Engineering Specification ES400T2

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Specification for Plastic Underground Marker Tape

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Appendix A: Drawing HQ.A1.52.09-261

Approved for issue by the Technical Policy Panel

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## Amendment Summary

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Prepared by: DPH

Authorised by:
SPECIFICATION FOR PLASTIC UNDERGROUND MARKER TAPE

1. SCOPE

This specification covers the supply of plastic marker tape for laying above buried electricity supply cables and specifies the materials, dimensions, physical and chemical properties, colour, lettering, layout and testing.

2. DEFINITIONS

Approval: Sanction by the Engineer that specified criteria have been satisfied.

Contract: The agreement between Electricity North West Limited and the Contractor for the execution of the Works including therein all documents to which reference may properly be made in order to ascertain the rights and obligations of the parties under the said agreement.

Contractor: The person or person's firm or company, including personal representatives, successors and permitted assigns, who's tender has been accepted by Electricity North West.

Engineer: Electricity North West Policy and Standards Manager or his successor or such person specifically nominated on his behalf.

Specification: The Specifications and schedules (if any) agreed by the parties for the purpose of the Contract.

Supplier: Any person or person's firm or company who supply goods to Electricity North West or Electricity North West contractor.

Tender: An offer in writing to execute work or supply goods at a fixed price.

Tenderer: The person or person's firm or company, including personal representatives, successors and permitted assigns, invited by Electricity North West to submit a tender.

Words: Words importing persons shall include firms and corporations; words importing the singular only, also include the plural, and vice versa where the context requires.

Work: All materials, labour and actions required to be provided or performed by the Contractor under the Contract.

Writing: Any manuscript, typewritten or printed statement under seal or hand as the case may be.

3. GENERAL REQUIREMENTS FOR APPROVALS AND TESTING

3.1 Product not to be changed

No change in the product, packaging or labelling shall be made after Approval has been granted without prior notice to the Engineer, and receipt of agreement from the Engineer, in writing to the proposed change.

3.2 Electricity North West Technical Approval

3.2.1 The tenderer shall submit, with this tender, proposals for testing which will demonstrate, to the satisfaction of the Engineer, compliance with this Specification. Such tests shall be carried out without expense to Electricity North West.
3.2.2 Alternatively, the tenderer may submit technical reports and other data that he considers will demonstrate, to the satisfaction of the Engineer, compliance with this specification. Acceptance of this evidence shall be at the discretion of the Engineer but will not be unreasonably withheld.

3.2.3 Approval shall be ‘site specific’ and is not transferable to another site without the written approval of the Engineer.

3.3 Quality Assurance

3.3.1 The Tenderer shall confirm whether or not approval is held in accordance with a Quality Assurance Scheme accredited under ISO 9000. If not, he shall submit a statement of the quality assurance procedures employed to control the quality of the product, including the performance of Suppliers and Sub-Contractors.

3.3.2 The right is reserved for the Engineer to require, from time to time, the repeat of such tests as he may deem to be reasonably necessary to demonstrate continued compliance with the Specification.

3.3.3 The tenderer shall submit, with his tender, a list of tests and inspections which are carried out on the product prior to despatch which shall demonstrate, to the satisfaction of the Engineer, fitness for installation and service.

3.3.4 The tenderer shall provide free of charge to Electricity North West such samples as may, in the opinion of the Engineer, be reasonably required for inspection and/or retention as quality control samples. The Engineer will confirm the requirement for samples at the time of tendering.

3.3.5 The right is reserved for the Engineer to make, from time to time, such inspections of the tenderer’s facilities as he may deem to be reasonably necessary to ensure compliance with this Specification and any Contract of which it forms a part.

3.3.6 The Tenderer shall submit, with his tender, such details of product packaging disposal, as will enable UU to comply with the requirements of BS EN ISO 14001: 1996 – Environmental Management Systems.

3.4 Formulation

The Tenderer shall submit, with his tender, such details of the formulation and use of the product and associated substances as will enable UU to comply with the obligations of the Health and Safety at Work Act 1974 and the Control of Substances Hazardous to Health Regulations 1988, in the use, storage and disposal of the product. The tenderer may stipulate, prior to submission of such information, that he requires it to remain confidential and the Engineer will, if requested, confirm his agreement to this prior to receipt of the information.

3.5 Identification Markings

3.5.1 The Tenderer shall submit, with his Tender, details of markings which it is proposed to apply to the product or packaging to identify manufacturing batches or items. The forms and content of such markings shall be subject to the Approval of the Engineer, and shall in all cases include the UU Commodity Code Number.
3.5.2 The Tenderer shall submit, with his Tender, such details of marking gross weight on components, assemblies and packages, as will enable UU to comply with the Health and Safety Manual Handling Operation Regulations 1992, for components, assemblies and packages supplied with a gross weight over 1kg. The forms and content of such markings shall be subject to the Approval of the Engineer.

3.6 Manufacturers Already Approved

Clauses 3.2.1, 3.2.2, 3.3.1, 3.3.3, 3.3.4, 3.4 and 3.5 will be waived in the case of products already approved.

3.7 Product Conformity

Preference will be given to those suppliers who can provide EAQA Product Conformity Certification to the specified standard, or an equivalent certification.

4. TECHNICAL PARTICULARS

4.1 Material

The material shall consist of polythene manufactured from virgin polymer having a density between 0.91 and 0.93g/ml at 20°C to which has been added only those materials needed to facilitate the manufacture of tape of good finish, strength, durability, colour and opacity.

4.2 Dimensions

4.2.1 Length

The minimum length of each roll of tape shall be 350 metres.

4.2.2 Width

The width shall be 150mm ± 4mm.

4.2.3 Thickness

The nominal thickness of the tape shall be 0.1mm. The minimum thickness shall be 0.09mm when measured accordance with 4.7.1.

4.3 Physical Characteristics

The tape shall have the following physical characteristics when tested in accordance with 4.8.1.

(i) Minimum ultimate tensile stress at break

- longitudinal 10 MN/m²
- transverse 10 MN/m²

(ii) Minimum elongation

- longitudinal 300 per cent
- transverse 350 per cent

4.4 Chemical Properties

The polythene tape and the colour, including the printing, shall be unaffected by soils having pH values between 2.5 and 11.
4.5 Colour

The background colour of the polythene tape shall be yellow within the range given by BS5252: 1976 Group E, Code 10E53 to 10E55 inclusive.

This colour shall be obtained by the use of suitable pigments but lead based pigments shall not be used.

The printing shall be black in accordance with BS5252: 1976 Group E, Code 00E53.

4.6 Written Word and Layout

The written word, layout and UU current logogram shall be in accordance with UU Drawing HQ.A1.52.09-261 (appendix A)

4.7 Routine Tests

Routine tests as detailed in 4.7.1 and 4.7.2 shall be carried out in every production batch of tape. Failure of either of these tests will require rejection of the whole of the production batch.

4.7.1 Measurement of Thickness

Ten samples free from printing, each 50mm x 25mm shall be taken from 1 length of tape, three samples being taken from each longitudinal edge of the tape and four samples from the centre of the tape. The ten samples shall be stacked and measurement of the overall thickness of the stack taken, using a dead weight micrometer having an anvil diameter not less than 6mm using a pressure of 10-20 kN/m². The thickness of the film shall be taken as 1/10th the thickness of the stack and this shall be not less than 0.09mm.

4.7.2 Adhesion of Printing

Tests for the adhesion of printing shall be carried out using 3M's 'Scotch' tape, No 850 PUA, silver.

The adhesive tape shall be 25mm in width. It shall be applied to the marker tape in sufficient lengths to cover at least one repeat of printing. One length of adhesive tape shall be applied to each line of printing.

The adhesive tape shall be applied evenly, and firmly smoothed over, to avoid wrinkles and air bubbles.

The adhesive tape shall then be removed at an even rate, taking approximately 10 seconds per length.

There shall be no more than 5 per cent of the area of the printing removed in any one test.

4.8 Type Test

Proof of successful tests from an accredited test agency is to be supplied on request to the Engineer. All type tests shall be carried out on samples taken from one roll of tape. Before the introduction of any changes in the materials used and/or the process of manufacture, written agreement shall be obtained from the Engineer who may request, if necessary, a repeat of the type test procedure.
4.8.1 Tensile Stress and Elongation Tests

Tensile stress and elongation tests shall be carried out as detailed in BS2782, Part 3, Method 301F, on specimens cut from the roll of tape. Four specimens shall be taken longitudinally and four transversely. The tensile stress and the elongation at break shall be the average result of four specimens in each mode and shall not be less than that specified in 4.3, 'Physical Characteristics'. For the purpose of calculating the tensile stress the thickness established by 4.7.1 shall be used.

4.8.2 Chemical Tests

4.8.2.1 Size of Samples of Marker Tape to be Tested

Samples of size 150mm x 50mm shall be cut along the marker tape such that each sample contains both background colouring and lettering. Sufficient samples shall be cut to allow one sample to be placed in each chemical solution. These samples will be used for assessment of background discoloration and durability of the lettering.

Sufficient specimens shall be cut, in accordance with 4.8.1, to allow four specimens taken longitudinally and four taken transversely to be placed in each chemical solution. These specimens will be used for assessment of the deterioration of the physical characteristics.

The remaining length of marker tape, including the length from which the samples have been taken shall be stored in a light-proof container.

4.8.2.2 Chemical Solutions

Into each of the chemical solutions listed below shall be placed:

one sample 150mm x 50mm
four specimens cut longitudinally in accordance with 4.8.2.1
four specimens cut transversely in accordance with 4.8.2.1

(i) Diesel oil (35 s, Redwood scale, gas oil)
(ii) Sulphuric acid pH 1
(iii) Hydrochloric acid pH 1
(iv) Ammonium hydroxide pH 11
(v) Sodium nitrate pH 11

4.8.2.3 Duration of the Test

The samples shall be immersed in the chemical solutions listed in 4.8.2.2 for:

(i) a period of 12 weeks, and stored in a light-proof enclosure at an ambient temperature of 20°C

or,

(ii) a period of 30 days, and stored in a light-proof enclosure at an ambient temperature of 50°C.
4.8.2.4 Examination of Samples

The samples shall be removed from each chemical solution and then washed and dried. The following properties shall be investigated:

(i) Background discoloration

The background colour of the 150mm x 50mm sample shall not have significantly discoloured during the test by comparison with the original tape from which the samples were taken. The resultant colour shall still remain within the range specified in 4.5, 'Colour'.

(ii) Durability of the lettering

The durability of the lettering on the 150mm x 50mm sample shall be assessed by abrasion of the lettering by rubbing between the index finger and the thumb. The durability of the lettering on the 150mm x 50mm sample shall be compared with that of the lettering on the original plastic marker tape from which the sample was taken. No significant change in the durability of the lettering shall be observed.

(iii) Deterioration of physical characteristics

The ultimate tensile stress and elongation of the eight specimens cut longitudinally and transversely shall be tested in accordance with 4.8.1. The results obtained shall be not less than 80 per cent of the results obtained for specimens cut out from the roll of marker tape prior to the chemical tests.

4.9 Packaging

4.9.1 Roll Former

The tape shall be wound on a suitable former of adequate strength to allow handling and unrolling, and shall have an internal diameter of between 50mm and 100mm. The total weight of one roll of tape shall not exceed 6kg.

4.9.2 Carton

The method of packing and the number of rolls per carton shall be agreed between the Engineer and the Tenderer.

5. DOCUMENTS REFERENCED

5.1 BS2782 Methods of testing plastics.

5.2 BS5252 Framework for colour co-ordination for building purposes.

6. KEYWORDS

Underground; cable