



Designation: D3888 – 12

Standard Terminology for Yarn Spinning Systems¹

This standard is issued under the fixed designation D3888; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This terminology covers terms related to ring, rotor, and air jet yarn spinning systems.

1.1.1 This standard formerly only included terminology related to open-end spinning. It has been expanded to include terms relating to ring and air jet spinning systems.

1.1.2 While the term rotor spinning is technically correct, the terms rotor and open-end are used interchangeably in the textile industry.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D2255 Test Method for Grading Spun Yarns for Appearance

D3888 Terminology for Yarn Spinning Systems

D3990 Terminology Relating to Fabric Defects

3. Significance and Use

3.1 Terminology D3888 was originally developed as a terminology standard for rotor spinning when it evolved as a new yarn spinning technology in the 1980s. Ring spinning production had been the traditional spinning since the early 1800s when hand spinning became mechanized. Rotor spinning and other spinning technologies increased yarn production rates and formed yarns by different mechanical means that generated yarns with characteristics unlike traditional ring-spun yarns. The revision of this document is intended to compile terminology for current yarn spinning systems into one standard rather than individual standards, in that all yarn formation is generated by processing raw fiber into a spun yarn by using common preparation steps, such as opening, cleaning,

carding, roving formation, and sometimes combing. Terminology in this standard is grouped by the type of spinning system and in chronological order of their development and production usage. It should be noted that the higher end of yarn number ranges cited with each spinning system are possible but are rare in actual production.

4. Terminology

4.1 *Ring Spinning*—Ring spinning is the oldest spinning system in use, therefore ring-spun yarns are the basis for comparing yarns produced from other spinning systems. Production rates are low when compared to new spinning systems. The production delivery capability of ring spinning is limited by traveler velocity and the twist limits of the yarn number being made; the speed may range between 10 and 20 m/min. Ring spinning allows for the production of the widest range of yarn numbers from 200 to 2 tex (N_e 3/1 to 300/1). Ring-spun yarns are produced by drafting rovings between pairs of rollers, twisting the drafted roving by passing it under a traveler that rotates around a fixed ring on the frame of the spinning machine, and winding the twisted strand on a removable bobbin mounted on a rotating spindle. Ring spun yarns are characterized by a uniform fiber orientation around the yarn axis. See Fig. 1.

bobbin, n —a slightly tapered plastic cylinder, mounted on a spindle of a ring spinning frame on which yarn produced from drafting and twisting is wound.

DISCUSSION—Yarn from several ring frame bobbins is wound onto a cone or cheese to create a larger package from which it can be easily unwound for use in weaving, knitting, or other processes.

carding, v —a mechanical preparation, utilized by staple fiber spinning systems, that cleans, straightens, and aligns fibers using wire-covered rolls (or cylinders) that converts fibers into a sliver.

carded yarn, n —an organized, continuous strand of staple fibers produced by carding, drawing, roving formation, and spinning. (Compare with **combed yarn**.)

combing, v —an optional mechanical preparation process undertaken to remove additional trash particles, neps, and short fibers (typically fibers less than 12.5 mm or 0.5 in.) from carded sliver to further align the remaining fibers.

¹ This terminology is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.58 on Yarns and Fibers.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

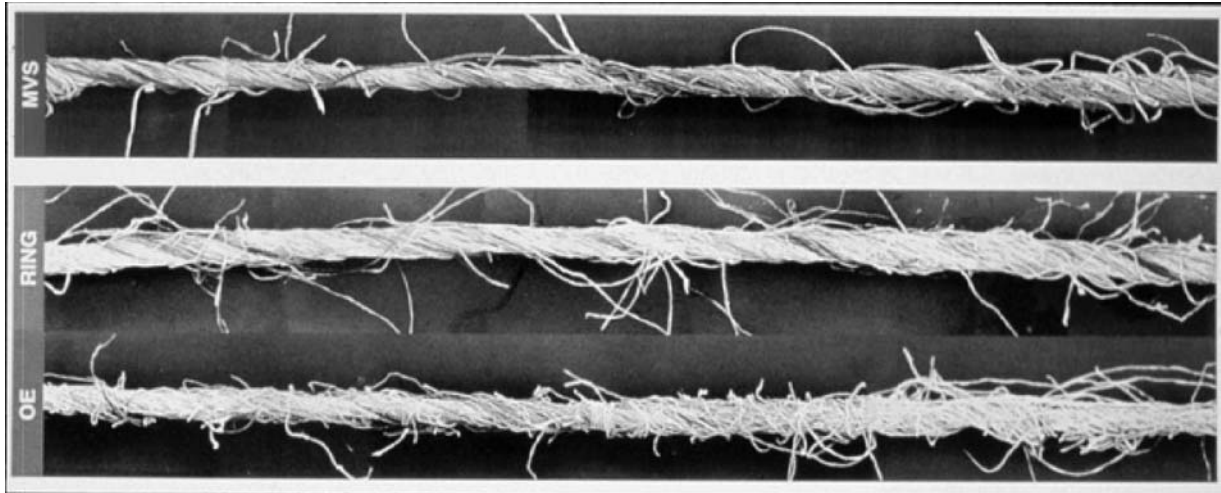


FIG. 1 Longitudinal Sections of Ring (middle view), Rotor (bottom view) and Air Jet (top view) Yarns (Courtesy of Murata Machinery, Ltd.)

combed yarn, *n*—an organized, continuous strand of staple fibers produced by carding, roving, drawing, formation, combing, and spinning. (Compare with **carded yarn**.)

DISCUSSION—Combed yarns produced on the same spinning system are, generally, stronger, more uniform with fewer imperfections, and have greater luster than carded yarns.

compact spinning, *n*—a modified ring-spinning process that alters the geometry of the spinning twist triangle to produce a more uniform structure by binding fibers into the body of the yarn. See Fig. 2.

DISCUSSION—Yarns produced from compact ring spinning exhibit reduced hairiness (see Fig. 3) and higher strength than conventional ring spun yarns in the same yarn number.

drafting, *v*—the process of attenuating a web, sliver or roving of staple fiber to increase its length per unit mass.

DISCUSSION—Drafting is generally attained by passing a web, sliver or roving between pairs of rollers (or a combination of pairs of rollers with aprons), operating at differing speeds.

drafting zone, *n*—the location on a drawing, roving or spinning frame where pairs of rollers, cylinders, aprons or a combination of the same, operate at differing surface speeds.

DISCUSSION—The differing surface speeds attenuate the material being processed, and control the number of fibers per cross-section.

ring spinning machine, *n*—a machine that converts roving of staple fiber (produced from carded or combed sliver) into

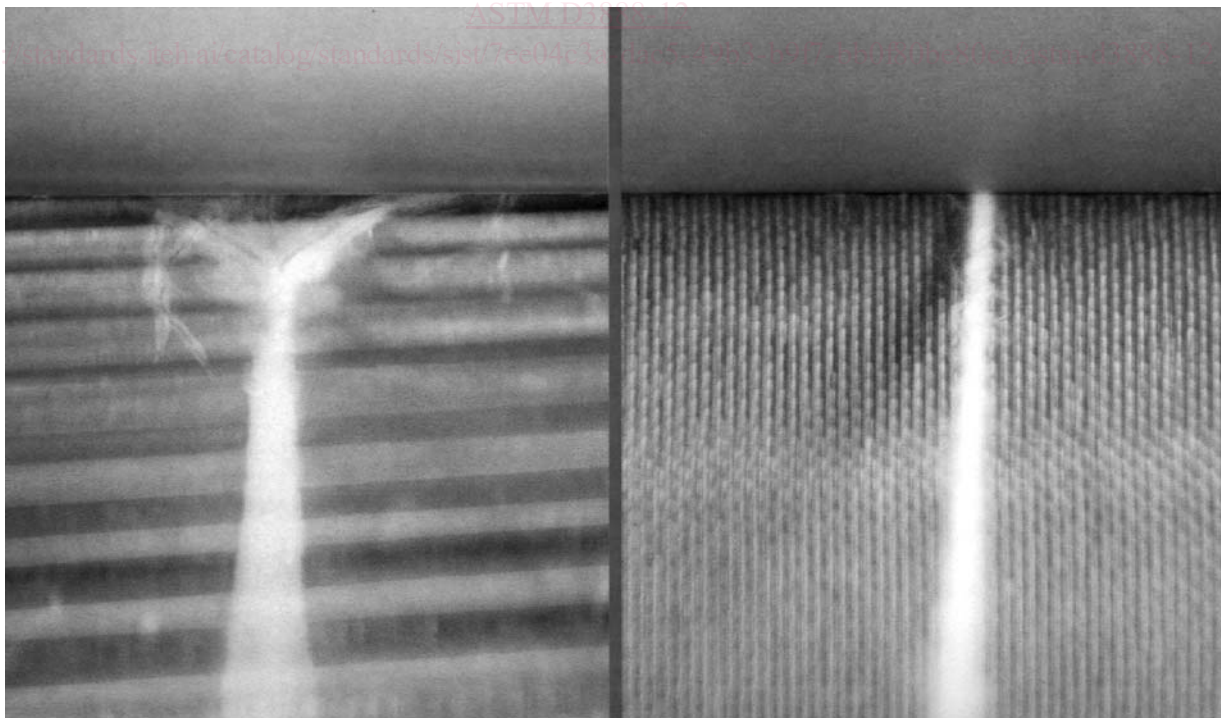


FIG. 2 Illustration of the Traditional Ring Spinning Drafting Triangle (left) and Compact Spinning Drafting (right) (Provisional Approval by Spindelfabrik Sussen, Stahlecker & Grill, GmbH, Germany)

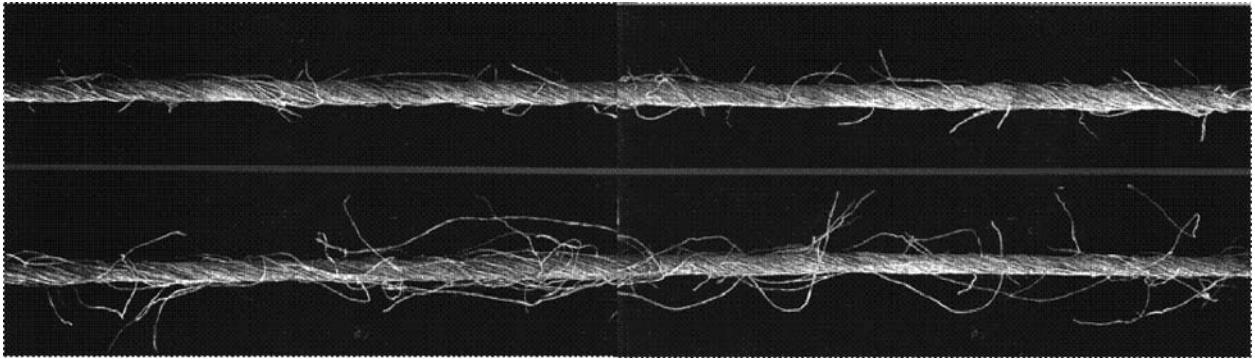


FIG. 3 Traditional Ring-Spun Yarn Longitudinal Section (bottom view) and Compact Ring-Spun Yarn Longitudinal Section (top view)
(Courtesy of Cotton Incorporated)

spun yarn by drafting, twisting, and winding onto a removable bobbin. (Syn. ring-spinning frame.) See Fig. 4.

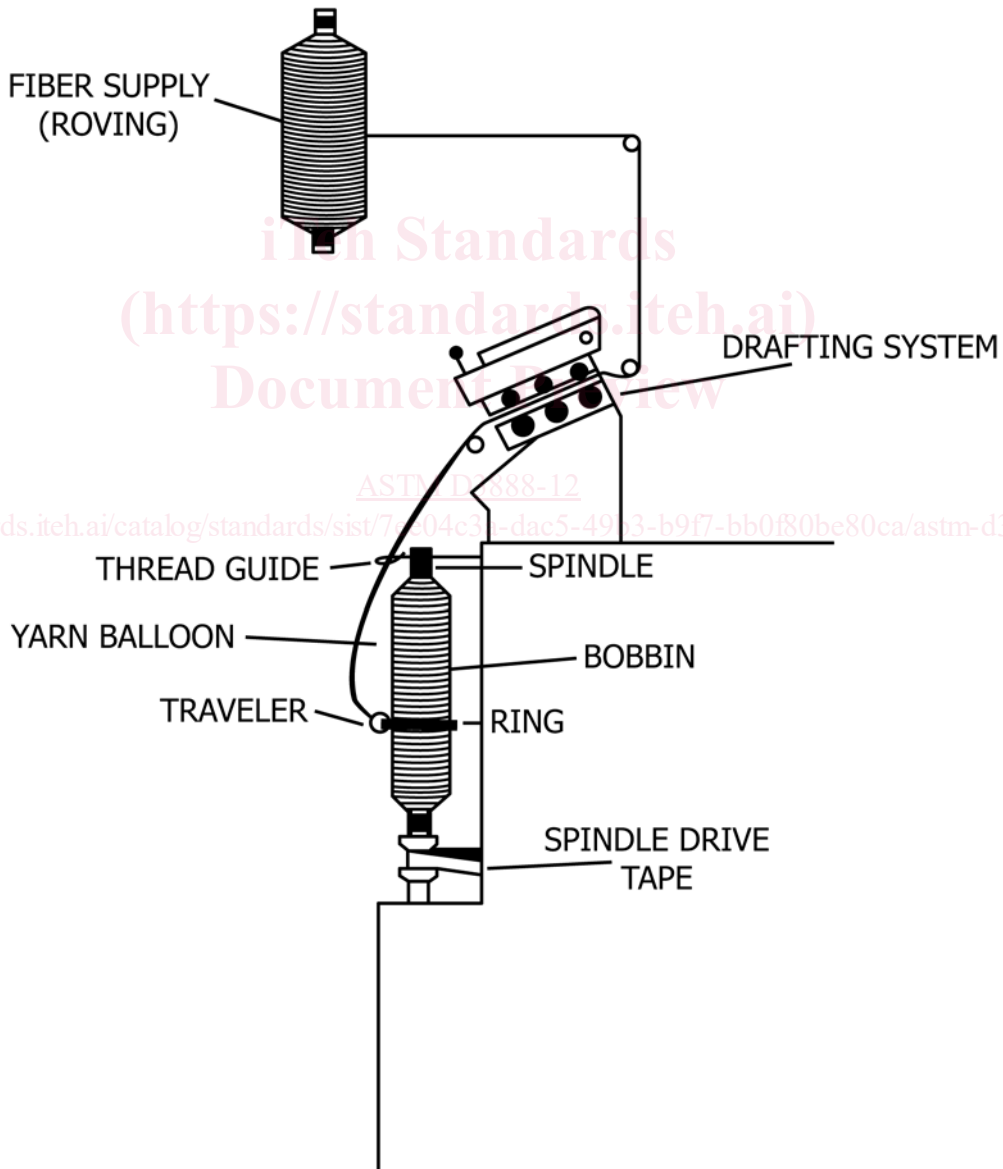


FIG. 4 Schematic Diagram of Ring Spinning
(Courtesy of Cotton Incorporated)