape shall have a nominal width of 150 mm and a nominal roll length of 350 metres. Marking shall be 35 mm high letters and shall bear the following words in accordance with AS 2648 Part 1:

**'CAUTION CAUTION CAUTION
BURIED ELECTRIC CABLE BELOW '**

5.3 Colour

The background colour of items supplied under this specification shall be in accordance with Table 4:

Table: 4

BACKGROUND COLOUR	
ITEM	REQUIREMENT
Conduits and fittings	<ul style="list-style-type: none"> • number 557, Light Orange, as specified in AS 1345 (X 15 - AS 2700S), or • Grey, or • White, as specified by the Purchaser.

Technical Specification for Electricity Conduits and Associated Materials

Polymeric cable-protection covers	X15 orange or R11 international red (AS 2700S) with black lettering.
Polymeric marker tape	In accordance with the requirements of AS/NZS 2648.1

5.4 Marking

The permanent marking of all items shall meet the requirements specified in the appropriate Australian Standard.

The permanent marking on white conduits shall be red and in accordance with the requirements of AS 2053. This marking shall consist of the following text:

“**ELECTRICITY AUTHORITY COMMUNICATIONS**”, with a continuous red stripe (AS 2700S - R11 International Red) between the text. The stripe shall be the same height as the text.

6. Performance and Testing

6.1 Conduits and Fittings

The conduit and fittings shall be tested in accordance with the applicable parts of AS 2053.

6.2 Polymeric Cable Protection Covers

The polymeric cable-protection covers shall be tested in accordance with the applicable parts of DR94102.

6.3 Underground Marking Tape

The underground marking tape shall be tested in accordance with AS 2648 Part 1.

7. Risk Assessment

There is no requirement for manufacturer provided safety risk assessments for the items covered in this specification.

8. Quality Assurance

8.1 Purchasers Policy

The supplier's attention is drawn to the attached Annexure "Quality Assurance Requirements for Suppliers - Products" which forms an integral part of this specification.

8.2 Documentary Evidence

Documentary evidence shall be provided concerning the level of quality system certification associated with the supplier and/or manufacturer.

Technical Specification for Electricity Conduits and Associated Materials

9. Samples

9.1 Production Samples

When requested, production samples of each item shall be submitted to assist in the evaluation of the offer.

9.2 Sample Delivery

Each sample shall be delivered freight free, suitably crated and packaged and labelled with the following information:

Name of Supplier and this Contract No.
Contract Item Numbers
Any supporting data on features or characteristics

10. Packaging and Marking

10.1 Acceptable Packaging

All items shall be suitably packaged or bundled to prevent damage or deterioration during delivery.

10.2 Marking of Packages

The following information shall be legibly and indelibly marked on enclosed packaging:

- (a) The Purchaser's name.
- (b) Manufacturers name and sequential unit identification number.
- (c) Contact number and order release number (ORA).
- (d) Gross mass.
- (e) Handling or lifting instructions where applicable
- (f) Description of contents.

11. Service Performance

Suppliers shall state:

- (a) The period of service of manufacturing and supplying the items offered within Australian service conditions, and
- (b) Electricity supply authorities within Australia who have a service history of the items proposed for use by this specification.

12. Reliability

12.1 Service Life

Suppliers are required to comment on the reliability and performance of the items offered for a service life of 60 years under the specified system and environmental conditions.

Technical Specification for Electricity Conduits and Associated Materials

12.2 Evidence in Support of Reliability

Such comments shall include evidence in support of the reliability and performance claimed including information of failure mode and effect analysis.

13. Training

Training material in the form of drawings, instructions and/or audio visuals shall be provided for the items accepted under this offer.

This material shall include but is not limited to the following topics:

- Handling
- Storage
- Application (particularly in areas of heavy coastal pollution)
- Installation
- Maintenance
- Disposal

14. Environmental Considerations

Suppliers are required to comment on the environmental soundness of the design and the materials used in the manufacture of the items offered. In particular, comments should address such issues as recyclability and disposal at end of service life and leeching from materials used in the items offered.

15. Information to be Provided

15.1 Specific Technical Requirements

The specific technical requirements for the items offered shall be as stated in **Attachment 1** of this specification. The supplier shall provide all details requested by **Attachment 1** and shall guarantee such data.

The supplier shall provide comment and details requested by **Attachment 3** with the offer.

15.2 Checklist of Supporting Documentation

Attachment 4 details a checklist of supporting technical documentation which is required to be submitted with the offer.

Technical Specification for Electricity Conduits and Associated Materials

16. Attachment 1 – Technical Details (A)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
CONDUITS	
Name of Manufacturer:	
Manufacturers Catalogue Number.	
Place of Manufacture	
Nominal conduit diameter - internal diameter (mm) - external diameter (mm)	
Mechanical classification.	LD/HD
Type of construction	Solid Wall/ Sandwich/ Profile Wall
Are integral sockets permanently moulded in one end of each length?	Yes/No
Does this conduit comply with the requirements of AS 2053 Part 2?	Yes/No
Does this conduit comply with the requirements of AS 2053 Part 6?	Yes/No
Does the colour of the items offered meet the requirements of this specification?	Yes/No

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



17. Attachment 2 – Technical Details (B)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
POLYETHYLENE TUBING	
Name of Manufacturer	
Manufacturers Catalogue Number.	
Place of Manufacture	
Nominal conduit diameter - internal diameter (mm) - external diameter (mm)	
Mechanical classification.	LD/HD
Does this conduit comply with the requirements of AS 2053 Part 2?	Yes/No
Does the colour of the items offered meet the requirements of this specification?	Yes/No

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



18. Attachment 3 – Technical Details (C)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
CONDUIT BENDS	
Name of Manufacturer	
Manufacturers Catalogue Number.	
Place of Manufacture	
Do conduit bends comply with the requirements of AS 2053 Part 6?	Yes/No
Do conduit bends comply with the requirements of AS 2053 Part 2?	Yes/No
Are internal sockets permanently moulded into end as specified?	Yes/No
Nominal conduit diameter - internal diameter (mm) - external diameter (mm)	
Nominal Radius of conduit bend mm	
Nominal Radius Angle of conduit bend degrees	
Mechanical classification of bend or coupling.	LD/HD
Type of construction of bend or coupling.	Solid Wall/ Sandwich/ Profile Wall N/A
Does the colour of the items offered meet the requirements of this specification?	Yes-No-N/A

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



19. Attachment 4 – Technical Details (D)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
COUPLINGS/ADAPTORS AND FITTINGS	
Name of Manufacturer	
Manufacturers Catalogue Number.	
Place of Manufacture	
Do couplings/adaptors comply with the requirements this specification?	Yes-No-N/A
Do end caps comply with the requirements of this specification?	Yes-No-N/A
Do end plugs comply with the requirements of this specification?	Yes-No-N/A
Does the colour of the items offered meet the requirements of this specification?	Yes/No

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



20. Attachment 5 – Technical Details (E)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
POLYMERIC CABLE-PROTECTION COVERS	
Name of Manufacturer	
Manufacturers Catalogue Number.	
Place of Manufacture	
Nominal width and length of cover (mm) X
Nominal Thickness of cover material. (mm)	
Does this cover comply with the requirements of DR94102?	Yes/No
Nominal Height of lettering. (mm)	
Colour of lettering.	
Does the colour of the items offered meet the requirements of this specification?	Yes/No X15/R11

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



21. Attachment 6 – Technical Details (F)

The Supplier must complete this attachment and guarantee the particulars for each item offered.

ITEM NO.	
PARTICULARS	RESPONSE
MARKER TAPE	
Name of Manufacturer	
Manufacturers Catalogue Number.	
Place of Manufacture	
Nominal width and length of marker tape (mm) X
Does this marker tape comply with the requirements of this specification?	Yes/No
Does this marker tape comply with the requirements of AS 2648.1?	Yes/No
Does the colour of the items offered meet the requirements of this specification?	Yes/No

SIGNATURE OF TENDERER: _____

Technical Specification for Electricity Conduits and Associated Materials



22. Attachment 7 – Technical Document Checklist

CLAUSE REF.	PARTICULARS	UNITS
Have full and comprehensive details been submitted WITH the tender documents associated with each of the following items?		
6.1	Test certificates specified in AS 2053.	Yes/No
6.2	Test certificates specified in DR94102.	Yes/No
6.3	Test certificates specified in AS 2648, Part 1.	Yes/No
8.0	Quality systems of both the Supplier and the Manufacturer.	Yes/No
11.0	Service History.	Yes/No
12.0	Reliability.	Yes/No
13.0	Training Materials.	Yes/No
14.0	Environmental Soundness	Yes/No

List below any variations in the items offered to the requirements of this specification:

.....

NAME OF TENDERER:

ADDRESS OF TENDERER: _____

SIGNATURE: _____ FOR AND ON BEHALF OF TENDERER

DATE: _____

Technical Specification for Electricity Conduits and Associated Materials



23. Drawings

