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Draft Private Specification for South African Army for Mens Black Leather Combat, Goodyear Welted Boot

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CHANGE HISTORY

Rev	Change Control No	Date	Name	Description
001	n/a			Original release.

CONTENTS

FIGURES

TABLES

ABBREVIATIONS

AQL	Acceptable Quality Limit
ASTM	American Society for Testing and Materials
CSIR	Council for Scientific and Industrial Research
DWS	Dick Whittington Shoes
ISO	International Organization for Standardization
JER	Soldier
NSN	National Stock Number
RSA	Republic of South Africa
SA	South Africa
SABS	South African Bureau of Standards
SANDF	South African National Defence Force
SANS	South African National Standards
SPEC	Specification
ST	Standard
UK	United Kingdom

FOREWORD

This specification is an update of the Armscor military combat boot document 05181-100-038 Issue 2 following the development of a new combat boot for the SA Army. This specification sets forth the materials required for, and the method of construction to be used in, the manufacture of Combat Boots (Black).

The specification is arranged in 6 sections and three Appendices. Section 1 states the scope of the specification. Section 2 lists the applicable documents. Section 3 details the requirements for the product, the materials, the method of manufacture and standards of workmanship. Section 4 details the qualification procedures, the quality assurance provisions, test methods and acceptance inspection procedures. Section 5 details the preparation of the product for delivery. Section 6 contains definitions and notes on special requirements and documentation. Figure 1 is an illustration of the new military boot prototype.

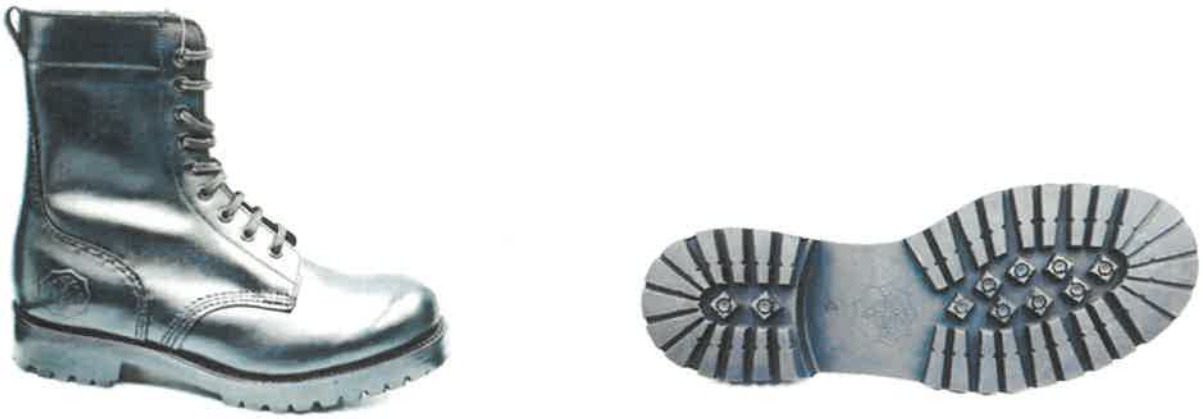

Figure 1. Is an illustration of the male combat boot GZ543

SECTION 1

1 SCOPE

This specification covers the design, materials, manufacture, packing, marking, acceptance and testing of Derby-type boots with smooth side uppers, leather-lined plain vamps, full-bellows tongues, top bands, back straps, outside counters of the military type, middle sole of a cross-linked high-density polyethylene/EVA blended polymer sheet and outer sole and heel unit of rubber, for use by male personnel of the South African Army.

SECTION 2

2 APPLICABLE DOCUMENTS

The following documents contain provisions which, through reference in this text, constitute provisions of this specification. All documents are subject to revision and, since any reference to a document is deemed to be a reference to the latest edition of that document, parties to agreements based on this specification are encouraged to ensure the use of the most recent editions of the documents indicated below. Information on currently valid national, international and CKS documents may be obtained from the South African Bureau of Standards, and on RSA-MIL documents from the Bureau for RSA Military Standards (BRMS).

2.1 Government documents

CKS 189, Lining leather (chrome-tanned syntan-retanned) side

CKS 226, Leather welting

CKS 623, Side upper leather

RSA-MIL-SPEC-296, Corrugated board boxes for clothing and footwear

Armscor Document: 05181-100-038 issue 2

2.2 National and international documents

2.2.1 Specifications

ISO 2859-1, Sampling procedures for inspection by attributes - Part 1: Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection

SANS Drawing No.C5016/13/2

SANS Standard Last 91511

SANS 770, Footwear laces

SANS 1091, National colour standards for paint

SANS 1362, Sewing threads

SANS 1437, Footwear soling material and footwear sole and heel component of rubber and plastics

SANS 700, Side upper leather

2.2.2 Test methods

BS 5131-1-1.2, Methods of test for footwear and footwear materials - Part 1: Adhesives- Section 1.2: Resistance of adhesive Joints to peeling

BS 5131-3-3.1, Methods of test for footwear and footwear materials — Part 3: Uppers, textiles and threads - Section 3.1: Strength of upper materials and lining materials at right angles to stitch perforations

B5 5131-4-4.5, Methods of test footwear and footwear materials- Part 4: Other components — Section 4.5: Tensile strength of fiberboard.

DIN 5035, Testing of rubber for Shore A Hardness Test

05181-100-209 Corrugated Board Boxes for Clothing and Footwear

SANS method 184, Determination of peeling load of direct moulded footwear

SANS method 572, Linear density of textile yams (other than stretch-type yams) on packages

SANS method 577, Breaking strength, extension at break and tenacity of textile yams (other than stretch-type yams)

SANS method 579, Textiles - Mass per unit area of conditioned textile fabrics

SANS method 85, Thickness of wool fabrics

SANS method 113, Non-fibrous material content of wool

SANS method 5272, Non-fibrous material content of textiles: Hydrochloric acid method (Applicable to textile materials treated with resins such as amino-type resins)

SANS method 5468, Breaking strength and extension at break of textile fabrics: narrow strip method using constant rate of traverse

SANS method 616, Preparation of samples (leather; elastomeric material and other footwear materials)

SANS method 5626, Leather or footwear components - pH value and difference figure of an aqueous extract

SANS method 5629, Leather and fibreboard - Determination of apparent density

SANS method 5640, Determination of flex resistance (leather fibreboard and cellulose fibreboard inner soles)

SANS method 5641, Determination of wet and dry bursting strengths of stiffeners

SANS method 646, Determination of bond strength of rib attachment (stuck-on rib inner soles)

SANS method 5664, Footwear materials - Abrasion resistance of elastomeric material

SANS method 714, Leather Lining

SANS method 5962, Determination of wet split tear strength of inner sole and runner materials (other than leather)

SANS method 6080, Footwear materials - Resistance to to-and-fro rubbing

SANS method 6134, Fatigue bending of granulated cork bottom filler for footwear

SANS method 6135, Heat insulation of granulated cork bottom filler for footwear

SANS method 6214, Footwear materials - Collapsing load of domed shapes

SANS method 6231, Footwear materials - Absorption and desorption of water

SANS 5646, Determination of water absorption of inner soles and inner sole material

SANS method 6233, Footwear - Toe-puff and stiffener material - Shape retention

SANS method 2589/ISO 2589, Leather – Physical and mechanical tests – Determination of thickness

SANS method 3380/ISO 3380, Leather – Physical and mechanical tests – Determination of shrinkage temperature up to 100°C. (Amdt 1)

SANS method 4045/ISO 4045, Leather – Chemical tests – Determination of pH. (Amdt 1)

SANS method 5398-1/ISO 5398-1, Leather – Chemical determination of chromic oxide content – Part 1: Quantification by titration. (Amdt 1)

SANS method 4684/ISO 4684, Leather – Chemical tests – Determination of volatile matter. (Amdt 1)

SANS method 5316, Abrasion resistance of textile shoe laces (without core) and similar articles

SANS method 5615, Method for the sampling of footwear components and materials other than leather.

SANS method 5616, Preparation of samples (leather, elastomeric material and other footwear materials).

SANS methods 5618, Leather – Matter extractable by petroleum ether.

SANS method 5620, Determination of sulphated ash content of water-solubles in leather.

SANS method 5637 (SANS SM 637), Determination of tearing strength.

SANS method 5649 , Determination of density of elastomeric material

SANS method 5651, Tensile strength, elongation at break, and tensile stress at specified elongation of elastomeric material (footwear)

SANS 5664, Footwear materials - Abrasion resistance of elastomeric material

SANS method 5669, Measurement of distension and strength of grain of leather by the ball burst test.

SANS method 11640/ISO 11640, Leather – Tests for colour fastness – Colour fastness to cycles of to-and-fro rubbing. (Amdt 1)

SANS method 11644/ISO 11644, Leather – Test for adhesion of finish. (Amdt 1)

SANS method 17694/ISO 17694, Footwear – Test methods for uppers and lining – Flex resistance. (Amdt

3 REQUIREMENTS

3.1 Product definition

Boots Combat, with smooth, side leather uppers, quarter with top band lining, leather vamp lining, outside leather counter, padded insole with leather cover and sock, middle sole of a rubber /EVA blended polymer sheet and an outer sole and heel unit of rubber. Boots, service type, are hard-wearing general-purpose footwear for use by South African military personnel on base or in the field. They offer protection to the feet from rough surfaces and have a cleated sole for improved grip on most surfaces. Boots are available in two fittings medium and wide, and in sizes 5 to 16. They give a comfortable fit to 95 % of the population providing the feet have been correctly measured.

3.1.1 Major components list

Major components used in the manufacture of the boots are listed below:

- Eyelets
- Stiffeners
- Toe-puffs
- Heels (rubber moulded) and Outer soles (rubber cleated)
- Inner soles
- Welts
- Upper leather
- Tongue leather
- Midsoles
- Threads

3.1.2 Interfaces

All interfaces are addressed under the requirements of the specification.

3.1.3 Identification and marking

Each boot shall bear the following information, neatly and legibly impressed on the waist of the inner sole by means of steel stamps:

- The manufacturer's name or trademark
- The size and fitting of the boot
- The year of manufacture.
- The National Stock Number (NSN)
- In addition, the army pride of lion's logo will be imprinted on the leather
- In addition, the production batch number, the size and the fitting of the boot shall be permanently sown on the grain side of the tongue by means of glueing and stitching (See also 5.2 and 5.3).

3.1.4 Client furnished equipment or material

This subclause is not applicable to this specification.

3.2 Characteristics

3.2.1 Performance characteristics

The boots are intended to give satisfactory wear when worn on an alternate day basis for a period of twelve months. Although they resist the ingress of water they are not intended to be waterproof.

Table 1. Performance characteristics

Sizing	Available in sizes 5 – 16 for males
Storage requirements	Dry and ventilated storage for a period not exceeding 12 months
Temperature range in storage	23 ± 2 °C
Humidity	50% ± 5
Transport requirements	None
Durability factors	Dependent on wear conditions - 1year normal wear.Worn on alternate days.
Health and safety criteria	Ensure correct fit.

3.2.2 Maintainability

Boots shall withstand various daily cleaning processes as detailed in 7.1.4.3.

4 DESIGN AND CONSTRUCTION

4.1 General

The method of construction shall be in accordance with the Goodyear welted principle and shall be such that an innersole, a welt, a middle sole and a single component outersole and heel unit are used. The middle sole shall be securely stuck and stitched to the welt all around the insole including the seat, the outersole and heel unit shall be secured to the middle sole by a suitable adhesive.

4.2 Materials

4.2.1 Upper leather - General

The uppers shall be of a smooth, very slightly corrected with a hair cell print chome-tanned side leather substance in accordance with **Error! Reference source not found.** below and complies with the physical and chemical requirements of SANS 700. The leather shall be through drum dyed to at least the depth of the grain layer and shall have a natural finish. The flesh side of the leather shall be clean and free of any stain and fleshy areas and shall have been so treated as to produce a soft, mellow and Napa feel. The uppers shall not contain any leather that is pipy, loose grained, hard or bony. Upper and lining leather shall not be split to substance.

When leather or components conditioned as in SANS method 5616 are tested using a British Leather Confederation ST 300 Softness Tested, with the 35 mm ring in position, the displacement of the plunger shall be a maximum of 3.0mm. 1) *Details of the ST 300 Softness Tester are available from the British Leather Confederation, Leather Trade House, Kings Park Road, Moulton Park, Northampton NN3 6JD, UK*

Table 2. Thickness of upper components

1	2	3
Components	**Thickness range mm**	
	Min.	**Max.**
Vamps	2,0	2,2
Quarters	2,0	2,2
Outside counters	2.0	2,2
Back straps.....	1,5	2,0
Tongues.....	1,1	1,3
Vamp linings	1,1	1,3
Top bands.....	1,1	1,3

4.2.2 Upper leather – Colour No. 340c>

The colour of the leather shall be a match to colour No. 340c "Jet Black" of CKS 129 "Colours for textiles"

The colour shall comply with the following:

1. Any difference between the colour of a side of leather or of cut components and that of the specified colour shall not exceed the difference represented by grade 3 - 4 of the International Geometric Grey Scale for the assessment of colour.

2. Any difference between the colours of any two pairs of boots supplied against the same contract by the same manufacturer shall not exceed the difference represented by grade 3 - 4 of the International Geometric Grey Scale; and

3. The maximum difference between the colours of different parts of one pair of boots shall not exceed the difference represented by grade 4 of the International Geometric Grey Scale.

Details of the ST 300 Softness Tester are available from the British Leather Confederation, Leather Trade House, Kings Park Road, Moulton Park, Northampton NN3 6JD, UK.

Colour difference has been defined by reference to the International Geometric Grey Scale for the assessment of change in colour. It is accepted that this is not a perfect method. The SANS uses a readily available colour difference meter and will, on request, give the values that are used when that instrument is being used. It would be preferable to carry out interlaboratory tests to obtain a correlation between the results given by the different instruments in use.

4.2.3 Tongues and top bands

Tongues and top bands shall be of a printed/embossed leather that complies with the relevant requirements of CKS 189. The colour of the leather shall match that of the finished upper leather.

The printed/embossed leather shall meet the requirements of the South African Bureau of Standards. Tongue leather shall be mellow, soft and pliable. Upper leather shall not be split to substance.

When leather or components conditioned as in SANS method 616 are tested using a British Leather Confederation ST 300 Softness Tester with the 35 mm ring in position, the displacement of the plunger shall be at least 4,0 mm.

4.2.4 Vamp linings

The vamp linings shall be of a chrome-tanned Syntan grain side leather that complies with the relevant requirements of SANS 714.

4.2.5 Thickness of upper and lining materials

The thickness of the various upper components shall be within the appropriate range given in columns 2 and 3 of **Error! Reference source not found.**.

4.2.6 Stiffeners and toe-puffs

Toe Puffs and Stiffeners shall be of a thermoplastic or a solvent-activated material and shall comply with the requirements of Table 3. Toe puffs shall be thin enough to avoid a print-through effect on the finished side of the boot.

Table 3. Material properties of the toe puffs and stiffners

1	2	3	4
Property	Requirement		Test Method
	Toe-puffs	Stiffeners	
First collapsing load, N, min.....	130	130	SABS 1233[1)]

Resilience, %, min.....	30	30	
Moisture, %, min.....	80	80	SABS 6233
Area shape retention Initial, %.....	70	85	
After 10 collapses, %, min.....	60	75	BS 5131-1-1-2
Peel; strength, N/cm, min.....			
Dry.....	10,0	6,0	
Wet.....	6,0	-	
1) See the relevant subclause of 4.2.3.2(b) for additional information.			

4.2.7 Eyelets

Eyelets shall be double telescopic eyelets of internal diameter, when the eyelets are fitted to the boots, 6.0 mm ± 0,5 mm and an outer diameter of 10 mm ± 0.5 mm. The barrels of the eyelets shall be of sufficient length to ensure proper clinching and firm fixing on the facings.

Eyelets shall be of brass or a suitable non-ferrous material and shall be so fitted that there are no sharp edges that could fray the laces of the boots during wear.

Eyelets shall have japanned or cellulose-painted rims that match the colour of the upper leather. When rims that have a cellulose paint finish are used, the paint shall have been applied to the base metal by means of the plated application process, and shall have been heat-dried. The number of eyelets shall be as follows:

1. Sizes 5 to 7: seven pairs on each boot; and
2. Sizes 8 to 16: nine pairs on each boot.

4.2.8 Threads

The threads used for attaching the various upper components shall be polyester and cotton core-spun threads that comply with the relevant requirements of SANS 1362. The colour of the threads shall match that of the upper leather.

4.2.9 Laces

Each pair of boots shall be provided with one pair of Ultra-High Molecular Weight Polyethylene laces of length at least 175 cm. The laces shall comply with the relevant requirements as per Table 4. The colour of the laces shall match the colour of the upper leather.

Table 4. Requirement for laces

1	2	3
Property	**Requirements**	**Test Method**
Type	Ultra-High Molecular Weight Polyethylene	SANS 770
Colour	Black	
Width	6 mm	
Weight	5.00 g/m	
Melting Point	155	
Tensile Strength	5174 N	SANS 770
Abrasion (>200000)	1706248	SANS 5316

4.3 Bottom Materials and components

4.3.1 Inner soles

4.3.1.1 Materials

Inner soles shall be of the stuck-on rib type and shall be of cellulose fibre board or a non-woven board, material of thickness not less than 2,0 mm and not more than 3,0 mm and shall comply with the requirements given in Table 5. A closed cell foam of thickness 3.0 mm ±0,5 mm shall be laminated to the innersole.

4.3.1.2 Physical and chemical properties of inner sole material

Inner sole material, when tested in accordance with 4.3.1.1 and 4.3.1.2, shall comply with the requirements given in Table 5.

Table 5. Requirements of Cellulose / Non-Woven Fibre Board, Inner Sole, And Foam

1	2	3
Property	Requirement	Test Method
PH value, min.....	3.5	SANS method 5626[1)]
Difference between PH values, max.....	0.7	

Flex endurance, cycles, min, In machine direction.....	10 000	SANS method 5640
At 90° to machine direction.....	7 000	
Wet stitch tear strength, N/mm of width, min.....	0.30	SANS method 5962
Water absorption, %, min.....	35	SANS method 6213
Water desorption, % of water absorbed, min.....	40	SANS method 6231
Abrasion resistance after 400 cycles wet.....	No surface Tearing	SANS method 6080
Bond strength of rib attachment per 25 mm of width N.....	440	SANS method 5646
FOAM		
Insole foam thickness (mm).....	3.0 ± 0.5	

4.3.1.3 Stuck on Rib

The stuck-on rib shall comprise:

a. A fibreboard, leather or fabric filler-piece of such thickness as to provide a total lip thickness of at least 2.0 mm when the filler-piece is enclosed in the outer cover; and

b. An outer cover of a fabric that, when tested in accordance with 4.3.1.3, complies with the requirements given in Table 6

c. The cover shall extend over the filler-piece to form a raised lip and shall have a base of width (measured from the bottom of the lip to the edge of the fabric) at least 3 mm on the outside and at least 8 mm on the inside of the raised lip.

d. The bond strength of the rib attachment, determined in accordance with 4.3.1.3 (d) shall be at least 440 N per 25 mm of width.

Table 6. Requirement for rib cover fabric

1	2	3
Property	**Requirement**	**Test method**
Composition.....	Polyester or an intimate blend of polyester and cotton with a maximum cotton content of 50 %	See 4.3.1.1(a)
Breaking strength		SANS method 4681
Dry, N, min.....	300	>
Wet, % of dry value, min.....	80	

Mass per unit area (free from non-fibrous material), g/m2, min....	260	SANS method 79
Non-fibrous material content, %, max.....	5	SANS method 272
1) See the relevant subclause of 4.3.1.2 for additional information.		

4.3.1.4 Welting

The welting shall be of a vegetable-tanned leather or a suitable synthetic material. The welt shall have a thickness of 1,6mm, at least 4 mm wide with 1mm grooving and shall be of the flat type. It shall be firm but flexible and shall be free from excess flesh, soft, spongy or loose-fibred leather, mechanical and hide defects and any imperfections and blemishes that affect its appearance or may affect its serviceability (or both).

4.3.1.5 Middle sole

The middle sole shall be of a microcellular rubber or ethylene vinyl acetate (EVA) blended polymer sheet with a nominal thickness of ±5 mm and shall comply with the requirements given in Table 7. The colour shall be black.

Table 7. The middle sole

1	2	3
Property	Requirement	Test Method
Shore A Hardness	85 - 90	DIN 5305
Density mg/mm^3	0.80 - 0.85	SANS 5649
Elongation (min)	385	SANS 5651

4.3.1.6 Outer soles

4.3.1.6.1 Material

The outer soles shall be of a moulded rubber that complies with the requirements for type R4 of SANS 1437. The colour of the outer sole and heel unit shall be black.

4.3.1.6.2 Thickness of outer-sole

The thickness of the outer sole and the heel units will be at least the relevant thickness given in Table 8. A different sole can be selected in agreement with the end user. The heel area has a cavity with at least four cross section bridges of thickness of at least 5.00 mm each and at least 10.00 mm deep. The height of the heel shall be in accordance with the pitch of the last.

Table 8. Outer sole and heel dimensions

1	2
Area	**Minimum thickness (mm)**
	Size 232/6 and larger
Fore part	
a) Between cleats.....	Min 5.0
b) Cleat height	Min 6.0
c) Including cleats	Min 11.0
Heel area close to the waist:	
a) Between cleats	Min 25.0
b) Including cleats	Min30.0
Heel area:	
a) Between cleats	Min 22.0
b) Including cleats	Min 28.0

4.3.1.6.3 Heels

The outer sole combined with the heel shall be moulded as a single component, and the rubber used shall comply with the requirements given.

Cavities in heels

The cavities in the heels shall be such that:

- The thickness of the wearing surface is at least 5.0 mm measured between the cleats and the bottom of the heel cavity and at least 11.0 mm including the cleats;
- There is a clearance of at least 15 mm between the outer top edge of the nearest cavity and the inner edges of the raised top edges at the back and sides of the heel;
- There is a clearance of at least 12 mm between the nearest cavity and the breast line at the base of the heel; and
- There is a support pillar of diameter at least 15.0 mm in the centre of the cavity.

Heel height

The height of the heel shall be in accordance with the pitch of the last used and shall incorporate a taper such that the height of the back of the heel is 2.0 mm greater than the height at the breast line.

4.3.1.7 Shanks

4.3.1.7.1 Material

Shanks shall extend from the joint line to a distance of at least 25 mm under the heel, measured from the breast line towards the rear of the heel. The shanks shall conform to the bottom contour of the last. They shall be of a combination of steel and fibreboard. The steel portion of a shank shall be fluted and shall be of steel of thickness at least 1.0 mm.

The width of the steel shanks shall be at least 9,5mm and the width of the fibreboard shall be such that the backer fits between the raised rib of the inside and outside of the waist.

4.3.1.8 Bottom Filler

The bottom filler shall be of a granulated cork filler or a suitable felt materials, when tested in accordance with the relevant methods given column 3 of table 6 complies with the requirements given in column 2 of. Table 9

Table 9. Requirements for granulated cork bottom filler

1	2	3
Property	Requirement	Test Method
Fatigue bending, after 3 000 cycles.....	The specimen shall not break	SANS method 6134
Heat insulation, °C, min.....	50	SANS method 6135
Apparent density, g/m³.....	0,45 – 0,60	SANS method 5629

Table 10. Requirements for wool or synthetic fibre felt for bottom filler

1	2	3
Property	Requirement	Test method
Mass per unit area (free from non-fibrous material), g/m2 , min.....	770	SANS method 79
Non-fibrous material content, %, max.....	3.4	SANS method 113
Thickness (mean), mm.....	5.0 ± 0.5	SANS method 85

4.3.1.9 Sole Stitching Threads

The threads used for welt sewing and for middle sole stitching shall be silken and poly-cotton core-spun threads respectively, that complies with the requirements of SANS 1362 and with the additional requirements when tested according to the relevant methods given in column 3 of.

Table 11. Additional requirements for welt sewing and midsole stitching thread

1	2	3
Property	Requirement	Test Method
Composition.....	20 % Cotton 80 % Polyester	
Welt sewing thread resultant linear density.....	R890 Tex	SANS Method 572
Breaking Strength.....	400	SANS Method 577

4.3.1.10 Seat socks

Seat socks shall be of a chrome-tanned syntan-retanned leather of nominal thickness 1.2 mm and that complies with the requirements of CKS 189. They shall be skived across the breast line.

4.3.2 Drawings and patterns

4.3.2.1 Pattern

The style shall be the Derby type with plain vamps. The model patterns No. GZ534 held by (and obtainable from) the manufacturer for a boot of size 8M fitting shall be used for the grading of all sizes throughout the range.

4.3.2.2 Height of leg

The height of leg (measured along a perpendicular line from the outside heel seat near the breast of the heel to the centre of the top of the leg) shall be as follows:

a. Size 8: 215 mm; and
b. Other sizes: so graded that the difference between the leg heights inconsecutive sizes does not exceed 3 mm.

4.3.2.3 Outer sole and heel pattern

The outer sole and heel unit is to be stuck to the middle sole and shall have been roughened, appropriately halogenated, and coated with a suitable adhesive. The pattern of the outer sole and heel shall be as shown in Appendix 10.1.

4.3.2.4 Lasts

The last for all **sizes** shall be the 91511 last, and the **size(s)** and fitting(s) (medium and wide) shall be as specified in the order or contract.

5 Construction requirements

5.1 General

The method of construction shall be in accordance with the Goodyear welted principle and shall be such that an inner sole, a welt, a midsole and an outer sole heel unit are used. Theouter sole shall be stuck onto the midsole using the appropriate adhesive methods. The midsole is stitched to the welt using lock stitching.

5.2 Upper construction

- The vamp shall be leather lined plain vamp
- The quarters shall be of the derby type where the top of the quarters shall have a top band lining.
- Outside counters shall be full counters.
- The tongue shall be a full bellows type. It shall be of one piece, and shall be overlaid on the vamp. The facing part of the tongue shall extend to the top eyelet.
- Quarters shall have a top band lining with a width of 27mm ±2.0mm.
- Pull loops shall taper down to at least 25mm wide and extend from the top edge of the counter, that when folded over to produce a finished loop, shall be at least 35mm.

5.3 Closing

5.3.1 Skiving

Skiving shall be done in a manner that will prevent the formation of ridges inside the shoe.

5.3.2 Seams

The upper closing shall be done in accordance with sound trade practice. All inside upper seams shall be free from ridges and roughness there shall be no loose, ragged or uneven seams, and all loose thread ends shall have been removed. The back seam shall be closed by means of a zig-zag stitch. The minimum requirements for the attachment of the various upper components shall be as given in Table 12.

Table 12. Requirements for attachment of upper components

1	2	3	4
Seam	**Number of rows of stitches, min**	**Type of Thread**	**Number of stitches per 25mm**
Back Seam	1 row, zig-zag	Ticket No. 36	9-12
Outside Counter	2 rows heavy stitch	Ticket No. 12	6-9
Tongue to Vamp Seam	2 close rows , 3mm apart	Ticket No. 36	9-12

Facing Rows	1 row along edge and 1 row 25mm away from edge	Ticket No. 36	9-12
Top Band Lining	1 row along edge and 1 row 27mm from edge	Ticket No. 36	9-12
Side seam	3 rows heavy stitch	Ticket No. 12	6-9

5.3.3 Stitch type

The side seams shall be 3 rows of heavy stitching

5.3.4 Eyeletting

The eyelets shall be securely fastened on the facings of the boots, shall be evenlyspaced and shall have a smooth setting.

5.3.5 Lacing of closed uppers

After eyeletting has been completed, the machine lacing shall provide for a 10 mmopening before lasting, with a tolerance not exceeding +3 mm after lasting.

5.3.6 Edge treatment

All raw edges visible on a finished boot shall be stained to a colour that is a match tothat of the upper leather.

5.4 Preparation of bottom stock

5.4.1 Inner soles

The inner soles shall be accurately cut to the correct shape of the last. The stuck-on rib shall be attached to the inner sole in a manner that provides an even, firm base for welt sewing and shall extend all around the seat. The inner soles shall be fully gemmed with gemming duck (of mass per unit area at least 270 g/m2 that has been coated with adhesive. The gemming duck shall be firmly and smoothly fitted to the base of the lip. The closed cell foam (see Table 5) shall be accurately located and securely laminated on the wearing surface of the innersole the closed cell foam shall be covered with a syntan re-tan lining material . The innersoles shall conform to the bottom contour of the last.

5.4.2 Outer soles and Heel unit

The outer sole and heel unit is to be stuck to the middle sole and shall have been roughened, appropriately halogenated and coated with a suitable adhesive.

5.5 Making

5.5.1 Back-part moulding

Stiffeners of the correct size, properly activated, shall be correctly positioned in the uppers which shall be back-part moulded. Stiffeners shall be well stuck to both the lining (counter) and the upper (quarter).

5.5.2 Lasting

Uppers shall be conditioned by heat and steam before toe-lasting and correctly drafted and attached all around the insole rib by means of staples and thermos adhesive around the toe area.

5.5.3 Welt sewing

The thread used for welt sewing shall have a linear density of at least R 890 tex. (See Table 11). The thread shall be properly waxed, and there shall be an average of 3.5 stitches per 25 mm. The welt shall be sewn in such a manner that the seam, after in seam trimming and welt beating, is tight and even.

The thread used for the middle sole stitching shall have a linear density of at least R 800 Tex (See Table 8). There shall be an average of not less than 5 stitches and not more than 6 stitches per 25 mm. The shuttle thread shall be well waxed (with hot wax) and the lock of the stitching shall be approximately two thirds down the thickness of the middle sole. The stitching on the welt shall be not less than 1.5 mm and not more than 2.5 mm away from the finished middle sole edge.

5.5.4 Shank fitting and bottom filling

The forward end of the shank shall be flush with the inner sole at the joint line. The shank shall be inserted with the fibreboard section against the inner sole and shall fit the contour of the boot bottom properly. The bottom filler shall be so applied and pressed into the inner sole cavity that there are no gaps between the inner edge of the inner sole lip and the filler material. The filled bottom shall extend with a uniform even surface through the entire bottom cavity.

5.5.5 Middle sole preparation

The middle sole shall be so roughened on both surfaces so as to create good bonding surfaces. The middle sole shall be washed with a suitable priming agent. The adjoining surfaces of the welt and middle sole shall be coated with a suitable neoprene adhesive. The middle sole shall be correctly positioned on the undersurface of the boot and so attached that there are no gaps between the welt and the middle sole edges.

5.5.6 Sole laying

The outer sole shall be correctly positioned on the welted boot bottom and so attached that there are no gaps between the welt and the outer sole edges or between the seat lift and the outer sole edges

5.5.7 Rough rounding

The outer soles, inner soles and welts shall be so rounded as to provide for an edge extension (on the finished boots) of at least 5.0 mm at the inner joint and at the toe and of at least 6.5 ± 0.5 mm at the outer joint.

5.5.8 Outsole laying

The outer sole is to be roughened so as to create a good boning surface and be washed with a suitable priming agent. The outer sole is to be properly halogenated. The adjoining surfaces of the middle sole and outer sole shall be coated with a suitable adhesive wherein the outer sole shall be coated with a second coat of adhesive The outer sole shall be correctly positioned on the middle sole of the boot bottom and so attached that there are no gaps between the middle sole and the outer sole edges.

5.5.9 Midsole stitching

The thread used for the outer sole stitching shall have a linear density of at least R 800 tex. (See Table 12). There shall be an average of not less that 5 stitches and not more than 6 stitches per 25 mm. The shuttle thread shall be well waxed (with hot wax) and the lock of the stitching shall be approximately two-thirds down the thickness of the outer sole. The stitching on the welt shall be not less than 2 mm and not more than 3 mm away from the finished sole edge.

5.5.10 Peeling strength of outer sole and heel unit

When a pair of boots is tested in accordance with SANS 184

Table 13. Requirements for peeling strength of Outer sole and heel unit

Area	Requirement	Standard
Forepart	Min 400 N	SANS 184
Waist	Min 400 N	
Seat	Min 200 N	

5.5.11 Heel trimming

Heels shall be trimmed square to the heel seat. The extension at the seat shall be not less than 4 mm and not more than 6 mm.

5.5.12 Edge trimming

Edges shall be trimmed square.

5.5.13 Burnishing

The leather parts of sole and heel edges shall be stained to match the colour of the upper leather and shall be well waxed and burnished.

5.5.14 Seat socks

Boots shall be provided with seat socks

5.5.15 Laces

Each pair of boots shall be provided with two pair of laces

5.5.16 Cleaning

The seams of the uppers shall be dressed with a seam filler, and the upper leather shall be properly cleaned and then polished with a high-grade wax polish. The uppers shall not be over sprayed.

5.5.17 Standards of manufacture

For the purposes of this specification, standards of manufacture are covered in 2.

5.5.18 Workmanship

5.5.18.1 General

Workmanship and finish shall be of standard at least equal to that of the pre- production samples (see6.4.1).

5.5.18.2 Freedom from defects

Inner soles shall be free from protruding grindery. The inside of the boot shall be free from roughness and pleats. The entire bottom shall be free from cracks, bubbles, blisters, mould marks, flow marks and foreign matter.

5.6 Qualification and pre-production

A successful tenderer shall send four pairs of pre-production boots to the Procurement Authority. The boots shall have been inspected, tested and approved by the Inspection Authority before bulk production is commenced. It shall be the duty of the manufacturer to advise the Inspection Authority of the availability of these samples.

5.6.1 Standard sample

The standard sample is held by and may be viewed at the Procurement Authority and at the Inspection Authority.

6 QUALITY ASSURANCE PROVISIONS

It is the responsibility of the supplier to ensure that boots offered for delivery conform to the requirements of this specification.

6.1 General

The Inspection Authority shall be specified in the contract.

6.2 Quality management system

The supplier shall maintain a quality management system which shall assure that all items supplied in accordance with this specification, comply with it in all respects. The Procurement Authority shall have the right to call for periodic audits of the supplier's management of quality.

6.3 Responsibility for inspection and testing

The responsibility for inspection and testing is addressed in subclause 6.4.5.

6.4 Special tests and examinations

6.4.1 Pre-production

The four pairs of boots submitted as pre-production samples shall be subjected to laboratory testing and inspection for compliance with all the requirements of this specification. One pair of boots shall be used for the destructive testing. When accepted, three pairs of boots shall be sealed. One pair shall be retained by the Inspection Authority one pair shall be sent to the Procurement

6.4.2 Qualification

Bulk production shall not commence until the sealed pre-production sample is received by the supplier.

6.4.3 Classification of inspection

6.4.3.1 Pre-production sample inspection and test

See 6.4.1

6.4.4 In-process quality inspection

a) Inspection by the supplier after clicking and closing and of the finished product shallbe done on a 100 % basis. Checklists shall be used for this purpose.

b) Inspection records shall be prepared at each inspection point. These records shallbe kept for a minimum period of one year.

c) The production of footwear shall be done in batches and each batch shall beaccompanied by a numbered job control card (work ticket).

d) The job control card (work ticket) shall bear the following information:

   1. The sizes of the footwear in the batch;
   2. The quantity of footwear in the batch; and
   3. The batch number.

e) The job control card shall have adequate space for the inspection stamp or signature (or both) of the supplier's quality inspectors to indicate that examination of the footwear at each

inspection point during manufacture as well as at the end of theproduction line has been completed.

f) The number of the work ticket shall be stamped on each boot and this number shall,for traceability purposes, be regarded as the batch number.

6.4.5 End item inspection

The supplier shall inspect every boot visually and dimensionally for compliance with this specification before submitting them to the Inspection Authority for final inspection.

6.4.6 Inspection, sampling and acceptance by the Inspection Authority

6.4.6.1 On-line inspection

The boots shall be subject to inspection by the Inspection Authority during manufacture. The inspector shall, during normal working hours, be given all reasonable facilities for carrying out his duties and shall have the right of entry into the supplier's factory and the factory of any subcontractors where work on boots supplied to this specification is in progress.

6.4.6.2 Test samples

During the currency of a contract, a sample pair of boots from completed production together with components shall be drawn at random by the Inspection Authority inspector. The frequency shall be as agreed in the contract or at the option of the Inspection Authority. These samples shall be subjected to destructive laboratory testing for compliance with the requirements of this specification.

6.4.6.3 Inspection

The sampling procedure given in 6.4.6.4 shall be applied by the Inspection Authority in determining whether, on visual inspection, a lot is acceptable. The samples so drawn shall be deemed to represent the lot.

6.4.6.4 Sample for inspection

From the lot, draw at random the number of pairs of boots shown in column 2 of Table 14, relative to the appropriate lot size shown in column 1. The sample size and the acceptance number are extracted from ISO 2859-1, using table 1, general inspection level II, table IIA, and an AQL of 1,0.

6.4.6.5 Acceptance of a lot

The lot shall be deemed to be acceptable and an acceptance certificate of inspection will be issued by the Inspection Authority if, after visual inspection of the sample taken in accordance with 6.4.6.4, the number of pairs that have defects does not exceed the relevant acceptance number shown in column 3 of Table 14. All boots found during inspection of the sample to have defects shall be marked with a reject stamp and removed from the lot prior to despatch.

Table 14. Inspection sample size

1	2	3
Lot size, pairs	**Sample size, pairs**	**Acceptance number of**

		rejects, pairs
2-8	2	0
9 -15	3	0
16-25	5	0
26- 50	8	0
51 - 90	13	0
91 - 150	20	0
151 -280	32	1
281 -500	50	1
501 -1 200	80	2
1 201 - 3 200	125	3
3201-10000	200	5

6.5 Calibration of test and measuring equipment

The supplier shall control, calibrate and maintain all inspection, measuring and test equipment used to demonstrate the compliance of the product with the requirements of the specification. Calibration certificates shall be available to the Inspection Authority on request.

6.6 Quality Records

6.6.1 General

Records of all certificates, checks, tests and calibrations required in terms of this specification in a form acceptable to the Inspection Authority, shall be kept by the supplier at his factory and such records shall be available to the Inspection Authority for inspection during normal working hours.

6.7 Traceability

Sufficient detail shall be recorded by the supplier's management system to enable the particular batch of material to be traced from the information stamped on the boot.

6.8 Quality conformance inspection

6.8.1 Certificate of compliance (C of C)

- The supplier shall obtain a certificate of compliance with each consignment of the following raw materials obtained from each sub-contractor. The certificate shall clearly refer to the invoice or batch to which it applies. Leather, lining materials, inner sole material, mid soles, toe-puffs, stiffeners, heels, outer sole and laces.
- With every purchase or delivery of components a full test report indicating the relevant specification requirements and test results shall be obtained from each sub-contractor.
- In the absence of sub-contractor's certificates of compliance, the supplier shall arrange for the testing of each consignment of raw material against the requirements of this specification.
- Only test reports issued by the Inspection Authority or a testing laboratory acceptable to the Inspection Authority shall be valid.

- All material shall be visually inspected on receipt (on a percentage basis) against the requirements of this specification. A check list and reference sample (for checking of colour, print, etc.) shall be provided for this purpose.
- Materials complying with the requirements of this specification shall be stored in a manner acceptable to the Inspection Authority and shall be identified by lot numbers.
- Raw material inspection records, certificates of compliance and test reports shall be kept by the supplier for a period of at least one year or until the contract is released.
- The manufacturer shall supply, with each delivery, a certificate of compliance supported by objective evidence that the requirements of the specification have been met in every respect.

6.8.2 Classification of defects

Any defect or combination of defects or deviations from the specification that render the boots unacceptable and/or are such that the boots cannot be issued. (See Appendix A).

6.9 Test methods

Table 15. Summary of test methods

Requirement	Property	Standard
Preparation of test specimens		Use SANS method 616.
Properties of stiffeners and toe-puffs	Leatherboard stiffeners - Bursting strength	Use SANS method 641.
	Thermoplastic or solvent-activated stiffeners and toe-puffs	Use SANS method 1214 and report the first collapsing load and the percentage resilience. Calculate the percentage moisture resistance using the formula
	Area shape retention	Use SANS method 1233.
	Peeling strength	Use the method given in BS 5131-1-1.2.
Properties of inner soles	Water absorption	Use SANS method 1231.
	Water desorption	Use SANS method 1231.
	Flex endurance	Use SANS method 640.
	Wet split tear strength	Use SANS method 962.
	pH value	Use SANS method 626 and record the first pH value and the difference between the two pH values.
	Abrasion resistance	Use SANS method 1080 and follow the procedure for the wet test.
	Bond strength of rib attachment	Use SANS method 646
Properties of rib cover fabric	Composition	Use microscopical and chemical methods

	Breaking strength	Use SABS. method 468 to determine the breaking strengths of a dry specimen and a wet specimen of the fabric, on test specimens of width 25 mm.
	Mass per unit area	Use SANS method 79.
	Non-fibrous material content	Use SANS method 272.
Properties of wool or synthetic fibre felt bottom filler	Mass per unit area	Use SANS method 79
	Non-fibrous material content	Use SANS method 113.
	Thickness	Use SANS method 85.
Properties of granulated cork bottom filler	Fatigue bending	Use SANS method 1134.
	Heat insulation	Use SANS method 1135.
	Apparent density	Use SANS method 629.
Outer sole abrasion resistance		Use the method A given in SANS method 664, using a vertical force of 10 N, over an abrasion distance of 40 m. Take the test specimen from the joint region
Properties of welt sewing and sole stitching threads	Resultant linear density	Use SANS method 72.
	Breaking strength	Use SANS method 77.
	Number of plies	Determine by visual examination.
	Composition	Use microscopical and chemical methods.
Peeling strength of outersole and heel unit		Use SANS 184

7 PREPARATION FOR DELIVERY

7.1 Packaging and preservation

7.1.1 Packing

Unless otherwise specified in the order or contract, each pair of boots shall be placed in an individual transparent plastics bag and then packed in a corrugated board outer container that complies with the requirements of RSA-MIL-SPEC-296. The number of pairs in each outer container shall be as follows:

- Sizes 220-270: 15;
- Sizes 275-300: 10.

With the exception of the last consignment of an order, only footwear of the same size and fitting shall be packed together in an outer container.

7.1.2 Preservation

There are no special preservation requirements.

7.1.3 Marking

Outer containers shall bear the following information:

- The manufacturer's name or trade mark or both;
- The description;
- The National Stock Number (NSN);
- The size and fitting (M or W);
- The quantity;
- The order number;
- The year of manufacture;
- The gross mass; and
- The Inspection Authority Inspection Certificate Number.

7.1.4 Labelling

7.1.4.1 Outer containers

Each outer container shall have a printed label securely attached to the short side. This label shall be visible when containers are stacked and shall provide the information given in 7.1.3 in legible and indelible block capital letters of height 12 mm.

7.1.4.2 Additional marking

When so required by the South African Army, boots or outer containers shall bear information additional to that specified in 3.1.3 and 7.1.3

7.1.4.3 Care-labelling

A swing label with care and use instructions that shall contain the substance of the wording shown below and shall be attached through the eyelet of one boot of each pair of boots.

- Be sure that your boots fit properly. Wearing the wrong size could lead to many different foot ailments such as blisters, corns, calluses, and bunions.
- To keep your boots lasting longer, rotate them with another pair.
- Ensure that boots are cleaned before polishing.
- Buff to shine boots using a natural bristle brush once polish has dried.

- If your boots get wet, allow them to dry naturally before polishing or wearing them again.
- Never dry your boots near direct heat; this will cause the leather to become hard and brittle.
- Always store your boots in a cool, dry, and airy place.
- Do not use your boots as brakes when riding bikes; this will cause your sole to wear rapidly.
- When removing your boots, ensure you loosen the fastening system first; using one foot as leverage to remove your boot will result in the sole coming loose
- Clean your boots daily. Remove all dust and dirt using a brush or wet newspaper. Apply a thin layer of good shoe polish with a brush paying special attention around the seams. Leave for a few minutes then brush well.
- Before leaving base in wet weather, clean boots as in 5.4.2, but do not brush polish off.
- When you return to base with wet boots remove all mud and dirt by washing, brushing or rubbing and dry with a cloth or newspaper. Apply a thick layer of good shoe polish to the upper leather, especially to the seams. Place the boots in a cool, dry, airy place until dry.
- Do not use any form of heat on your boots. Do not bone them or use a hot iron on them.
- Avoid using the same cleaning tools for different colour boots/shoes.

7.1.5 Special requirements

The following requirements will be specified in tender invitations and in each order orcontract:

- The size(s) and fitting(s)
- The National Stock Number (NSN);
- The method of packing if other than as specified (see 7.1); and
- Additional marking, if required (see 5.3.2).

7.1.6 Documentation

One container of each consignment shall be marked "Documents" and shall, in addition to the boots, contain the following:

- The packing slip/delivery note;
- The inspection certificate(s); and
- A copy of the invoice containing the following:
- The order number;
- The finance authority number; and
- A full description of the consignment, i.e. items, size(s), quantity, etc.

8 NOTES

8.1 Definitions

For the purposes of this specification, the following definitions apply:

Acceptable: An item that complies with the specification and any requirements as reviewed by the contracting party or duly appointed Procurement Authority representative.

Batch: A quantity of footwear manufactured at one time, covered by one work ticket, and recorded on the product for traceability.

Goodyear welted: A generic term for a machine method of welted footwear manufacture.

Lot: A consignment of finished footwear presented for inspection at one time, intended for despatch to one destination.

Roughened: Descriptive of a material that has had its original surface removed using a sharp wire brush or an abrasive paper with a grit that avoids burning the surface of the material, and that in the case of leather, has had its entire grain surface (when relevant) removed and the fibres raised without impairing the strength of the leather.

Appendix A List of Defects

Defects include but are not limited to those listed below:

- Cuts on upper material;
- Serious pleats inside boot;
- Protruding nails inside boot;
- Open scratch, tick or warble marks;
- Brand marks;
- Unevenly stained flesh side of quarters;
- Loose grain leather;
- Colour match outside specification;
- Toe-puff placed too far forward or too far back;
- Incorrectly clinched eyelets;
- Stitching running off edge;
- Mispositioned outer sole laying;
- Loose thread tensions; and
- Blow holes, cracks or flow marks on outer sole.
- Outer sole and heel unit delamination from midsole