
**Textiles — Socks — Part 1: Men's and
women's socks — Specification**

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Made-up-Textiles & Ready-Made Garments (TC 72) and published by the Ethiopian Standards Agency (ESA).

In preparing this Ethiopian Standard reference has been made to the ARS 658-1:2019 *Textiles — Socks — Part 1: Men's and women's socks — Specification*, prepared by East African community (EAC)

Acknowledgement is made to the ARS (African Regional Standards) for the use of the said publication in preparing the standard.

Textiles - Socks Part 1: Men's and women's socks — Specification

1 Scope

This Ethiopian Standard specifies requirements for fourteen types of men's quarter, half and three-quarter hose and four types of women's ankle and three-quarter hose.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ES 6579 *Textiles and textile merchandise — Terms and definitions*

ASTM D629, *Standard Test Methods for Quantitative Analysis of Textiles*

ASTM D8007, *Standard Test Method for Wale and Course Count of Weft Knitted Fabrics*

ES ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ES ISO 105-C10, *Textiles — Tests for colour fastness — Part C10: Colour fastness to washing with soap or soap and soda*

ES ISO 105-E04, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*

ES ISO 105-X12, *Textiles -- Tests for colour fastness -- Part X12: Colour fastness to rubbing*

ES ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

ES ISO 1833 (relevant part), *Textiles — Binary fibre mixtures — Quantitative chemical analysis*

ES ISO 3998, *Textiles — Determination of resistance to certain insect pests*

ES ISO 6330, *Textiles — Domestic washing and drying procedures for textile testing*

ES ISO 7211-5, *Textiles — Woven fabrics — Construction — Methods of analysis — Part 5: Determination of linear density of yarn removed from fabric*

ES ISO 8559-2, *Size designation of clothes — Part 2: Primary and secondary dimension indicators*

ES ISO 22198, *Textiles — Fabrics — Determination of width and length*

3 Terms and definitions

For the purposes of this standard, the definitions given in ES 6579 and the following definitions apply.

3.1

leg length

the length of a sock measured on the leg, from the floor to the top of the sock

3.2

foot length

the length of the foot measured from the tip of the toe to the back edge of the heel

3.3

automatic toe closure

an acceptable and approved method, other than linking, of effecting closure of the toe and instep pieces of the hose

3.4

linking

a method of joining the toe and instep pieces of the hose by a chain stitch (single or double) that passes through adjacent loops of the same knitted course

3.5

nominal

subject to the tolerances normal to good manufacturing practice

3.6

socks

a sock is an item of clothing worn on the feet and often covering the ankle or some part of the calf

4 Requirements

4.1 Yarn requirements

4.1.1 Quality

The fibres used in the yarns shall be pure, free from foreign matter.

4.1.2 Composition

The socks shall be produced from natural fibres, synthetic fibres or the blend of the two. The composition shall be agreed upon by the producer and the customer.

4.1.3 Elastic splicing yarns

When examined in accordance with 5.4, an elastic splicing yarn shall have an elastomeric or rubber core and a cover of nylon thread.

4.2 Hose requirements

4.2.1 General

Hose shall

- a) have been made from clean and uniformly prepared yarns,
- b) be free from defects that impair their appearance or can impair their serviceability (or both),
- c) be of uniform and acceptable construction, colour and finish, and
- e) be so paired that any difference between the length of the feet does not exceed 5 mm, and any difference in the length of the legs (including the ribbed tops) does not exceed 10 mm.

4.2.2 Type

The hose shall be of one of the types (see Annex A) given in the relevant columns of Table 1 or Table 2, as required.

4.2.3 Size

The size and size marking (see 6.2.1 and annex A) shall be the length, in centimetres, of the foot of the intended wearer. The size shall be 22, 24, 26, 28, 30 or 32 in the case of men's hose, and 22 or 24 (or 26 in the case of type WA1) in the case of women's hose, as required.

4.2.4 Colour

The colour (see Annex A) of the hose shall be an acceptable match to the colour required.

4.2.5 Constructional requirements

The hose shall comply with the relevant requirements of Table 1 or Table 2, as appropriate.

4.2.6 Elastic splicing

Elastic splicing shall be incorporated in the ribbed top of all hose, and shall be positioned as follows:

- a) in the case of all three-quarter hose, and women's hose of type WA1: at the bottom end of the ribbed top; and
- b) in all other cases: at the top end of the ribbed top.

4.2.7 Toe closure

The toe shall be closed (see Annex A) by linking or by automatic toe closure, as required.

In the case of

- a) closure by linking, the ends of the linking yarns shall extend not less than 12 mm and not more than 25 mm beyond the ends of the toe linking, and
- b) automatic toe closure, the seam shall be such as to be acceptable.

NOTE An acceptable seam is sufficiently extensible to prevent cracking and undue shrinkage, and flat enough to prevent discomfort.

Table 1 — Recommended constructional requirements for men's quarter, half and three-quarter hose

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Parameter	Quarter				Half					Three-quarter					Test method
	MQ1	MQ2	MQ3	MQ4	MH1	MH2	MH3	MH5	MH6	MT1	MT2	MT3	MT5	MT6	subclause
Top	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	1x1 rib	
Leg and instep	5x1 rib	plain	5x2 rib	5x2 rib	5x1 rib	plain	5x2 rib	5x2 rib	5x2 rib	5x1 rib	plain	5x1 rib	5x2 rib	5x2 rib	
Heel, toe and sole	plush	plain	plain	plain	plush	plush	plain	plain	plain	plush	plush	plain	plain	plush	
High heel	plush	plain	plain	plain	plush	plush	plain	plain	plain	plush	plush	plain	plain	plush	
Depth of elastic splicing, mm, min	30	30	30	50	30	30	30	30	30	30	30	30	30	30	5.10
Position of splicing	—	—	heel, toe high heel	heel, toe high heel	—	—	heel, toe high heel	heel, toe high heel	heel, toe high heel	heel, toe high heel	—	—	heel, toe high heel	heel, toe high heel	5.11
Extent of splicing above bottom of heel, mm, min.	—	—	80	80	—	—	80	80	80	—	—	80	80	—	5.12
Extent of plush above bottom of heel, mm, min.	80	—	—	—	80	80	—	—	—	80	80	—	—	80	5.12

Table 1 — Recommended constructional requirements for men's quarter, half and three-quarter hose (conc.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Parameter	Quarter				Half					Three-quarter					Test method subclause
	MQ1	MQ2	MQ3	MQ4	MH1	MH2	MH3	MH5	MH6	MT1	MT2	MT3	MT5	MT6	
Dimensions, cm															5.13
a) length (nominal) of top	6	60	60	50	130	130	130	130	130	180	180	180	180	180	
b) length of leg (including top) ⁴⁾															
size 220	24	240	240	240	380	380	380	380	380	580	580	580	580	580	
240	24	240	240	240	380	380	380	380	380	580	580	580	580	580	
260	26	260	260	260	400	400	400	400	400	600	600	600	600	600	
280	28	280	280	280	420	420	420	420	420	620	620	620	620	620	
300	300	300	300	300	440	440	440	440	440	640	640	640	640	640	
320	320	320	320	320	440	440	440	440	440	640	640	640	640	640	
c) length of foot ⁵⁾ to fit															5.13
Size 220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	
240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	
260	260	260	260	260	260	260	260	260	260	260	260	260	260	260	
280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	
320	320	320	320	320	320	320	320	320	320	320	320	320	320	320	
Stretched width, mmm min.															5.14
Top															
Elastic splicing															
Mid-leg (between top and heel)															
Nominal mass per 10 pairs, g															5.15
size 220	535	430	380	430	735	855	550	590	520	1 000	1 130	1 350	780	720	
240	565	450	400	470	775	900	580	620	550	1 050	1 190	1 420	820	760	
260	620	485	420	510	825	960	615	650	580	1 090	1 260	1 490	885	855	
280	680	520	440	550	880	1 030	650	690	610	1 130	1 330	1 560	955	955	
300	740	555	460	590	925	1 100	680	720	640	1 180	1 400	1 650	1 030	1 030	
320	780	575	480	630	970	1 180	710	750	670	1 220	1 470	1 740	1 110	1 110	
1) Subject, except in the case of type MH3 and type MT3, to a tolerance, on each component, of ± 5 %. 2) Plied together with a nominal twist of 70 turns per metre. 3) Also used as plating yarn in hose. 4) Subject to a tolerance of ± 10 mm. 5) Subject to a tolerance of ± 5 mm.															

Table 2 — Constructional requirements for women's anklet and three-quarter hose

	Anklet		Three-quarter		Test method
	WA1	WA2	WT1	WT2	
Overall composition ¹⁾					5.5
Wool, %	55	40	55	40	
Nylon, %	45	60	45	60	
Yarn linear density					5.6
a) Ground:					
bulkied cont.-filament nylon, dtex	78 × 2	2 ends	78 × 2	2 ends	
		110 × 2		110 × 2	
b) Plating:					
wool/nylon, tex	34	—	34	—	
c) Splicing:					
wool/nylon, tex	34	—	34	—	
d) Pile:					
wool/nylon, tex	—	40 ²⁾	—	40 ²⁾	
Number of courses per cm	11.0-11.5	8.0-8.5	11.0-11.5	8.0-8.5	5.7
Pile-to-ground length ratio	—	1.8:1.0	—	1.8:1.0	5.8
Design					5.9
Top	1 × 1 rib	1 × 1 rib	1 × 1 rib	1 × 1 rib	
Leg and instep	5 × 2 rib	5 × 1 rib	5 × 2 rib	5 × 1 rib	
Heel, toe and sole	plain	plush	plain	plush	
High heel	Not applicable	plush	Not applicable	plush	
Depth of elastic splicing, mm, min.	30	30	30	30	5.10
Position of splicing	Heel, toe, sole	—	Heel, toe, sole	—	5.11
Extent of plush above bottom of heel, mm, min					5.12
	—	60	—	60	
Dimensions, cm					5.13
a) Length (nominal) of top	110	60	130	130	
b) Length of leg (including top) ³⁾					
size 220.....	220	220	460	460	
240.....	240	240	480	480	
260.....	260	—	—	—	
c) Length of foot ⁴⁾ to fit					
size 220.....	220	220	220	220	
240.....	240	240	240	240	
260.....	260	—	—	—	
Stretched width, cm, min.					5.14
Top	200	200	200	200	
Elastic splicing	—	—	200	200	
Mid-leg (between top and heel)	—	—	200	200	
Nominal mass per 10 pairs, g					5.15
size 220.....	335	495	530	795	
240.....	370	515	560	830	
260.....	400	—	—	—	

1) Subject to a tolerance, on each component, of ± 5 %.

2) Also used as plating yarn in hose.

3) Subject to a tolerance of ± 10 mm.

4) Subject to a tolerance of ± 5 mm.

4.2.8 Performance requirements

The hose shall comply with the performance requirements given in Table 3.

Table 3 — Performance requirements

1	2	3
Parameter	Requirement	Test method
Dimensional change on laundering, %, max.		5.16
Leg	8	
Foot	5	
Colourfastness to:		
a) light, rating, min.	5	5.17
b) perspiration, rating, min.		5.18
change in colour	4	
staining of transfer cloths	4	
c) washing, rating, min.		5.19
change in colour	4	
staining of transfer cloths	4	
d) rubbing	4	5.22
rubbing		

4.2.9 Moth resistance

When tested in accordance with 5.21, 95% - 98 % of mothproofing agent should remain on the textile. (ES ISO 3998 Textiles -- Determination of resistance to certain insect pests)

4.2.10 Foreign matter content

The non-fibrous material content, determined in accordance with 5.20, shall not exceed 2 % (by mass).

5 Inspection and methods of test

5.1 Inspection

After inspecting the sample for compliance with the requirements of Clause 6, inspect all the hose in the sample for compliance with the requirements given in 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5 (design only) and 4.2.7.

5.2 Conditioning

Condition all the hose in the test sample in accordance with ES ISO 139.

5.3 Sequence of testing

After conditioning, subject all the hose in the test sample to the tests given in 5.7 and 5.10 to 5.15 (inclusive), and then divide them into five sets, each set consisting of an equal number of pairs. Use a different set for each of the following groups of tests:

- Group 1: 5.4, 5.5, 5.6, 5.8 and 5.9;
- Group 2: 5.16;
- Group 3: 5.17, 5.18 and 5.19;
- Group 4: 5.21; and

– Group 5: 5.20.

5.4 Composition of yarns

Determine by physical and chemical analysis.

5.5 Overall composition of hose

Use ES ISO 1833.

5.6 Yarn linear density

Unravel a suitable number of courses from the foot portion of the hose and use ES ISO 7211-5 to determine the linear density of each different type of yarn. Check for compliance with Table 1 or Table 2 as relevant.

5.7 Courses per centimetre

Use ASTM D8007, and determine the number of courses per centimetre on the centre portion of the leg. Check for compliance with Table 1 or Table 2 as relevant.

5.8 Pile-to-ground length ratio

Unravel three courses from each of the toe, sole, heel and high heel. Separate the pile and ground yarns in each of the four sets, apply sufficient tension to the yarns to straighten them, and measure the length of each yarn in each set of pile yarns and in each set of ground yarns. Express the total lengths of the pile yarns and of the ground yarns as a ratio, and record the result. Check for compliance with Table 1 or Table 2 as relevant.

5.9 Design

Determine by physical examination. Check for compliance with Table 1 or Table 2 as relevant.

5.10 Depth of elastic splicing

Use ES ISO 8559-2.

5.11 Position of splicing

Determine by visual examination. Check for compliance with Table 1 or Table 2 as relevant.

5.12 Extent of splicing or of plush above bottom of heel

Use ES ISO 8559-2 to determine the extent of splicing above the bottom of the heel. Determine the extent of plush above the bottom of the heel by physical measurement. Check for compliance with Table 1 or Table 2 as relevant.

5.13 Dimensions

Use ES ISO 8559-2. Check for compliance with Table 1 or Table 2 as relevant.

5.14 Stretched width of hose

5.14.1 Apparatus

5.14.1.1 Test assembly, that incorporates a lateral stretching device (see 5.14.1.2), which is operated by compressed air.

5.14.1.2 Lateral stretching device (see Figure 1) that consists of

- a) a stand to which one arm is fixed, and that incorporates a scale,
- b) a second (free) arm mounted to a masspiece that slides in a vertical track on the stand, and
- c) a masspiece such that the masspiece and the free arm together apply a force of 45 N to the test specimen.

Each of the two arms has a diameter of 8 mm and a working length of 52 mm and the initial distance between the two arms is $73 \text{ mm} \pm 1 \text{ mm}$. When the compressed air pressure is applied, a piston moves the masspiece and free arm into its upper position.

When the pressure is released, the piston retracts faster than the masspiece falls, allowing the masspiece to fall freely. Friction in the track is minimized by the use of nylon bushes.

NOTE Clean and thoroughly lubricate the track with a suitable agent before every test run.

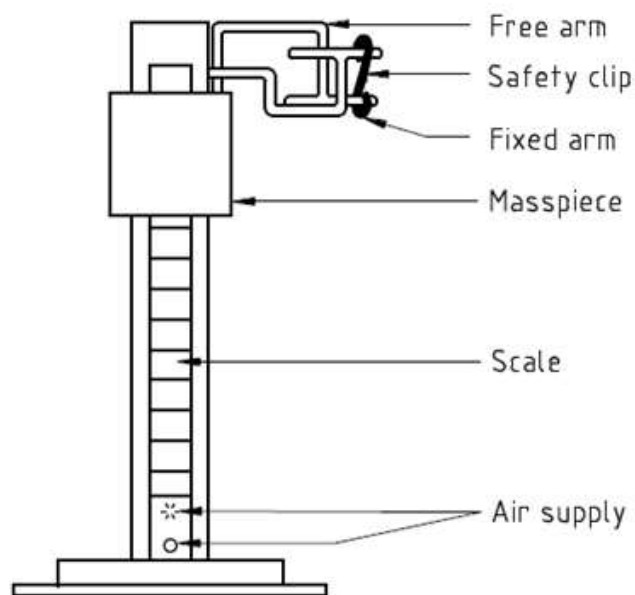


Figure 1 — Lateral stretching device

5.14.2 Procedure

5.14.2.1 Ensure that the safety clip on the stretching device holds the free arm securely. Operate the compressed air supply to maintain a working pressure of 410 kPa, then remove the safety clip. Carefully ease the hose under test over the arms of the stretching device, until the arms are just fully inserted into the top of the hose and, after ensuring that the wale direction is parallel to the arms and that the fabric positioned over the arms is free from lengthwise tension, release the compressed air pressure. Record, to the nearest millimetre, the scale reading right above the masspiece as the stretched width of the top.

5.14.2.2 By repeating 5.14.2.1 but with the arms of the stretching device in the appropriate position, obtain the stretched width of elastic splicing of three-quarter hose and of the mid-leg of all types of quarter, half and three-quarter hose.

Caution: Always replace the safety clip if the air supply is to be interrupted for any reason.

Check for compliance with Table 1 or Table 2 as relevant.

5.15 Nominal mass per 10 pairs

Determine, to an accuracy of 1 part in 500, the mass of each pair of hose of the same size, and calculate, for each size, the mass per 10 pairs in grams. If the actual foreign matter content (determined in accordance with 5.20) exceeds 2 %, correct the mass per 10 pairs by subtracting the equivalent mass of foreign matter content in excess of 2 %. Check for compliance with Table 1 or Table 2 as relevant.

5.16 Dimensional change on laundering

Mark, measure and record the length of the leg and the foot of each specimen in accordance with ISO 22198. Subject the specimens to washing, using ISO 6330: washing procedure D1, and drying procedure F. Condition the specimens, and then determine and calculate (separately) the mean total dimensional change in the length of the leg and of the foot. Check for compliance with Table 3.

5.17 Colourfastness to light

Use ES ISO 105-B02.

5.18 Colourfastness to perspiration

Use ES ISO 105-E04.

5.19 Colourfastness to washing

Use ES ISO 105-C10.

5.20 Non-fibrous material content

Use ASTM D629.

5.21 Moth resistance

Use ES ISO 3998.

5.22 Color fastness to rubbing

Use ES ISO 105-X12.

6 Packing and marking

6.1 Packing

The pairs of hose shall be made up in bundles (each containing hose of the same type, size and colour) and shall be acceptably packed. The hose shall be in a clean and commercially dry condition and only hose of the same type, size and colour shall be packed together in a bulk container.

6.2 Marking

6.2.1 Hose

The sole of one foot of each pair of hose shall be legibly and durably marked (e.g. by transfer printing) with the following information:

- a) the manufacturer's name or trade mark or both;
- b) the overall composition; and
- c) the size.

6.2.2 Containers

The following information shall appear in legible and indelible marking on the outside of each container, in a position that will be visible when the containers are stacked:

- a) the manufacturer's name or trade mark or both;
- b) a description of the contents, e.g. "Men's half-hose, type MH3";
- c) the colour;
- d) the quantity (in pairs);
- e) the date of manufacture;
- f) the gross mass, in kilograms; and
- g) the order or contract number.

6.2.3 Additional marking

When so required (see annex A), hose or bulk containers (or both) shall bear information additional to that specified in 6.2.1 and 6.2.2.

Annex A (informative)

Guide to manufacturers

A.1 Hose that comply with this standard can be made using machines of the diameter and number of needles given below:

1	2	3
Machine diameter inches	Number of needles	Type(s) of hose
4½	84	MT3
4¼	120	MQ1, MQ2, MH1, MH2, MT1, MT2, WA2, WT2
4	168	MQ3, MQ4, MH3, MH5, MH6, MT5, MT6, WA1, WT1

A.2 The following are recommended:

Wool: 21 µm ± 0/2 µm to 25 µm ± 0.2 µm

Nylon 6.6: 3.3 dtex

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

ESA's objectives are:-

- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services are in compliance with the required standards,
- ❖ Facilitate the country's technology transfer through the use of standards,
- ❖ Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes. Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement

ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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