

**Ministry of Defence  
Defence Procurement Agency, ADRP2  
Abbey Wood  
Bristol  
BS34 8JH**

## **OBSOLESCENCE NOTICE**

All DTD specifications were declared obsolescent from 1<sup>st</sup> April 1999. All DTD 900 series approvals also lapsed at that time. The standards will no longer be updated but will be retained as obsolescent documents to provide for the servicing of existing equipment.

### **Further Guidance**

The aim in declaring the specifications obsolescent is to recognise that the documents are not being updated and thus should be used with care by both purchaser and supplier. For example, a specification could contain valid technical information but may also contain type approval clauses that contradict procurement policy and/or use materials that do not comply with environmental legislation. The obsolescent specification can still be used as a basis for a purchase provided that the supplier and purchaser agree suitable changes to the specification within the purchase order/contract.

For the DTD 900 system, each specification has provided an MoD approved material and process. For these items, the declaration of obsolescence will constitute the termination of both the extant MoD approval and the continuing MoD assessment that had underpinned those approvals. Again, the technical content of the document remains valid and can be used by both purchaser and supplier as a basis for a contract but an acceptable (to the parties) approval/assessment procedure would be required.

**Aerospace Material Specification**  
**BANNER TARGET AND TARGET TOWING CABLE MATERIALS**

---

*NOTE 1. This specification is one of a series issued by the Procurement Executive, Ministry of Defence, either to meet a limited requirement not covered by any existing British Standard, or to serve as a basis for inspection of material, the properties and uses of which are not sufficiently established to warrant submission to the British Standards Institution for standardisation.*

*NOTE 2. Standard knitting nomenclature is used throughout this specification. Definitions may be found in "Textile Terms and Definitions" (Textile Institute).*

*NOTE 3. The requirements of this specification are intended to ensure the reproducibility of the material. They should not be considered as guaranteeing suitability for any particular application.*

*NOTE 4. This Specification calls for the use of substances and/or test procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and in no way absolves either the supplier or the user from statutory obligations related to health and safety at any stage of manufacture or use.*

*This Specification has been devised for the use of the Ministry of Defence and its contractors in the execution of contracts for the Ministry and, subject to the Unfair Contract Terms Act 1977, the Ministry will not be liable in any way whatever (including but without limitation negligence on the part of the Ministry, its servants or agents) where the Specification is used for other purposes.*

---

**SECTION 1**

**Scope**

- 1** Part 1 of this specification stipulates the requirements for the fabric for the manufacture of towed banner targets, and Part 2 the requirements for the cord for the target towing cable.

**SECTION 2**

**Related Documents**

Reference is made in this specification to the following:

BS F100	Procedure for inspection and testing of textiles.
DTD 5620	Braided nylon cord.
BS F120	Nylon sewing thread.
Textile Institute	Textile Terms and Definitions.

Reference in this specification to any related document means, in any order or contract, the edition current at the date of such tender or contract unless a specific issue is indicated. The Quality Assurance Authority will supply, on request, information concerning any changes that may be necessary due to cancellation, replacement, supersession or amendment of any related document.

**PART 1 BANNER TARGET MATERIAL**

**SECTION 3**

**Requirements**

**3.1 General requirement**

In addition to all the specific requirements listed in this specification including the frequency of test stipulated in Section 6, the relevant portions of Sections 1 and 2 of BS F100 shall apply.

**3.2 Fabric**

The material shall be warp knitted fabric made from nylon 66 yarns, and shall be finished with a polyvinyl chloride composition.

**3.3 Yarn**

The yarn shall be high tenacity continuous filament bright nylon 66 yarn of spinners twist with normal spin finish. The yarn shall have a nominal tenacity of 71 cN/ tex and shall be either (a) 700 dtex, 100 filaments or (b) 235 dtex, 34 filaments with 3 ends being used in each working guide.

The yarn used shall be of an approved type, and applications for approval shall be addressed to Head of Materials Department, Royal Aircraft Establishment, Farnborough, Hants, GU14 6TD.

NOTE: ICI Fibres Type 112 nylon yarn has been found suitable.

### 3.4 Knitting

The machine used shall be a latch or compound needle warp knitting machine of the raschel type having one looping bar, two inlaying bars and one selvedge bar.

The use of a machine containing 9 or 10 needles per English inch has been found satisfactory.

### 3.5 Selvedges

Selvedges shall be straight, even, and well made. They shall not be substantially thicker than the body of the fabric. Selvedges employing two ends of 700 dtex in each working guide are acceptable.

The selvedges in the finished fabric shall be uniform in appearance and of a uniform width which shall not be less than 14mm.

### 3.6 Finishing

The fabric shall be wet treated to remove the spin finish and shall be heat set.

The heat set fabric shall be finished with a polyvinyl chloride composition. The process shall be of an approved type and applications for approval shall be addressed to Head of Materials Department, Royal Aircraft Establishment, Farnborough, Hants, GU14 6TD.

A currently acceptable finishing process gives an add-on of 10%, and is based on the application of a formulation consisting of one part by weight of a modified polyvinyl chloride and two parts of plasticised polyvinyl chloride copolymer in water. Details of this process are given in Appendix 2.

## SECTION 4

### Fabric Construction and Properties

#### 4.1 Fabric construction

The fabric shall be a mesh construction as in Figures 1 and 2.

NOTE: The following quantities of yarn used on each of the four bars have been found suitable:

Bar 1 (Loops)	3200 mm per rack on 355 working guides.
Bar 2 (Inlay)	2200 mm per rack on 346 working guides.
Bar 3 (Selvedges)	5400 mm per rack on 4 working guides.
Bar 4 (Inlay)	1680 mm per rack on 347 working guides.

#### 4.2 Knitting direction

The fabric as delivered by the manufacturer shall be rolled full width on a cardboard tube in such a manner that the end knitted last is on the outside of the roll. A label endorsed with the words 'End knitted last' shall be secured on a selvedge at a position between 1 and 2 metres from the last knitted end of the fabric.

Markings shall be retained throughout finishing and subsequent cutting to show the direction of knitting. Thus, if the fabric is cut, the requisite label must be attached to the appropriate cut end of each piece of fabric.

#### 4.3 Properties

The properties of the finished fabric shall comply with the requirements of Table 1.

TABLE 1

Test	Requirement	Method
Overall width (cm)	186 ± 3	
Mass/unit area (g/sq m)	190 ± 20	BSF 100
Rectangles per metre		
Lengthwise	160 ± 15	
Widthwise	190 ± 20	
Breaking strength		Appendix 1
min N/10 meshes		
Lengthwise	700	
Widthwise	1000	

## SECTION 5

### Defects, Methods of Marking, and Acceptances Limits

#### 5.1 Defects

Manufacturing defects in the fabric are classified as either major or minor. Minor defects as defined in this section, unless very frequent, are considered as having no detrimental effect on the performance of the fabric, and do not justify special attention.

Minor defects:

- a. Filamentation of the yarns.
- b. One trailing end of inlay, provided such an end is securely contained within the fabric structure and does not extend more than 2 metres.
- c. Local reduction in width caused by fabric off-pins during finishing, provided such reduction does not exceed 3 cm and does not extend for more than 15 cm in the lengthwise direction. There shall be not more than 10 such defects per 100 m of finished fabric.
- d. One broken end in the selvedge.

Major defects:

- a. One broken chain stitch in the body of the fabric.
- b. Two or more broken threads in the selvedge.
- c. Reduction in fabric width caused by fabric off-pins during finishing, such reduction exceeding 3 cm or extending more than 15 cm in the lengthwise direction.
- d. Skewed and bowed inlay - deviation of the inlay from a line drawn perpendicular to the selvedge in excess of 50 mm in 1 metre of width.
- e. Covered rectangular (windowing) to the extent of more than 1% in any metre length of the finished fabric.

#### 5.2 Marking of defects

- 5.2.1 No marking is required in respect of minor defects.
- 5.2.2 Major defects shall be marked by means of a suitable tag, preferably of a contrasting colour, securely inserted in the fabric selvedges opposite to and enclosing the extent of the defect.

#### 5.3 Repair of defects

- 5.3.1 Certain major defects, eg broken chain stitches, may be repaired by patching. Patching schemes shall be submitted to and agreed by the Design Authority.
- 5.3.2 A major defect, (eg a broken chain stitch) extending for more than 30 cm shall not be repaired.
- 5.3.3 Defects in the selvedges shall not be repaired.

#### 5.4 Acceptance limits

- 5.4.1 Fabric shall not be acceptable containing more than four major defects per 100 metre nominal length.
- 5.4.2 Major defects extending for more than 2 metres shall be removed by cutting out the defective area across the full fabric width. The cut ends shall not be joined, the distance between any two cuts shall be not less than 11 metres, and there shall be not more than 2 cuts per 100 metre nominal length.
- 5.4.3 A consignment shall be acceptable only if the total quantity affected by markable defects does not exceed 5%.

## SECTION 6

### Frequency of test

One sample shall be selected for test to the requirements of this specification (a) each time a warp beam is renewed, (b) at intervals of 1000 metres of (c) per finishing batch, whichever is the less.

## PART 2 TOWING CABLE MATERIAL

### SECTION 7

#### Requirements

#### 7.1 General requirement

In addition to the specific requirements listed in Part 2 for the towing cable, the relevant portions of Sections 1 and 2 of BS F1000 shall also apply.

**7.2 Cord**

The cable shall be braided cord designation SC 714 in accordance with DTD 5620.

**7.3 Finishing**

The cord shall be wet treated to remove the spin finish and shall be finished by a process similar to that used for the fabric.

**SECTION 8****Properties of the Finished Cord****8.1 Breaking strength**

The breaking strength of the cord after finishing shall continue to conform to the requirements stipulated in DTD 5620 for cord SC 714.

**8.2 Mass**

The increase in mass due to finishing shall be  $8 \pm 2\%$ .

**SECTION 9****Frequency of Test**

Samples shall be selected for testing at a rate of not less than one per finishing batch.

**APPENDIX 1****Method for Determining the Breaking Strength of the Fabric**

The breaking strength of the fabric shall be determined by the method of BS F100 except that the test specimens shall be cut with a fringe all around as shown in Figure 3.

The specimens shall contain ten complete squares widthwise.

The grips of the testing machine should contain soft packing material to assist in gripping the test specimen without causing damage.

**APPENDIX 2****Finishing Process**

A currently acceptable finishing process comprises the following steps:

- i The fabric is run through water, stenter dried and heat set at  $180^{\circ}\text{C}$  ( $+5^{\circ}$ ,  $-0^{\circ}$ ).
- ii The fabric is impregnated with a liquid containing 3 kg of Breon latex 351 (BP Chemicals Ltd), 6 kg of Breon latex 576 (BP Chemicals Ltd) and 12 litres of water.
- iii The impregnated fabric is passed through a mangle, stenter dried and cured at  $160^{\circ}\text{C}$  ( $+5^{\circ}$ ,  $-0^{\circ}$ ).
- iv The impregnating liquor has a dry solids content of 24%, and with the nip expression of the particular mangle used gives a final solids pick up of 10%.

Approved for issue:

D K Thomas

Head of Materials Department  
Royal Aircraft Establishment  
Farnborough, Hampshire

**Fig.1 MESH CONSTRUCTION**

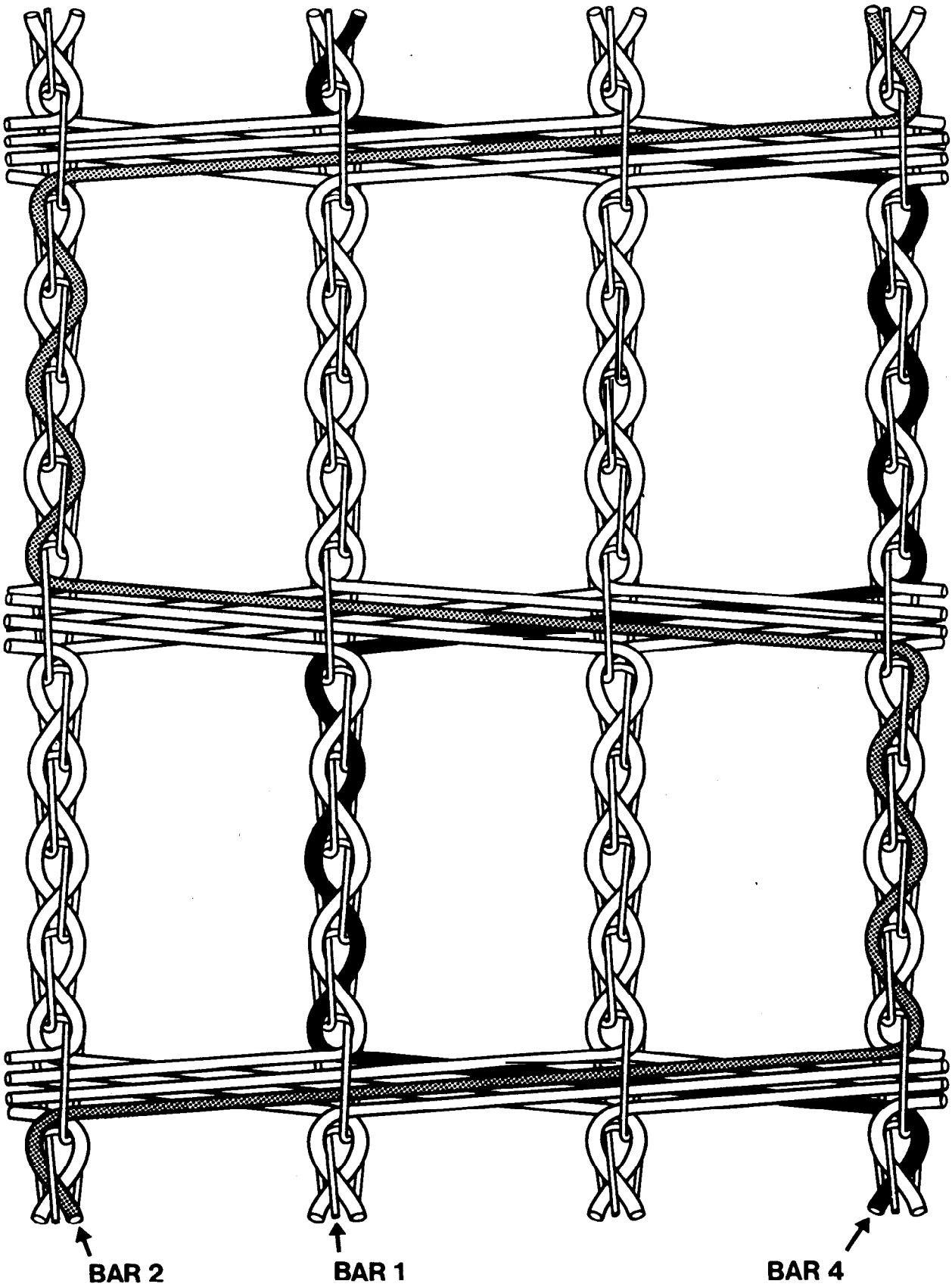
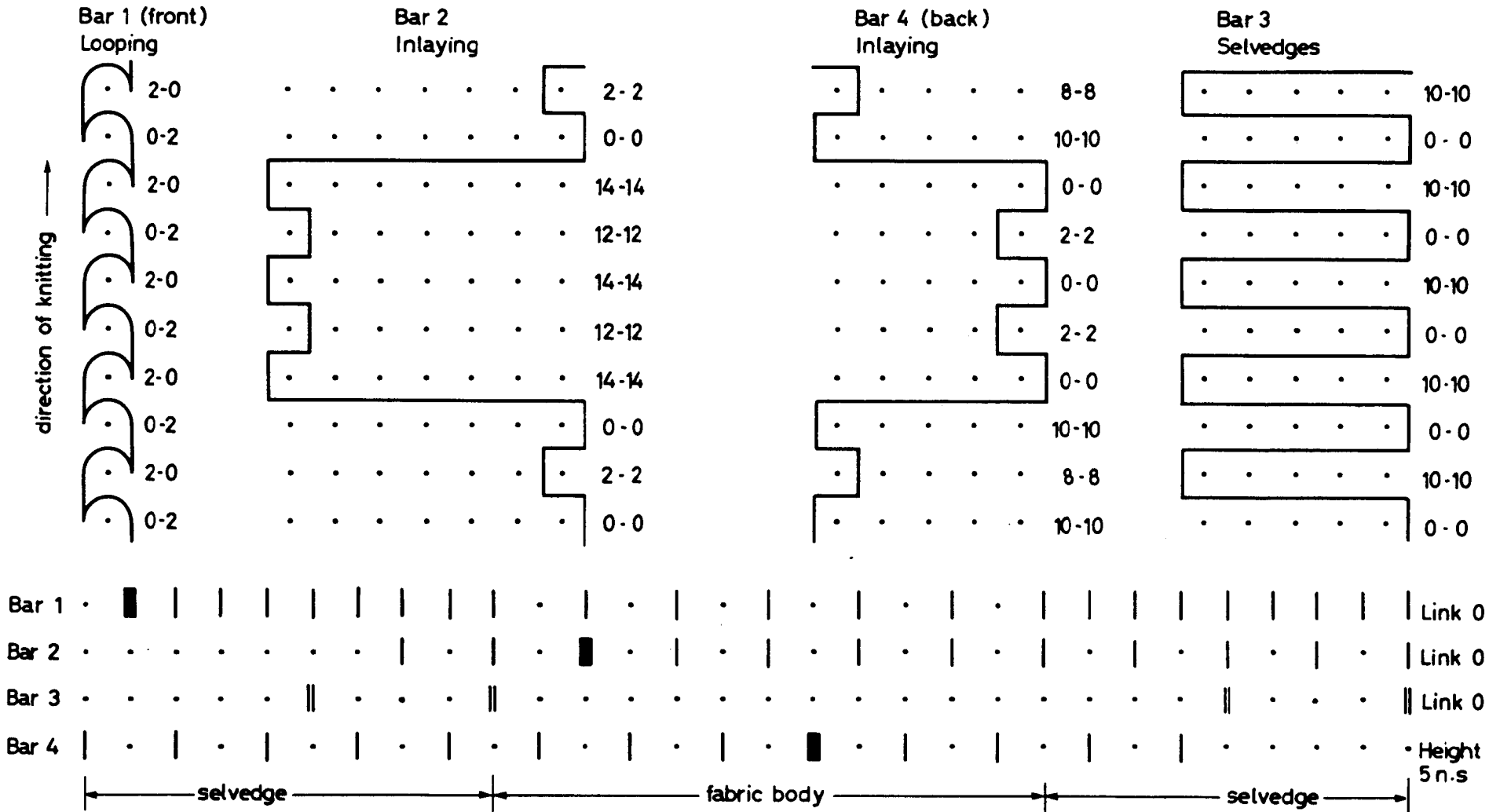


Fig.2 Knitted structure for machine setting



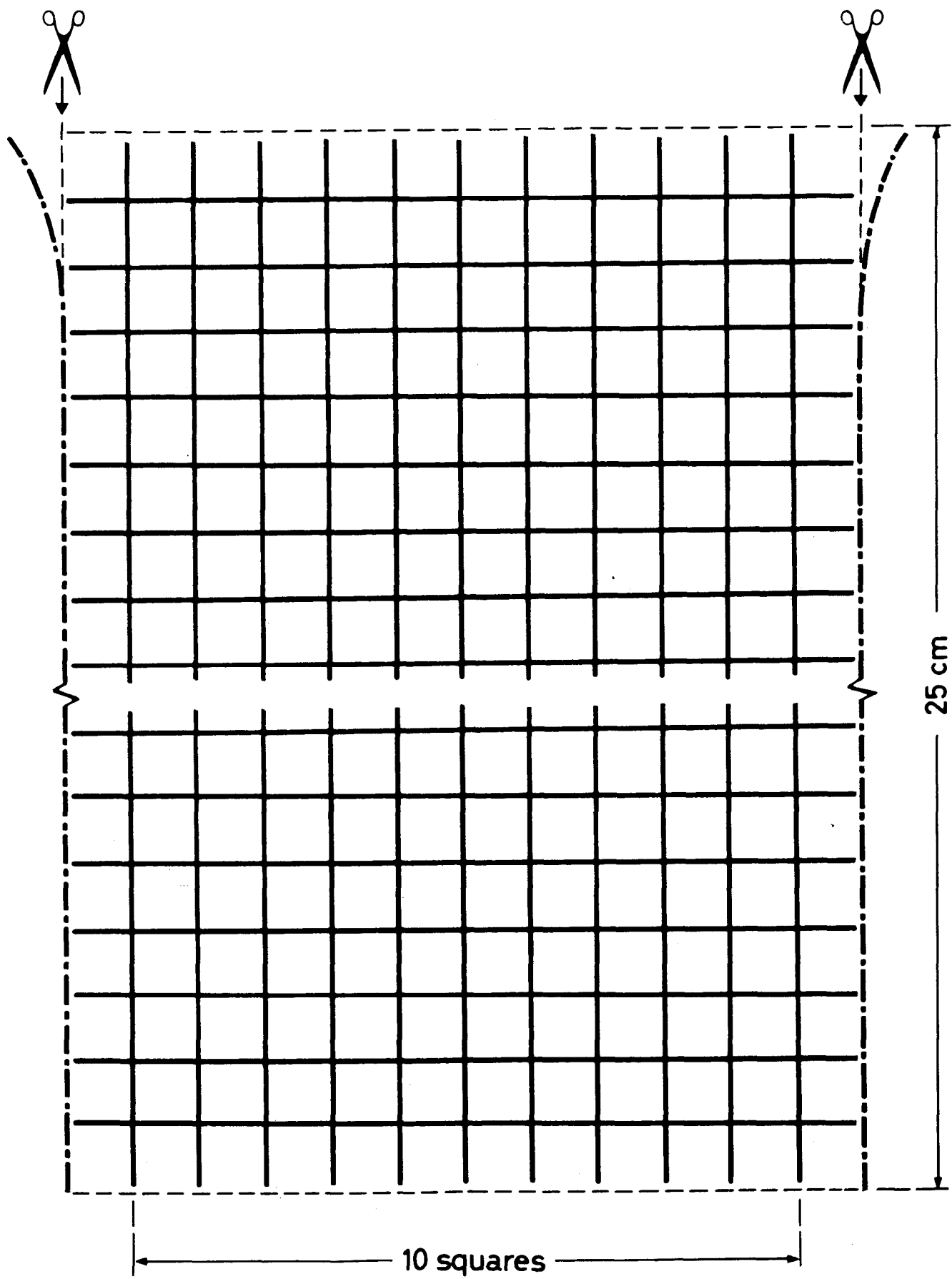


Fig. 3 Tensile test sample



© Crown copyright 1982

First published 1982

HER MAJESTY'S STATIONERY OFFICE

*Government Bookshops*

49 High Holborn, London WC1V 6HB  
13a Castle Street, Edinburgh EH2 3AR  
41 The Hayes, Cardiff CF1 1JW  
Brazenose Street, Manchester M60 8AS  
Southey House, Wine Street, Bristol BS1 2BQ  
259 Broad Street Birmingham B1 2HE  
80 Chichester Street, Belfast BT1 4JY

*Government Publications are also available  
through booksellers*

£1.20 net

ISBN 0 11 771680 4