



# FOOTWEAR TESTING GUIDELINES

**Modern Testing Services**

GLOBAL FOOTWEAR REQUIREMENTS 2021



## We understand **Your Challenges**

Footwear manufacturers and brands today face complex regulations and safety requirements that challenge footwear manufacturers to produce safer, higher quality and more sustainable products.

As a manufacturer, supplier or retailer of finished footwear products or footwear materials and components, you are responsible for ensuring that your products comply with local, state and global regulations. Non-compliance can put your business and brand reputation at risk through sales denials, product recalls, fines and dissatisfied customers.

That's why it's important for footwear brands and retailers to work with a trusted quality assurance partner to assist with product testing, quality control and factory audits to ensure your products meet global standards and exceed your customers' expectations.





## Your Quality Assurance Partner

Strategically positioned in key manufacturing regions, our footwear testing laboratories provide fast, accurate and cost-effective quality assurance solutions, offering footwear manufacturers and brands global reach with local solutions.

With our technical expertise and state-of-the-art laboratories, MTS offers a one-stop solution to ensure your footwear products meet all applicable local, state and international regulations. At the same time, we help you bring better footwear products to your desired market.

Partnering with MTS immediately strengthens supply chain efficiencies by leveraging decades of technical expertise, industry best practices and innovative solutions necessary to maintain a competitive edge for market success.



# Common Chemical Testing Footwear Products

- Azo Dyes
- Chromium VI
- Extractable Heavy Metals
- Release of Nickel
- Determination of Formaldehyde
- Total Cadmium
- Phthalates (5P/ 6P/ 7P)
- Flame Retardant
- Fiber Composition
- Volatile Organic Compounds
- Total Lead in Surface Coating/ Substrate
- CA Proposition 65 Testing
- CPSIA Testing
- REACH Testing
- Client's Product and Manufacturing RSL



# Common Physical Testing Footwear Products

## Whole Shoe

- Slip Resistance
- Waterproof
- Flammability
- Upper / Outsole Bond Strength
- Component Attachment

## Insole

- Abrasion Resistance
- Water Absorption and Desorption
- Thickness

## Heel

- Heel Fatigue Resistance
- Heel Impact Resistance

## Upper & Lining

- Burst Strength
- Martindale Abrasion
- Water Resistance
- CF to Rubbing / Water
- Flexing Resistance
- Tear Strength/Tensile Strength
- Thickness

## Outsole

- Tensile Strength
- Aging test for sole
- Hardness

## Lace

- Lace Abrasion
- Lace Strength





# Requirements for Footwear - Safety Standards by Countries

## European Union (EU)

- EN ISO 20347:2012 - Protective Footwear (Occupational Footwear)
- EN ISO 20346:2014 - Protective Footwear
- EN ISO 20345:2011 - Protective Footwear (Safety Footwear)
- EN 13636:2017 - Protective Footwear (Motorcycle Rider)
- EU REACH (Chemical)

## Gulf

- Gulf Conformity Mark (G-Mark) of Gulf Cooperation
- Saudi Arabia – SASO Certificate of Conformity

## China

- QB/T 2673-2013: Footwear – Specification of Marking
- GB/T3293.1-1998: Shoe Sizes
- GB20400-2006: Leather and fur – Limit of harmful matter
- GB 21550-2008: Restriction of hazardous materials
- GB 25038-2010: Rubber shoes – Healthy and safe specification
- GB 21536-2008: Athletic Shoes

## United States (US)

- ASTM F-2412:2005 – Foot Protection
- ASTM F-2412:2005 – Performance Requirement for PPE
- ANSI Z41-1999: Personal Protection
- California Proposition 65 (Prop 65)
- Consumer Product Safety Improvement Act (CPSIA)

## Canada

- CAN / CSA Z195 – Protective Footwear

## Australia / New Zealand

- AS / NZS 2210.1-2010: Safety, Protective and Occupational Footwear

## India

- IS 15844:2010 – Sports Shoes
- IS 15298: Personal Protective Footwear
- IS 11544:1986 – Slipper, Rubber
- IS 13893:1994 – PU Sole Semi Rigid

## Japan

- JIS T 8101:2006

# Global Footwear Requirement Summary - Main Standards (Chemical)

| S.NO | TESTING ITEMS                            | EU   | USA   | SAMPLE SIZE |
|------|--|--|---|-------------|
| 1    | Azo dyes and azo colorants               | REACH 1907/2006 Annex XVII Entry 43<br>Textile : EN 14362-1 & EN 14362-2<br>Leather :m CEN ISO/TS 17234  |   | 10 gm       |
| 2    | Nickel Release                           | REACH 1907/2006 Annex XVII Entry 27<br>A. EN 1811<br>B. EN 12472+EN 1811   |   | 3 Pcs       |
| 3    | Lead (and its compound)                  | REACH 1907/2006 Annex XVII Entry 63<br>EN 16711-1 & EN ISO 16711-2<br>ISO 17071-1 & ISO 17071-2  | CPSIA, 1. Surface coating $\leq$ 90mg/kg;<br>2. Accessible substrate 100mg/kg<br>CAL PROP 65, TOTAL LEAD        | 10 gm       |
| 4    | Cadmium                                  | REACH Annex XVII Entry 23 $\leq$ 100mg/kg<br>BS EN 1122 Method B   |   | 10 gm       |
| 5    | Phthalates                               | REACH Annex XVII Entry 51 for all plasticized material sum: DEHP, DBP, DIBP and BBP $\leq$ 1000 mg/kg ; Entry 52 for material can be placed in the mouth sum: DINP, DIDP and DNOP $\leq$ 1000<br>EN 14372<br>Textiles EN ISO 14389<br>ISO16186 | CPSIA, DEHP, DBP, BBP DINP, DIDP and DnOP $\leq$ 1000mg/ kg individually,<br>CAL PROP 65, DBP DIBP DEHP<br>DnHP | 10 gm       |
| 6    | Dimethyl fumarate                        | REACH 1907/2006 Annex XVII Entry 61<br>Solvent extraction followed by GC-MS, ISO-TS 16186  |   | 10 gm       |
| 7    | Chromium VI                              | REACH 1907/2006 and Regulation 201/2014 ISO 17075  |   | 10 gm       |
| 8    | SCCP (Short Chain Chlorinated Paraffins) | REACH 1907/2006 Annex XVII Entries 32 to 38 inclusive POP Regulation 850/2004 as amended by Regulation 2015/2030<br>Solvent extraction followed by NCI-GC-MS<br>ISO-18219  |   | 10 gm       |

## Global Footwear Requirement Summary - Main Standards (Chemical)

| S.NO | TESTING ITEMS                              | EU   | USA | SAMPLE SIZE |
|------|--|--|-----|-------------|
| 9    | Chlorinated Phenols<br>(Pentachlorophenol) | REACH 1907/2006 Annex XVII Entry 22<br>DIN 53313 (Leather)<br>ISO 17070<br>LFGB-64B82.02-8:2001<br>UNI 11057   |     | 10 gm       |
| 10   | Organotin                                  | REACH 1907/2006 Annex XVII Entry 20<br>Solvent extraction followed by GC-MS or LC-MS<br>ISO 16179  |     | 10 gm       |
| 11   | Polycyclic Aromatic<br>Hydrocarbons (PAH)  | REACH 1907/2006 Annex XVII Entry 50 as amended by Regulations 1272/2013<br>and 326/2015<br>AfPS GS 2019<br>Footwear: ISO/TS 16190                            |     | 10 gm       |
| 12   | Allergenic Disperse Dyes                   | DIN 54231  |     | 10 gm       |
| 13   | Carcinogenic Disperse Dyes                 | DIN 54231 (textiles)   |     | 10 gm       |
| 14   | Formaldehyde                               | ISO 14184-1 (Textile) ISO 17226 (for leather)<br>Formaldehyde - Textile /leather   |     | 10 gm       |
| 15   | NPEO & APEO                                | REACH 1907/2006 ANEX XVII ENTRY 26 as amended by Regulation 2016/26<br>AFIRM Method<br>Textile : EN ISO 18254-1<br>Leather : EN ISO 18512-1 & EN ISO 18512-2 |     | 10 gm       |





# Common Quality & Performance Testing For Footwear Products

| S.NO | TESTING ITEMS                            | EU / SATRA  | US               | SAMPLE SIZE |
|------|--|---|------------------|-------------|
| 1    | Flexing Resistance (Ambient Temperature) | EN 13512: 2002, EN ISO 5402: 2015, ISO 17694:2016, SATRA TM 55: 1999                          | ASTM D 6182      | A4 swatch   |
| 2    | Tear Strength (Single Edge)              | ISO 3377-1: 2011, EN 13571:2006, ISO 17696: 2004, SATRA TM 30: 1995                           | ASTM D 2261      | A4 swatch   |
| 3    | Tear Strength (Double Edge)              | ISO 3377-2: 2016  |                  | A4 swatch   |
| 4    | Color Fastness To Rubbing                | EN 13516: 2002, ISO 11640:2012, ISO 17700: 2015, SATRA TM 173: 1995                           | AATCC 8/116      | A4 swatch   |
| 5    | Color Fastness To perspiration           | ISO 11641: 2012, ISO 105- E04:2013, SATRA TM 335: 1994, ISO 105- B02: 2014, SATRA TM160: 1992 | AATCC 15         | A4 swatch   |
| 6    | Color Fastness To light                  | ISO 105 B02   | AATCC 16         | A4 swatch   |
| 7    | Color Fastness To Water                  | ISO 105- E01: 2013, SATRA TM 335: 1994  | AATCC 107        | A4 swatch   |
| 8    | Color Fastness To Sea Water              | ISO 105- E02: 2013  | AATCC 106        | A4 swatch   |
| 9    | Color Fastness To Phenolic Yellowing     | EN ISO 105- X18: 2007   |                  | A4 swatch   |
| 10   | Color Fastness To crocking               | ISO 105- X12: 2016, SATRA TM 167: 2001  | AATCC 8/116      | A4 swatch   |
| 11   | Tensile Strength & Elongation            | ISO 3376, EN 13522, ISO 17706   | ASTM D5034/D5035 | A4 swatch   |
| 12   | Abrasion Resistance (Martindale)         | ISO 17704: 2004, EN 13520: 2006, EN ISO 12947-1: 1998   | ASTM D 4966      | A4 swatch   |

# Common Quality & Performance Testing For Footwear Products

| S.NO | TESTING ITEMS  | EU / SATRA  | US                       | SAMPLE SIZE                                   |
|------|--|---|--------------------------|---|
| 13   | Water Vapor Permeability                                   | EN 13515: 2001, ISO 17699:2003, ISO 20344: 2012                                     |                          | A4 swatch                                     |
| 14   | Abrasion Resistance of outsole                             | EN 12770: 1999, ISO 4649:2010, ISO 20871: 2001, ISO 20344: 2012, SATRA TM 174:1994  | ASTM D 1630/D3886 (Mod.) | 1 outsole                                     |
| 15   | Flexing Resistance of outsole                              | EN ISO 17707: 2005, ISO 20344: 2012, SATRA TM 161:2004                              | ASTM D 2594              | 1 outsole or A4 size solesheet                |
| 16   | Hardness (Shore, Asker)                                    | ISO 868: 2003   | ASTM D 2240              | 1 outsole                                     |
| 17   | Hardness (IRHD)  | ISO 48: 2012  |                          | 1 outsole                                     |
| 18   | Tear Strength of outsole                                   | EN 12771: 2000, ISO 34-1:2015, ISO 20872: 2001, ISO 20344: 2011, SATRA TM 218: 1994 | ASTM D 624               | ½ x A4 Size sole Sheeter or 1 Pair of outsole |
| 19   | Tensile strength of outsole                                | EN 12803: 1997, ISO 22654: 2002, SATRA 137: 1995                                    | ASTM D 3851              | 1 x A4 size sole sheet                        |
| 20   | Split Tear strength  | SATRA TM 65: 1999, IS 15844: 2010   | ASTM D 624               | ½ x A4 size sole sheet                        |
| 21   | Compression Set  | SATRA TM 65: 1996   | ASTM D 395               | ½ x A4 size sole sheet                        |
| 22   | Sole Bond strength or sole interlayer bond strength        | EN ISO 17708: 2003, ISO 20344: 2011, SATRA TM 411:1992                              | ASTM D2099               | 1 Pair of shoes                               |
| 23   | Peel strength of bottom constructions in complete Footwear | SATRA TM 281: 2002  | ASTM D 1876              | 1 odd shoe                                    |
| 24   | Seam strength  | EN ISO 17697:2016 Method B  | ASTM D 4884              | 1 Pair of shoes                               |
| 25   | Flexing resistance of whole shoes                          | In house method, SATRA TM 92: 1992; ISO 24266                                       | ASTM D 2097              | 1 odd shoe                                    |
| 26   | Heel Fatigue   | EN ISO 19956: 2004<br>BS 5131: 1991 Section 4.9                                     |                          | 3 pcs of raw heels                            |
| 27   | Heel Attachment  | EN 12785: 2009, ISO 22650:2002  | ASTM F 2232              | 3 odd shoes                                   |
| 28   | Heel Impact  | In house Method   | In House method          | 1 Pair of shoes                               |

# Common Quality & Performance Testing For Footwear Products

| S.NO | TESTING ITEMS  | EU / SATRA  | US                   | SAMPLE SIZE                      |
|------|--|---|----------------------|----------------------------------|
| 29   | Strength of top piece Attachment                             | EN ISO 19958: 2004, SATRA TM 108: 1992  |                      | 3 odd shoes                      |
| 30   | Hydrolysis of outsole (PU)                                   | ISO5423:1992, SATRATM60:1992  |                      | 1 odd shoe                       |
| 31   | Thickness  | Sole: ISO 20344: 2011<br>Upper: ISO 23529: 2010                                 |                      | 1 outsole<br>1 odd shoe          |
| 34   | Slip Resistance  | ISO 13287: 2012, SATRA TM144: 2011  | ASTM F 1677          | 1 odd shoe                       |
| 35   | Washability in domestic washing machine                      | In house Method, ISO 6330: 2012   | AATCC-150            | 1 pair of shoes                  |
| 36   | Durability of zipper (Reciprocation Test)                    | BSEN 16732:2015, BS 3084: 2006 Annex F (5000 Cycles) Each additional 500 cycles | ASTM D 2062          | 3 pcs of zipper length >15cm     |
| 37   | Zipper Strength  | BSEN 16732:2015, BS 3084:2006   | ASTM D 2061          | 3 pcs of zipper for each annexes |
| 38   | Shear Strength of Velcro                                     | 1) EN ISO 22776: 2004<br>2) After Fatigue 5000 Cycles                           | ASTM D 8172          | 1-meter Velcro<br>1-meter Velcro |
| 39   | Peel Strength of Velcro                                      | 1) EN ISO 22777: 2004<br>2) After Fatigue 5000 Cycles                           | ASTM D 8172          | 1-meter Velcro<br>1-meter Velcro |
| 40   | Pulling strength or Ornaments, button, rivets                | In House Method, BS EN 7907: 2007 Annex B,                                      | ASTM                 | 3 sets                           |
| 41   | Corrosion resistance of metal Parts                          | EN ISO 22775:2004 Method 2  | ASTM B 117           | 3 pcs of metal parts             |
| 42   | Determination of the strength of buckle fastening assemblies | BS 5131: 1991 § 5.11  | ASTM D 4831          | 3 odd shoes                      |
| 43   | Lace Abrasion Resistance                                     | EN ISO 22774: 2004  |                      | 6 pcs of laces                   |
| 45   | Color fastness to migration test into plasticized PVC        | EN ISO 15170: 2015  |                      | ½ x A4 swatch                    |
| 46   | pH Value   | ISO 4045, ISO 3071, EN 1413   | ASTM E70-19/AATCC-81 | 20 gm                            |

# Testing Guide for Restricted Substances in Major Footwear & Components

|   | Animal Fibres | Cellulosic Textile | Synthetic Textile | PVC Plastic & PVC coatings | Non-PVC plastic & coatings | Leather | Metal          | Rubber | Adhesives | Paints and coatings | Foam | Paper |
|---|---------------|--------------------|-------------------|----------------------------|----------------------------|---------|----------------|--------|-----------|---------------------|------|-------|
| Azo dyes  |               | ✓                  | ✓✓                |                            |                            | ✓       |                |        |           |                     |      |       |
| Allergenic/Carcinogenic Disperse Dyes               |               |                    | ✓✓ <sup>4</sup>   |                            |                            |         |                |        |           |                     |      |       |
| Chromium (VI)                                       |               |                    |                   |                            |                            | ✓✓      | ✓              |        |           | ✓                   |      |       |
| Phthalates  |               |                    |                   | ✓✓ <sup>1</sup>            |                            |         |                |        | ✓         |                     |      |       |
| Flame retardants (HBCDD, TRIS, TEPA, Deca-BDE)      | ✓             | ✓                  | ✓                 | ✓ <sup>6</sup>             | ✓                          |         |                |        |           |                     | ✓    |       |
| Nickel (release)                                    |               |                    |                   |                            |                            |         | ✓ <sup>5</sup> |        |           |                     |      |       |
| Diaminodiphenylmethane (MDA)                        |               |                    |                   |                            | ✓                          |         |                | ✓      | ✓         | ✓                   |      |       |
| Total Lead / Lead compounds                         |               |                    |                   | ✓                          | ✓                          |         |                |        |           | ✓                   |      |       |
| Soluble heavy metals                                |               |                    |                   | ✓                          | ✓                          | ✓       |                |        |           | ✓                   |      | ✓     |
| Formaldehyde  | ✓             | ✓                  | ✓                 |                            |                            | ✓       |                |        | ✓         |                     | ✓    |       |
| Dimethylacetamide                                   |               |                    | ✓                 |                            |                            |         |                |        |           |                     |      |       |
| Organic Tin   |               |                    |                   | ✓                          |                            | ✓       |                | ✓      |           | ✓                   |      |       |
| Alkyl/Nonyl phenyl ethoxylates (APEO/NPEO)          | ✓             | ✓                  | ✓                 |                            |                            |         |                |        |           |                     |      | ✓     |
| Dimethyl formamide (DMF)                            |               |                    |                   |                            | ✓                          |         |                |        |           | ✓                   |      |       |
| Perfluorooctanate sulphonate (PFOS) <sup>2</sup>    | ✓             | ✓                  | ✓                 |                            |                            | ✓       |                |        |           |                     |      |       |
| Polycyclic Aromatic Hydrocarbons (PAH)              |               |                    | ✓                 |                            | ✓                          | ✓       |                | ✓      |           |                     |      |       |
| Short chain chlorinated phenols (SCCP) <sup>3</sup> |               | ✓                  | ✓                 |                            |                            |         |                | ✓      |           | ✓                   |      |       |

1. Flexible PVC including Plastisol prints
2. May be found in stain and soil resistant treatments and water repellent finishes
3. Rot proofing agent
4. May be used for dyeing polyester and acetate fibers
5. Requirements applicable to skin contact items such as jewelry, rivets and metal press fasteners
6. High risk for PVC coatings

#### Key to symbols

- ✓ Chemical may be found in indicated substrate      ✓✓ Commonly used chemical may be found in indicated substrate

Remark: This table is not a definitive or exhaustive list of chemicals and their end-uses. It is intended only as a guideline as to the most likely substrates in which some of the commonest restricted substances may occur. The indication of possible presence of substance does not infer that it will always be present nor that it is always necessary to conduct testing to prove the absence of said chemical.



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