BSR/O1.1-7 (202X)

Safety Requirements for Table Saws for the Woodworking Industry

Secretariat

Wood Industry Association®

(WIA)®

Approved on [Enter date]

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Forward *(This forward is not part of BSR/O1.1-7 (202X)*

Historical Perspective

The recorded history of the ANSI O1 standards begins in 1924 with the United States Department of Labor, Bureau of Labor Statistics (BLS). Published as BLS Bulletin Number 378 in December 1924, it was clearly intended for use in the woodworking industry. The original document, titled Safety Code for Woodworking Plants, began with this introduction:

> This woodworking safety code is primarily intended to cover the hazards of the "point of operation" in woodworking machinery from the crude lumber to the finished product.
>
> It further offered this as the scope of the standard:
>
> This code is intended as a guide for the safe operation and maintenance of wood-working machinery, including cooperage and making of veneer. It deals primarily with "point of operation" hazards on woodworking machinery.

The cover page of the standard indicates it was sponsored by the International Association of Industrial Accident Boards and Commissions, and the National Bureau of Casualty and Surety Underwriters. It was further approved as a "Tentative American Standard" by the American Engineering Standards Committee (AESC) on October 16, 1924. The AESC later became the American Standards Association (ASA) and today is known as the American National Standards Institute (ANSI).

A revision of the 1924 standard was sponsored by the International Association of Industrial Accident Boards and Commissions and The National Bureau of Casualty and Surety Underwriters. That revision was approved by the ASA and issued in 1930 as Bureau of Labor Statistics Bulletin No. 519.

The first standard revision bearing the O1.1 designation was approved by the ASA in 1944. The standard title was changed to American National Safety Code for Woodworking Machinery.

The Standards Committee was reorganized in 1952, and the scope of the standard was changed to exclude the manufacture of structural plywood. A comprehensive revision of the section on cooperage machinery was completed and a new section dealing with radial-type saws was included. The resulting standard was issued in 1954 and reaffirmed in 1961.

In 1969 the Standards Committee was again called and revised the 1954 (R1961) standard. The 1971 revision was retitled American National Standard Safety Requirements for Woodworking Machinery. Several issues related to guarding were corrected and clarified. The revision also incorporated as a section of the standard an important head note in Section 6.1 of earlier versions of this standard.

The standard was again revised and issued in 1975. In 1979 an amendment was made to the 1975 edition. Subsequent updates were published in 1992, 2002, 2004, 2009 and 2013.

Prior to the 2004 edition, the committee adopted a resolution regarding the US Occupational Safety and Health Administration (OSHA). The resolution remains in agreement with this edition and is therefore reproduced here:

> Resolved: As the standards developed by this committee are relevant to the health and safety of workers in the woodworking industry, and as this committee is charged with developing such standards and recognized for its expertise in woodworking industry safety and machinery, it is the intent and expectation of this committee that newly published versions of standards developed by this committee be adopted by the US Department of Labor as regulations under the United States Occupational Safety and Health Act.

The 2004 edition marked the beginning of a new process for the standard. Hereafter, new standards for specific machine types will be developed within the scope of the O1.1 standard. Thus, the O1.1 standard will be developed and applied as an "umbrella" under which subsequent standards are developed.

This edition of the O1.1-7 standard carries on to the umbrella standard process by introducing a machine specific standard for table saw type woodworking machines.

Prior to the publication of the current edition of O1.1, the Accredited Standards Committee O1 (ASC O1) adopted a resolution regarding standards governing the safety of woodworking machinery that are developed outside the dominion of ANSI. The resolution remains in agreement with this edition and is therefore reproduced here:

> Resolved: As part of the ASC O1 responsibility for developing standards applicable within the region of influence of the American National Standards Institute (ANSI), the ASC O1 endeavors to maintain reasonable awareness of standard developments occurring outside that ANSI dominion. The ASC O1 resolves to remain vigilant for opportunities of alignment with such standards whenever possible and in so far as it furthers the safety of woodworking machinery applications.

Changes Found in This Version:

> This is the first edition of this standard.

Suggestions for improvement of this standard are welcome.

They should be sent to the Wood Industry Association, 2331 Rock Spring Road, Forest Hill, MD 21050

allison@woodindustry.org.

Effective Date

The following information on effective dates is informative guidance only, and not a normative part of this standard. The Accredited Standards Committee O1 (ASC O1) recognizes that some period of time after the approval date on the title page of this document is necessary for suppliers and users to develop new designs, and/or modify existing designs or manufacturing processes in order to incorporate the new and/or revised requirements of this standard into their product development or production system.

The ASC O1 Standard Development Committee recommends that suppliers complete and implement design changes for new machinery and machinery systems within 30 months of the approval of this standard.

The ASC O1 recommends that users evaluate whether existing machinery and machinery systems can implement the requirements of this new edition within 30 months of the approval date of this standard using generally recognized risk assessment methods. If the risk assessment shows that modification(s) is necessary, refer to the applicable requirements of this standard or the machine-specific safety standard of the ANSI O1 safety standards to implement risk reduction measures (protective measures) for appropriate risk reduction.

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This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee O1 (ASC O1).

The following list represents membership at the time the committee was balloted on the final text of this edition. Since that time, changes in membership may have occurred:

Full Name	Interest Category	Sponsoring Organization
Jack Hyde, *Chairman*		System Safety Society
Richard Otterbein, *Vice-Chairman*		Affiliated Engineering Laboratories, Inc.
Al Weaver		American Society of Safety Professionals
Amanda Johnson		SawStop LLC
Brad Graves		Accu-Router, Inc.
Bruce Rosenthal		U.S. TAG to ISO/TC 39/SC 4
Bryon Snapp		Oregon OSHA
Chuck Arnold		Kitchen Cabinet Manufacturers Association
David Felinski		B11 Standards, Inc.
Drew Hornick		Power Tool Institute
Eric Ruzicka		UL Solutions
James Orr		James L. Taylor Mfg./Cameron Automation
Jason Hunter		
Mark Nobles		Grizzly Industrial
Ted Sberna		White Horse Safety
Warren Weber		Standards Consultant (WIA)
Tom Onsrud		C. R. Onsrud Inc.
Alternates		
George Pfreundschuh *(Alt.)*		Affiliated Engineering Laboratories, Inc.
Andy Phan *(Alt.)*		SawStop LLC
Dave Miller *(Alt)*		White Horse Safety
Staff		
Allison Forsythe		Wood Industry Association

STANDARD REQUIREMENTS	EXPLANATORY INFORMATION (*These notes are not a mandatory part of this standard)*
1 Scope, Purpose, and Application	
1.1 Scope This standard covers the safety requirements for the design, installation, care and use of table saws and accessory equipment, used in industrial and commercial applications, having a total connected power of 5 hp (3.7kw) or greater, or having 3-phase wiring.	*E.1.1 Scope* *Design of products outside of the scope of this standard and not specifically excluded in paragraph 1.1.1 are referred to ANSI/UL 987, the ANSI/UL 62841 series of standards or other standards covered by individual requirements.* *Governmental, educational, and similar institutions as well as business establishments are considered commercial applications in this standard.* *A stationary table saw is not intended to be taken to various job site working areas.*
1.2 Additional Requirements This machine specific standard is intended to be used in conjunction with ANSI O1.1, Safety Requirements for Woodworking Machinery. Where contradictions exist, this machine specific standard shall be the controlling requirement.	*E.1.2 The ANSI O1.1, Safety Requirements for Woodworking Machinery, standard is periodically updated; the user should consult the current version of the standard.*
1.2.1 Description of Dimension "D" "D" as referenced throughout this standard is the manufacturer recommended diameter of the saw blade.	
1.3 Application The purpose of this standard is to establish the safety requirements for the design, installation, care and use of table saws and accessory equipment covered by this standard.	

2 Definitions The definition of a term in this standard is for the purpose of the standard and is not to be construed as universal in its application.	*E2. Definitions* *For additional applicable definitions, refer to ANSI O1.1. Some definitions from O1.1 are repeated in this standard when a machine specific explanatory note is provided.*
2.1 Adjustable Extended Riving Knife A device designed to function at least in one position as an extended riving knife and in a second position as a riving knife. [ASTM]	*E2.1 Adjustable Extended Riving Knife* *See Figure 108.*
2.2 Anti-Kickback Device See ANSI O1.1 clause 2.1.5.	*E2.2 Anti-Kickback Device* *See Figure 43.8.*
2.3 Blade Guard [IEC] Device mounted above the table such that a workpiece will pass between the mounted device and the table, designed to minimize inadvertent saw blade contact by the operator.	*E2.3 Blade Guard* *Blade guards are also known as saw blade guards.*
2.4 Crosscutting Fence See ANSI O1.1 2.1.14.	*E2.4 Crosscutting Fence* *See 2.10 Miter gauge.*
2.5 Cutting Capacity [IEC] For any depth setting of the saw blade at 0° bevel position, the height of the highest saw blade tooth tip above the tabletop.	*E2.5 Cutting Capacity* *For any depth setting of the saw blade, at bevel angles other than 0°, the height of the highest saw blade tooth tip above the tabletop, but only the side of the tooth closest to the table is considered.*
2.6 Cutting Edge Zone [IEC] The outer 20% of the radius of the saw blade.	*2.6 Cutting Edge Zone* *See Figure 43.2.*
2.7 Extended Riving Knife A device in all aspects identical to a riving knife, except it extends above the maximum cutting capacity of the saw blade to allow the mounting of a saw blade guard or an anti-kickback device, or both. [ASTM]	*E2.7 Extended Riving Knife* *An extended riving knife can be either adjustable or fixed.* *(See Figure 108.)*

2.8 Fixed Extended Riving Knife An extended riving knife that is fixed in position. [ASTM]	
2.9 Kickback [IEC] Sudden reaction to a pinched, bound, or misaligned workpiece with respect to the saw blade, which causes the workpiece to be propelled by the saw blade.	
2.10 Miter Gauge See ANSI O1.1, clause 2.1.48.	
2.11 Non-Through Cutting [IEC] Any cutting operation where the cutting tool does not protrude through the thickness of the workpiece.	*E2.11 Non-Through Cutting* *Examples of non-through cutting include dado cutting, grooving, rabbeting/rebating, and grooving/slotting/kerfing.*
2.12 Over-Arm Blade Guard Hood type barrier designed to reduce the risk of inadvertent contact with the portion of the saw blade extending above the tabletop. The hood barrier is not attached to a splitter, riving knife or an extended riving knife, but can be suspended from the ceiling, or held by a supporting arm or a standalone device.	*E.2.12 Over-Arm Blade Guard* *An over-arm blade guard is also known as over-head blade guard. When used for through-sawing, the riving knife and the anti-kickback devices are mounted to the table saw under the tabletop.*
2.13 Rip Fence A workpiece guiding device that has the workpiece guiding face parallel with the plane of the saw blade and can be set to a desired distance from the saw blade	*E2.13 Rip Fence* *Table saw fences are also known as guides.*
2.14 Riving Knife A device located behind and in the plane of the saw blade, within the cutting capacity of the saw blade and in a fixed proximity to the saw blade through an entire depth of cut and bevel angle operating range of the saw blade, with an intended function to reduce the risk of saw blade pinching and binding. [ASTM]	*E2.14 Riving Knife* *See also Extended Riving Knife, Adjustable Extended Riving Knife, and Fixed Extended Riving Knife.* *See Figure 108.*

Riving knives are designed to reduce the risk of the saw blade kerf in the cut workpiece from closing on the sides of the saw blade during a sawing operation.	
2.15 Splitter/Spreader A device located behind and in the plane of the saw blade, extending above the cutting capacity of the saw blade through the entire depth of cut and bevel operating range of the saw blade. [ASTM]	*E2.15 Splitter/Spreader* *Spreader is synonymous with splitter. Spreaders are designed to reduce the risk of the saw blade kerf in the cut workpiece from closing on the sides of the saw blade during a sawing operation and are typically utilized for mounting the blade guard and/or antikickback pawls. Because spreaders are mounted independently of the blade elevation mechanism, the distance between the spreader and blade changes when the blade elevation is changed.*
2.16 Stationary Table Saw A stationary type table saw is not intended to be moved to various working areas.	
2.17 Table Saw See ANSI O1.1, clause 2.2.9.	*E2.17 Table Saw* *Saws of this type are known as buzz, variety, rip, crosscut, table, table, tilting table, tilting arbor, sliding table, dimension, and similar names. On some saws of this type, the arbor may be raised or lowered. Saws of this type can have an arbor or a table which can be adjusted at an angle for beveling and compound miter cuts. Some machines of this type may use dado or molding cutters and other arbor mounted tooling. Table saws may be manually fed or power fed using universal feeders or, where so designed, with sliding tables.*
2.18 Through Cutting Any cutting operation where the saw blade protrudes through the thickness of the workpiece.	

3 Normative References The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard.	*E3 Normative References* *Not all normative references will necessarily apply to a specific application. The reader is responsible to determine and obtain the normative references that apply to the particular situation under consideration.* *For example, ANSI O1.1 lists an entire series of normative references which should all be applicable; each of those normative references may contain additional normative references that a manufacturer or user may not need.* *At the time of publication, the editions indicated were valid. All standards are subject to revision. Users are encouraged to review the most current editions.*
3.1 ANSI Standards ANSI O1.1 Safety Requirements for Woodworking Machinery	
3.2 ASTM Standards ASTM E3280 (2022), Standard Guide for the Safe Use of Table Saws.	
4 Hazard Identification and Control Clause 4 of ANSI O1.1 applies.	
5 Standards for Design	
5.1 Blade Guard	
5.1.1 Blade Guard Construction The table saw blade guard may be attached to an extended riving knife, or other equivalently effective mounting means. Mounting technology for new machinery shall consist of: (a) A self-adjusting modular blade guard system attached to an extended riving knife; or	

(b) An over-arm blade guard. Mounting technology for existing and rebuilt machinery that cannot be modified to support a riving knife shall consist of: (a) a splitter mounted hood type blade guard, or (b) An over-arm blade guard.	
5.1.1.1 Blade Guard Material Requirements The blade guard system shall be provided with openings and/or be made of a transparent material to allow viewing of the cutting edge, which is where the saw blade enters the top of the workpiece as viewed from the normal operator's position. Any portion of the blade guard that may contact the rotating saw blade shall be made of material (e.g. aluminum, plastic) that is unlikely to shatter or spark or cause tooth breakage of the saw blade.	
5.1.1.2 Self-Adjusting Blade Guarding The blade guard shall be one of the risk reduction measures for avoiding inadvertent contact with the blade cutting-edge zone. 1. The top barrier shall extend at least 1 in (25.4 mm) forward from the front edge of the saw blade above the tabletop at maximum blade elevation. 2. If an opening is provided at the top barrier of the blade guarding system, the opening shall not extend to the rear (outfeed) quadrant of the saw blade.	
5.1.1.3 Side Barrier Requirements [UL] The side barriers may be independent of each other or may be combined in construction and movement. Side barrier(s) of the blade guard systems shall guard at least the outer 20% of the radius of the saw blade.	

In addition, for guards mounting to riving knives, side barriers shall protect the guarded area of the saw blade (illustrated in Figure 43.2[UL]), as indicated in (1) or (2): 1. For an adjustable extended riving knife, between the tip of the extended riving knife and the point where the saw blade tooth intersects the tabletop in the front quadrant of the saw blade; or 2. For a fixed extended riving knife, the front quadrant of the saw blade.	
5.1.1.4 Blade Guard Alignment The blade guard shall be so designed and mounted to be reliable in its intended operation, and it will resist reasonable forces encountered which may tend to move it out of parallel alignment with the saw blade.	
5.1.1.5 Over-Arm Blade Guard The manufacturer of an over-arm blade guard shall provide a self-adjusting or fixed blade guard that accommodates the use of a splitter or riving knife and anti-kickback device. Saws utilizing over-arm blade guards shall have provision for mounting a riving knife or splitter. The manufacturer of the adjustable over-arm blade guard shall provide warnings and instructions to properly adjust the guard for the intended cutting operation.	*E5.1.1.5 Over-Arm Blade Guard* *Over-arm blade guards have historically been provided by the machine manufacturer or aftermarket providers.* *The employer, therefore, must supervise the proper installation, maintenance, and use of all the blade guarding components, such as blade guard, antikickback device and extended riving knife. (See Clause 6 for employer responsibility.)*
5.1.1.6 Fixed Over-Arm Blade Guard A fixed over-arm blade guard shall be capable of covering the top of the exposed saw blade during the cutting operation and designed such that, with the workpiece beneath the blade guard, any clearance between the saw table and blade guard and the workpiece top and blade guard is capable of complying with ANSI B11.19, Performance	

Requirements For Risk Reduction Measures: Safeguarding And Other Means Of Reducing Risk . A self-adjusting over-arm blade guard shall meet the test of section 5.1.3.1, Test: access to the cutting-edge area.	
5.1.2 Blade Guard Performance	
5.1.2.1 Self-Adjusting Guard Beveling [UL] Either one or both sides of the blade guard shall rest on the table and automatically adjust to the thickness of the advancing workpiece and shall remain in contact with the workpiece for all depths of cut and bevel positions of the saw blade. If only one side barrier rests on the table or the workpiece with the saw blade set at its 0° bevel position, the other side barrier shall rest on the table or the workpiece when the saw blade is moved to its maximum bevel position.	
5.1.2.2 Modular Blade Guarding System When used, a modular blade guard system shall consist of a blade guard, an antikickback device and an extended riving knife.	
5.1.2.2.1[IEC] Modular Blade Guard Component Mounting The modular blade guard shall be mounted to the extended riving knife, independently or in combination with the anti-kickback device. The removal of the blade guard shall not affect the performance of the extended riving knife. The anti-kickback device shall be capable of being disabled or removed without influencing the performance of the blade guard function and of the extended riving knife.	
5.1.3 Blade Guard Testing	
5.1.3.1 Test: Access To The Cutting-Edge Area[UL] Probe ”a” of Figure 43.1[UL], with its axis parallel with the plane of the table and perpendicular to the	

cutting line of the saw blade, shall be advanced from any direction (as illustrated in Figure 43.2[UL]) to the saw blade in a straight line, with the saw blade set at 0° bevel orientation and maximum depth of cut setting. Without lifting the side barriers, the probe shall be applied with a force of 1.12 lbf (5 N) and shall not contact the cutting-edge zone of the saw blade. At any other depth and bevel angle settings, the probe advanced under the same conditions as stated above shall not contact the tip of the blade teeth.	
5.1.3.1.1[UL] Top Barrier Guard The top barrier guard above the saw blade in conjunction with the extended riving knife shall prevent probe X of Figure, 43.1[UL] applied with a force of 1.12 lbf (5 N), from contacting the blade when the probe is advanced in a straight line that is perpendicular to the table and such that a plane of the extended riving knife intersects the finger of the probe. The test is performed at the 0° bevel blade setting.	
5.1.3.1.2 Front Quadrant Opening Where operator visibility is provided by a front quadrant opening in the top barrier guard, the opening shall either prevent probe X of Figure 43.1[UL] from contacting the saw blade or maintain a minimum distance from the opening to the blade no less than 3 times the width of the opening.	
5.1.3.1.3[UL] Sawdust Ejection Opening A blade guard with an opening for the ejection or collection of sawdust shall not allow a 0.5 in. (12.7 mm) diameter probe with hemispherical tip to contact the saw blade when inserted 2.5 in. (63.5 mm) into the opening and applied with a force of 1.12 lbf (5 N).	
5.1.3.2 Test: Undue Resistance A self-adjusting blade guard shall not offer excessive resistance to manually feeding a workpiece.	

The following test shall be performed, and no part of the blade guard system shall contact the saw blade.	
5.1.3.2.1 Guard Feed Resistance Test Protocol [UL][IEC] Each test workpiece shall be common wood, have a width dimension wide enough to fully engage both sides of the saw blade barrier guarding system, have a length of at least 2D, and a front leading end that has been cut to a 45° miter angle with a 0° bevel angle. With the saw blade set at the maximum depth of cut position for each test, the test workpiece is cut at a rate of approximately 4 ft./min. (1.2 m/min.). One complete rip cut is performed for each applicable combination of workpiece thicknesses with specified miter angles and blade bevel settings as specified below. The workpiece shall be guided with a fence, and the workpiece shall be centered about the saw blade and engaging both sides of the blade guarding system. Workpiece approximate thickness and miter angle orientation of the workpiece leading end shall be: 1) 25 % of the cutting capacity and: i) With a miter angle of 45° right (+); and ii) With a miter angle of 45° left (-). 2) 50 % of the cutting capacity and: i) With a miter angle of 45° right (+); and ii) With a miter angle of 45° left (-). The test is conducted in accordance with 1) and 2), with the saw blade set to 0° bevel angle. The test is then repeated in accordance with 1) and 2), with the saw blade set to the maximum bevel angle setting, but not more than 45°.	

During the tests, the saw blade guarding system shall self-adjust and allow the free passage of the test workpiece 1) Without being manipulated or contacted by devices such as push stick, push pad, or rip fence, and 2) shall not be displaced to a point where it contacts the cutting-edge zone of the saw blade, and 3) the riving knife shall not interfere with the passage of the workpiece.	
5.1.3.3 Test: Workpiece Height Clearance The blade guard and/or the anti-kickback device(s) attached to the extended riving knife shall allow the passage of material to the saw blade, at any depth-of-cut and bevel setting, where the thickness of the material is less than or equal to the saw blade height above the table of the saw.	
5.1.3.3.1 Workpiece Height Test Protocol [IEC] To verify workpiece clearance, test blocks at least 19.7 in. (500 mm) long and having sufficient width for the blade guard to remain in contact with the top surface of the test block is guided by the rip fence on the tabletop with the block to be cut down the middle of the width. The front edge of the test blocks shall be perpendicular to the tabletop and at 0° miter angle. For slide saws the test is carried out with the slide mechanism locked in a stationary position. A test block having a thickness equal to the cutting capacity, for the appropriate bevel and depth of cut settings, shall move without any interference during the cut from the front to the back end of the table.	
5.1.3.3.2 Workpiece Height Infeed Limit [UL] The blade guarding system shall not allow the passage of material to the saw blade where the material is equal to the saw blade height above the table of the saw for any depth-of-cut setting, plus:	

1) 0.25 in. (6 mm) at the maximum bevel setting; and 2) 0.40 in. (10 mm) at the 0° bevel setting	
5.2 Riving Knife The requirements in this section apply to the riving knife. Requirements that also apply to the extended riving knife are specified.	*E5.2 Riving Knife* *The adjustable extended riving knife is in the extended position when used with the attachment mechanism for the guard and/or antikickback device. The adjustable extended riving knife is in the riving knife position when all attachments, such as the blade guard and the antikickback device, are removed and, at any depth of cut setting, the adjusted extended riving knife is below the blade height above the tabletop.*
5.2.1 Riving Knife Construction 1) The thickness of the riving knife or extended riving knife shall be thicker than the body of the saw blade provided and specified by the manufacturer and thinner than the kerf width of that saw blade. 2) The riving knife shall have a width, measured at the tabletop level and with the blade set at the maximum cutting capacity, at least equal to 1/6 D for the riving knife or 1/5 D for the extended riving knife. 3) The faces of the riving knife or extended riving knife shall be parallel planes and smooth; the edges shall not be sharp and shall be chamfered on the edge facing the saw blade. 4) The riving knife or adjustable extended riving knife shall have a rounded tip with a radius of 0.16 in. or greater (4 mm). 5) The riving knife or extended riving knife shall be rigidly fixed and in parallel alignment with the plane of the saw blade. [UL]	
5.2.1.1 Riving Knife Material [UL] The riving knife or extended riving knife shall be made of steel with a hardness of between 38 – 48	

HRC and a resistance to rupture at least equal to 116,000 psi (800 MPa) or other equivalent material.	
5.2.1.2 Riving Knife Blade Clearance For all cutting blades recommended by the manufacturer, any type of riving knife and its holder shall be so constructed as to comply with the following specifications: (a) The linear distance above the table between the riving knife (except for its tip) or extended riving knife and the edge of the blade at its closest point to the saw blade shall be: 1) A minimum of 0.12 in. (3 mm); and 2) A maximum of 0.31 in. (8 mm) at any point, as shown in Figure 43.4; and b) The highest point of a fixed riving knife or adjustable extended riving knife in the non-through sawing position shall be at least 0.04 in. (1 mm) but not more than 0.20 in. (5 mm) below the highest point of the saw blade.	
5.2.2 Riving Knife Performance [UL] The riving knife or extended riving knife shall be located behind the saw blade and pass freely through the cut groove in the workpiece. The mounting means shall be designed to allow the riving knife to be properly aligned and positioned relative to the saw blade for all operating positions of the saw blade.	*E5.2.2* *The mounting for a riving knife must allow for top to bottom (vertical) and front to back (horizontal) adjustment to allow the riving knife to maintain proper saw blade alignment and clearance for all saw blade positions.*
5.2.2.1 Riving Knife Adjusting Means [UL] Except for initial setup, the installation, removal, or the adjustment of the riving knife or extended riving knife to a desired operating position recommended by the manufacturer shall be accomplished either: a) Without the aid of a tool; or b) With a tool provided with the table saw, or	*E5.2.2.1* *Adjusting the riving knife to its proper operating position (through-sawing or non-through sawing) should be easy to accomplish to encourage proper riving knife usage.*

c) With a tool of a commonly available type.	
5.2.3 Riving Knife Testing	
5.2.3.1 Test: Riving Knife Rigidity The riving knife and its holder shall have the rigidity to comply with the following test.	*E5.2.3.1 Riving Knife Rigidity* *As a result of the saw blade depth and bevel angle adjustment, the riving knife must resist reasonable side forces to maintain its functional spacing and alignment with the saw blade. Functional alignment includes self-restoration of alignment when reasonable side forces cause any sideways deflection. Examples of side forces can include gravity and contact of workpieces with the blade guard leading edge during miter and bevel cutting*
5.2.3.1.1 Riving Knife Rigidity Test Set Up [IEC] Prior to the tests, the table saw is set up as follows: a) The saw blade is set to maximum cutting capacity. The riving knife is mounted in accordance with the instructions. b) For riving knives or adjustable extended riving knives in the riving knife position: within their construction limits, they are adjusted to their minimum distance at the tip radius in accordance with 5.2.1.2(a), and to their highest position in accordance with 5.2.1.2(b). At the center of the tip radius a small test hole is drilled to accommodate the test. c) For fixed extended riving knives and adjustable extended riving knives in the extended riving knife position: within their construction limits, they are adjusted to their minimum distance to the top of the saw blade, in accordance with 5.2.1.2(a). To accommodate the test, a small test hole is drilled 0.08 in. (2 mm) radially from the edge facing the saw blade and at the height from the tabletop equal to the maximum cutting capacity minus 0.12 in. (3 mm).	

d) For adjustable extended riving knives: small test holes are drilled in both locations according to b) and c) above and test 1 and test 2 below are conducted for the position yielding the most adverse result.	
5.2.3.1.2 Riving Knife Rigidity Test Protocol [IEC] 1) At the hole provided for this test, a pull force of 112 lbf (500 N) is applied for 1 min. opposite to the direction of feed and parallel to the tabletop as shown in Figure 108. While the force is being applied, the riving knife shall not deflect or displace and contact the saw blade teeth. In addition, after the test, the linear spacing between the tips of the saw blade and the riving knife shall not be less than 0.08 in. (2 mm). 2) At the hole provided for this test, a pull force of 6.7 lbf (30 N) is applied for 1 min. perpendicular to the direction of feed and parallel to the tabletop, as shown in Figure 109[IEC]. The test is done in both directions. After each test, the riving knife shall be within the planes defined by the teeth of the saw blade supplied with the table saw.	
5.3 Anti-Kickback Device	*E5.3 Anti-Kickback Device* *Historically, antikickback devices for through-sawing operations have been self-adjusting antikickback pawls. Any system meeting these performance requirements may satisfy this standard whether using pawls or not.*
5.3.1 Anti-Kickback Device Construction [UL] The table saw anti-kickback device(s) may be attached to an extended riving knife or other effective mounting means.	
5.3.1.1 Anti-Kickback Device Mounting Anti-kickback device(s) shall be: 1) Easily enabled, removed, replaced or disabled without adjustment or removal of the extended riving knife; and	

2) Mounted independently from the side barriers of the blade guard. [UL]	
5.3.2 Anti-Kickback Device Performance The anti-kickback device shall be operable for all workpiece thicknesses up to the full through-cutting capacity of the saw and shall be self-adjusting.	
5.3.3 Anti-Kickback Device Testing	
5.3.3.1 Test: Anti-kickback Workpiece Removal [UL] The anti-kickback device shall provide sufficient constraint to prevent removal of the workpiece having a thickness within the capacity range of the table saw.	*E5.3.3.1 Test: Anti-kickback Workpiece Removal* *Antikickback devices must be reasonably able to engage the workpiece over the rated range of cutting capacities.*
5.3.3.1.1 Anti-Kickback Workpiece Removal Test Protocol With the table saw set to the maximum cutting capacity, feed a piece of wood, such as pine, with a thickness of approximately 25 % of the maximum cutting capacity into the anti-kickback devices from the feed direction, so that approximately 2 in. (50 mm) is fed past the point where the anti-kickback device contacts the wood. With the wood in place under the anti-kickback device, attempt to remove the wood by pulling the wood opposite to the direction of feed and parallel to the tabletop with a force of 4.5 lbf (20 N) for a time between 5 s and 10 s. [IEC] Repeat the test with a thickness of approximately 90 % of the maximum cutting capacity. It shall not be possible to completely slide the material out from under the anti-kickback device.	
5.3.3.2 Test: Anti-Kickback Device Restraint The anti-kickback device shall have the strength and rigidity to meet the following test requirements:	
5.3.3.2.1 Anti-Kickback Device Restraint Protocol	*E5.3.3.2.1 Anti-Kickback Device Restraint Protocol*

1. The saw blade shall be set to a maximum depth of cut at 0° bevel. If the anti-kickback device(s) is supported by the extended riving knife, it shall be set to the extended position and adjusted to the highest position near the top of the saw blade. [UL] 2. A smoothly planed wooden test block, made of soft wood, such as pine, of thickness approximately 25% of the maximum cutting capacity is partially split (ripped) long enough to reach from the front of the saw blade approximately 2 in. (50 mm) past the rearmost end of antikickback devices. 3. The antikickback device(s) shall contact and engage the test block with a force in the horizontal kickback direction not exceeding 1.12 lbf (5N). [UL] 4. Apply 112 lbf (500 N) to the front of the test block in the direction opposite the feed. The force shall be applied by a flexible cable attached to the center of the test block thickness, in the plane of the saw blade and parallel to the tabletop. The force shall be applied by a mass suspended from the cable run over a minimal friction pulley. (See figure 43.8[UL])	*The test setup specified is intended to apply a static load to the test workpiece and antikickback system. Cable, pulley and load selections should be made to minimize resistance to cable movement and minimize dynamic force absorption by any of the test fixture components.*
5.3.3.2.2 Anti-Kickback Device Restraint Performance [UL] During the test, the antikickback device(s) shall: 1) Not be permanently deformed; 2) Shall remain attached to its support; 3)Shall remain engaged with the test block; and 4) The extended riving knife or the alternative supporting member shall not contact the saw blade.	

5.4 Fence	
5.4.1 Fence Construction The fence shall be designed to permit proper alignment with the saw blade and be capable of being clamped so that it remains in position and parallel to the saw blade.	
5.4.1.1 Fence Strength [IEC] A rip fence shall be rigid and have sufficient strength to guide the workpiece under reasonably expected ripping operations.	
5.4.1.2 Fence Material [IEC] The portion(s) of the rip fence that may incidentally contact the rotating saw blade shall be made of material (e.g. aluminum, plastic, etc.) that is unlikely to shatter or spark or cause tooth breakage of the saw blade.	
5.4.1.3 Fence Guiding Surfaces [IEC] The rip fence shall have at least two guiding surfaces perpendicular to the tabletop. The guiding surfaces shall be straight. One of the guiding surfaces when facing the saw blade shall have a minimum height of 2/3 of the maximum cutting capacity and the other guiding surface when facing the saw blade shall have a height between 1/10 and 1/5 of the maximum cutting capacity and wide enough for the fence not to interfere with the side barrier(s) of the blade guard. **EXCEPTION:** For existing machines originally designed with a rip fence having a single height guiding surface(s), the employer shall provide an auxiliary fence dimensioned to this requirement's lower fence height and spacing requirements for use in any ripping operation where the existing fence height would interfere with the side barrier(s) of the blade guard.	
5.4.1.4 Fence for Beveling Operations [IEC] If the rip fence can be used on the beveling side of	

the tabletop, the lower guiding surface shall be capable of facing towards the saw blade.	
5.4.1.5 Fence/Table Clearance The maximum gap measurement between the tabletop and the bottom of the rip fence, shall be less than 0.08 in. (2 mm).	
5.4.1.6 Fence Guiding Surface Length The fence design shall provide continuous horizontal guiding support for any intended rip fence position. The guiding support is provided from at least the front (infeed) edge of the tabletop surface to the center of the saw blade.	
5.4.1.7 Cross-cutting Fence [IEC] For saws equipped with a crosscutting fence: If the crosscutting fence is not laterally adjustable, it shall not contact the blade guard at any saw blade orientation. If the crosscutting fence is laterally adjustable, it shall: 1. be capable of being secured in a position to prevent contact with the blade guard at any saw blade orientation, and 2. the portion(s) of the adjustable cross-cutting fence that may incidentally contact the rotating saw blade shall be made of material (e.g. aluminum, plastic, etc.) that is unlikely to shatter or spark or cause tooth breakage of the saw blade.	
5.4.1.8 Miter Gauge	
5.4.1.8.1 Miter Gauge Adjustment The miter gauge head shall be adjustable to support angled crosscut (miter) operations.	
5.4.1.8.2 Miter Gauge Face Board Mounting The miter gauge shall provide a means to mount facing boards or fixtures to the adjustable head face.	

5.4.1.8.3 Miter Gauge Travel The miter gauge shall be designed: 1. so that it can be used without contacting the saw blade or blade guard during use. 2. to slide freely along guide slot(s) in the tabletop that are parallel to the plane of the saw blade. 3. such that it will not entirely lift or swing out of position and shall be supported by the tabletop once inserted into the guide slot(s).	
5.4.2 Fence Performance When the saw blade is set for maximum cutting capacity and the low guiding surface of the rip fence is positioned so it is touching the saw blade, the side barrier(s) of the blade guard shall be free to be lifted, without inducing any sideway displacement, at least just above the maximum cutting capacity and then free to self-return onto the surface of the low rip fence. No portion of the rip fence shall obstruct the free movement of the side barrier(s) of the blade guard.	
5.4.3 Fence Testing	
5.4.3.1 Test: Rip Fence Clamping [IEC] A rip fence shall allow for parallel setting with the saw blade. The rip fence guiding surface shall consistently align parallel with the saw blade at any clamped position. The deviation from the parallel position shall be less than 0.003D. For table saws with sliding function, the saw blade is locked in the rip-cutting position.	
5.4.3.1.1 Rip Fence Clamping test protocol [IEC] Fit the table saw with a true planar metal disc with diameter D and set to maximum cutting capacity. For a rip fence that does not extend past the center of the saw blade, a straight edge extension is attached to the workpiece guiding surface. The rip fence is moved and set or clamped/unclamped to 3 random positions on each side of the saw blade between 20 %	

and 80 % of the “b” or “c” tabletop dimensions (see Figure 113[IEC]) from the saw blade as applicable. The distance from the rip fence to the front and back edge of the disc is measured less than 0.24 in. (6 mm) above the tabletop level. The difference between the two measurements at the given fence location is recorded as a deviation from parallelism.	
5.4.3.2 Test: Rip Fence Rigidity [IEC] A rip fence shall be rigid and have sufficient strength to guide the workpiece under reasonably expected ripping operations. The normal displacement of the rip fence with respect to the saw blade under typical load shall be less than 1/32 in. (0.8 mm).	
5.4.3.2.1 Rip Fence Rigidity Test Protocol [IEC] The rip fence shall be set with its higher guiding surface and clamped at one position between 20 % and 80 % of the ”b” or ”c” tabletop dimensions (see Figure 113[IEC]) from the saw blade on each side of the saw blade, if applicable. Apply a force in a direction away from the saw blade, perpendicular to the vertical plane of the rip fence through the center point of a hard wood block 5 in. (125 mm) long that is sufficiently thick to distribute the load, and, when placed on edge against the rip fence, has a height equal to the height of the rip fence (while resting on the tabletop surface). The test is conducted at two positions: 1) The block is positioned to be flush with the front edge of the tabletop and a force of 28 lbf (125 N) is applied at the center point of the block. 2) The block is centered between the center and the front edge of the saw blade. A force is applied at the center point of the block equal to 28 lbf (125 N). While the force is applied, measure the displacement of the rip fence surface contacting the block at the	

corresponding center point of the block with respect to a stable reference point on the tabletop.	
5.5 Table Insert	*E5.5 Table Insert* *Table inserts are also known as throat plates.*
5.5.1 Table Insert Construction The table insert shall be securely held in place to reduce the risk of unintentional removal while the saw is in operation.	
5.5.1.1 Table Insert Color The table insert shall be a color contrasting the tabletop surface. [UL] The edge of the table insert adjacent to the side of the saw blade and within 0.6 in (15 mm) of the cutting-edge zone shall be made of material (plastic, wood, etc.) that is unlikely to shatter or spark or cause tooth breakage of the saw blade.	
5.5.1.2 Table Insert Position [IEC] The table insert shall be of a planar design such that, when installed, in accordance with the instructions, no portion of the table insert or saw blade access panel is above or more than 1/35 in. (0.7 mm) below the plane of the tabletop surface at the infeed side and no portion of the table insert or saw blade access panel is below or more than 1/35 in. (0.7 mm) above the plane of the tabletop at the out-feed side.	
5.5.1.3 Table Insert Size The table insert shall be of a size such that the table opening with the insert removed shall accommodate the changing of the cutting tool and tightening of the arbor fastener. **EXCEPTION**: This requirement does not apply to table saws provided with saw blade access separate from a table insert.	
5.5.1.4 Table Insert Slot Width For saws with table inserts fully surrounded by a fixed table, the width of the slot for a single saw blade shall	

not exceed 0.47 in. (12 mm) plus the kerf width of the thickest saw blade recommended by the manufacturer throughout the bevel range. [IEC]	
5.5.1.4.1 For saws with inserts adjoining sliding tables, the width of the single saw blade opening created by the insert and the sliding table edge shall not exceed 0.47 in. (12 mm) plus the kerf width of the thickest saw blade recommended by the manufacturer throughout the bevel range.	
5.5.1.4.2 The width of the slot for cutting tools other than single saw blades, e.g. dado, shall not exceed 0.47 in. (12 mm) plus the maximum kerf width of the cutting tool recommended by the manufacturer. [IEC]	
5.5.1.5 Zero-Clearance Table Insert A zero-clearance table insert shall accommodate the passage of the riving knife splitter/mounting throughout the bevel range. The slot for the saw blade may be cut by the saw blade of the table saw. **EXCEPTION:** An opening to accommodate a riving knife spreader/is not required for operations where a riving knife spreader/ cannot be used.	
5.5.1.5.1 Zero-Clearance Table Insert Material The zero-clearance table insert shall be made of a material (e.g., aluminum, plastic, etc.) unlikely to shatter or spark or cause tooth breakage of the saw blade.	
5.5.2 Table Insert Testing	
5.5.2.1 Test: Table Insert Probe Test [UL] If any opening is provided on the table insert, other than the slot for the cutting tool, it shall not allow probe X of Figure 43.1[UL] to contact the cutting-edge zone of the saw blade, when applied with a force of 1.12 lbf (5N) and in any direction through the opening, when the saw blade is set at 0° bevel and any depth of cut.	

5.5.2.2 Test: Unintentional Table Insert Removal [IEC] For a table insert or a saw blade access panel in the tabletop, a pull force perpendicular to the tabletop, as indicated below, is applied sequentially at locations that are in line and within a 1 in. (25 mm) distance from the front and back of the saw blade. – 2.2 lbf (10 N) for table inserts or saw blade access panels where the width of the saw blade slot is 0.24 to 0.47 in. (6 to 12 mm) plus the width of the thickest saw blade, – 13.5 lbf (60 N) behind the saw blade and 2.2 lbf (10 N) in front of the saw blade for zero-clearance table inserts or saw blade access panels where the width of the saw blade slot is less than 0.24 in. (6 mm) plus the width of the thickest saw blade. During the test, the table insert or the saw blade access panel shall not be elevated by more than 1 in. (25 mm) and after the test the table insert shall not obstruct the passage of the workpiece.	
5.6 Arbor	
5.6.1 Arbor Construction The arbor fastener shall be accessible from the top and/or side of the table to permit changing cutting tools and tightening of the arbor.	
5.6.1.1 Arbor Threading [UL] The arbor shall be threaded such that the saw blade-retaining fastener is tightened by the normal rotation of the arbor.	
5.6.1.2 Arbor Length Arbors shall be of sufficient length to securely engage the arbor fastener in a manner consistent with common engineering practice when the widest intended cutting tool is properly mounted. Arbors shall be short enough to clear the underside of the saw table in the maximum bevel position.	

5.6.1.3 Flange The manufacturer shall provide a saw blade flange system that laterally supports the saw blade. The bearing surface outer diameter of the saw blade supporting flange shall not be less than 1/4 D. At least one of the flanges shall be keyed to the output spindle or otherwise prevent from rotation with respect to the arbor. The radial overlap of the saw blade bearing surfaces of the inner and outer flange shall be at least 1/10 of the flange diameter. [UL]	
5.6.2 Arbor Performance The arbor shall have a normal rotation causing the portion of the saw blade above the table to rotate opposite of the workpiece infeed direction.	
5.6.3 Arbor Testing	
5.6.3.1 Test: Blade Retention [IEC] The saw blade retaining fastener(s) in conjunction with the spindle shall not loosen under any operations, saw blade acceleration during start-up and rapid saw blade deceleration induced by motor braking devices, if any.	
5.6.3.2 Blade Retention Test Protocol Compliance with 5.6.3.1 shall be determined as follows: The test with the most massive saw blade with diameter D intended to be used with the table saw. [IEC] The cutting tool is installed on the table saw. The table insert shall be removed for the test. With the saw blade not rotating, the table saw is started, allowed to reach operating speed and shut down. This cycle is repeated ten times. The saw blade shall not become loose at any time during the test. [IEC]	*E5.6.3.2 Blade Retention Test Protocol* *"Most massive" means the heaviest blade of Diameter D.*

5.7 Push Stick	
5.7.1 Push Stick Construction The push stick shall be of sufficient length to minimize the possibility of the operator's hand contacting the saw blade. The minimum length for push sticks shall be 15.75 in. (400 mm). [UL] The push stick shall be designed to comply with the required features illustrated in Figure 43.9.	
5.7.1.1 Push Stick Material The push stick shall be made of non-metallic material (e.g., plastic, wood, etc.) unlikely to shatter or spark, or cause tooth breakage of the saw blade, and minimize the risk of grabbing, breaking, or throwing the push stick, if it contacts the saw blade.	*E5.7.1.1 Push Stick Material* *Push sticks are intended to be sacrificial work helpers to protect the operator. Should the push stick contact the saw blade, the design intent is to allow the saw blade to cut the push stick without exerting force that would cause the operator to lose control of the push stick.*
5.7.1.2 Push Stick Construction The manufacturer shall provide instructions for making a push stick that complies with the requirements of this standard.	
5.7.1.3 Push Stick Storage [UL] Provision shall be made for storing the push stick on the table saw.	
5.7.2 Push Stick Testing	
5.7.2.1 1 Test: Push Stick Strength [IEC] The push stick shall have the strength to withstand the force anticipated in its intended use. The push stick notch is positioned to have full surface contact with the horizontal and vertical sides of a suitable block of wood on a flat supporting surface, as indicated in Figure 111[IEC]. A force gradually applied at the center of the grasping zone is increased until the horizontal component F reaches 112 lbf (500 N) and is maintained for 10 s. The test may be conducted in a fixture that loads the push stick in an	

equivalent manner. The grasping area and the notch area on the push stick may be supported to prevent the lateral displacement of the push stick during the test. As a result of the applied force, the push stick shall not permanently deform, break, or show cracking visible with normal vision.	
5.8 Table	
5.8.1 Table Construction	
5.8.1.1 Table Surface The table shall ensure unobstructed passage of the workpiece.	
5.8.1.2 Table/Blade Clearance [IEC] The table saw shall be constructed so that saw blades with diameters 2 % larger than the saw blade diameter D cannot be mounted.	
5.8.2 Table Testing	
5.8.2.1 Test: Guarding Below the Table [IEC] For all barriers used as guarding below the tabletop, the test probe B of IEC 61032:1997 is applied with a force of 1.1 lbf. (5 N) to: 1) all areas below the tabletop. If an enclosure is fitted, the probe is applied to all sides and from underneath the enclosure. The test probe shall not contact the cutting-edge zone of the saw blade or power-driven moving parts beneath the table, and 2) dust collection openings below the table. The test probe is inserted into the dust collection opening until the probe's stop face reaches the plane of the dust collection opening and shall not touch hazardous moving parts.	*E5.8.2.1 Test: Guarding Below the Table* *The referenced test probe B is specified by IEC 61032:1997. At the time of this standard's publication, compliant test probes are commercially available for purchase from numerous vendors.*
5.8.2.2 Test: Saw Blade Access [IEC] For saw blade access panels below the table, a 2.2 lbf	

(10 N) pull force is applied at its weakest point perpendicular to the panel. The panel shall not be displaced.	
6 Employer Responsibility The employer shall supervise the proper installation and use of all required engineering control devices furnished with the table saw. If a manufacturer provided engineering control device is not compatible with an intended operation, then the employer shall provide alternate risk reduction measures compliant with the performance requirements of this standard.	*E.6 Employer Responsibility* *Numerous table saw operations cannot be safely done with through-cutting safeguards in place. Equivalent safeguarding is typically specific to the type of table saw operation being done. The employer, therefore, is in the best position to determine what safeguard(s) should be used for any table saw operation.*
6.1 Employer Responsibility – Blade Guard For operations where a blade guard cannot be used, ANSI O1.1 clause 6.8.3.4.2 Employer risk reduction measure responsibilities applies.	*E6.1.1 Employer Responsibility – Blade Guard* *See ASTM E3280-22 for guidance on risk reduction measures for table saw operations.*
6.1.1 Employer Responsibility – Over-arm guards The employer shall supervise the installation and use of all over-arm guard components, including a blade guard, an anti-kickback device and an extended riving knife. **EXCEPTION:** For employers with existing table saws not designed for extended riving knives, the employer shall ensure a spreader/or riving knife is used for all appropriate operations as instructed by the manufacturer.	
6.1.2 Employer Responsibility – Table Insert Before preparing a zero-clearance table insert for use, the employer shall verify the saw blade arbor is lowered sufficiently to provide clearance between the saw blade periphery and the bottom of the installed table insert.	
6.1.3 Employer Responsibility – Cutting tools The employer shall supervise the use of appropriate cutting tools to verify only tools recommended by the manufacturer are used on a table saw.	

6.1.4 Employer Responsibility – Workpiece support. The employer shall provide appropriate support as required by the workpiece size and supervise its use.	
6.2 Manufacturer Responsibility	
6.2.1 Manufacturer Responsibility – Blade Guard The Manufacturer shall provide a blade guard system.	
6.2.1.1 Manufacturer Responsibility – Riving Knife The manufacturer of new machines shall provide a riving knife or an extended riving knife for use in cutting operations or equivalent protection shall be provided. The manufacturer shall provide an anti-kickback device(s).	
6.2.2 Manufacturer Responsibility – Fence The manufacturer shall provide a rip fence for use in a ripping or bevel rip type operation(s).	
6.2.2.1 Manufacturer Responsibility – Miter Gauge The manufacturer shall provide a miter gauge on any table saw not equipped with a moving table that incorporates a crosscutting fence.	*E.6.2.2.1 Manufacturer Responsibility – Miter Gauge* *Sliding tables have historically included an integral crosscutting fence that performs the crosscutting and miter angle feed functions of a miter gauge system.*
6.2.3 Manufacturer Responsibility – Table Insert The manufacturer shall provide a table insert appropriate for the thickest manufacturer recommended single saw blade.	
6.2.4 Manufacturer Responsibility – Instructions The manufacturer shall provide instructions on the safe installation of the machine.	

7 Machine Layout, Installation, Testing and Startup	
7.1 General This clause describes the requirements for the layout, installation, testing and start-up of the machine and its associated equipment.	
7.2 Layout and installation The layout and installation shall meet the following requirements:	
7.2.1 Evaluation of layout area The installation layout area shall be compatible with the expected machine operating and maintenance conditions.	
7.2.2 Floor loading The flooring supporting the machine and its associated equipment shall be capable of bearing the dynamic load.	
7.2.3 Space Allocation	
7.2.3.1 Space Allocation – Access and Egress Equipment layout shall allow individuals access to and egress from the machine for operation, material handling and maintenance.	*E7.2.3.1 Space Allocation – Access and Egress* *Examples of space allocation considerations for access and egress may include:* • *positioning of equipment and workplace* • *physical features to provide for maintenance;* • *arrangement of machinery and operator interfaces to avoid blind corners;* • *traffic guide markings;* • *door swing.*
7.2.3.2 Space Allocation – Maintenance Sufficient space shall be provided to properly access machines for maintenance.	*E7.2.3.2 Space Allocation – Maintenance* *Where practical, maintenance elements (e.g., points of lubrication, adjustment mechanisms) should be located outside the hazard zone.*

7.2.4 Dust Collection Dust collection shall be provided in accordance with the requirements of NFPA 664, Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities.	*E7.2.4 Dust Collection* *The end user provides a proper collection system to be connected to the machine's dust extraction features.*
7.2.5 Electrical requirements for installation	
7.2.5.1 Electric Standards The installation of the machine and its associated equipment shall be in accordance with ANSI / NFPA 70 (National Electric Code), ANSI / NFPA 70E (Electrical Workplace Safety), ANSI / NFPA 79 (Electrical Standard for Industrial Machinery), and the supplier's instructions and recommendations.	
7.2.5.2 Failure of the power supply In case the electrical power supply is interrupted, automated restart of the table saw and its accessories after the restoration of power shall be prevented.	
7.2.6 Lockout/tagout Each installation shall have a means to disconnect and isolate all energy sources in accordance with ANSI/ASSP Z244.1, Lockout, Tagout and Alternative Methods.	
7.2.7 Lighting The user shall ensure proper lighting is installed so that personnel can safely perform their tasks.	*E7.2.7 Lighting* *The lighting should not create shadows, excessive glare, or stroboscopic effects. (For lighting recommendations see ANSI/IES RP- 7, Recommended Practice: Lighting Industrial Facilities).*
7.3 Testing and Startup	
7.3.1 Testing and Start-Up Procedure: The employer shall provide a testing and start-up procedure and ensure it is followed.	*E7.3.1 Testing and Start-Up Procedure*

	The employer should use the supplier's recommendations as a guideline in developing a testing and start-up procedure.
7.3.2 Personnel Restrictions Only trained personnel shall be allowed to operate the machine and its associated equipment during test and start-up.	
7.3.3 Risk Reduction Measures If the operational engineering control device is not in place prior to testing and start-up, other acceptable risk reduction measures shall be provided and used in accordance with Clause 8.	
8 Risk Reduction Measures Where a hazard exists, either immediate or impending, based on risk assessment appropriate risk reduction measures shall be provided. The selected risk reduction measure(s) shall be consistent with the identified hazards and their associated risks.	*E8 Risk Reduction Measures* *One or more of the following could be provided:* *• engineering control devices such as:* • *guard(s);* • *safeguarding device(s);* • *awareness barriers and device(s);* *• administrative controls.*
8.1 Blade Guard The saw blade shall be guarded to meet the design and test requirements of this standard.	*E.8.1 Blade Guard* *The use of a manufacturer supplied blade guard may not be feasible for attachments, such as a dado set, a molding head and the like that are not intended to cut through the workpiece. In addition, the use of a manufacturer supplied blade guard may not be feasible for single blade non-through operations. Examples of some single blade non-through cutting operations include resawing, kerfing, plunge cuts, and cove cuts. See employer responsibilities for when a manufacturer supplied blade guard cannot be used.*

8.2 Riving Knife For employers with existing saws not designed for extended riving knives, the employer shall ensure a spreader/is used for all appropriate operations as instructed by the manufacturer	
8.3 Anti-Kickback Device The anti-kickback device(s) shall allow the movement of the workpiece in the cutting feed direction but reduce to an acceptable level the risk of kickback movement that may result from the transfer of force from the outfeed saw blade quadrant to the workpiece. Where an anti-kickback device cannot be used, the employer shall provide alternate safety means.	*E.8.3 Anti-Kickback Device* *Historically, the risk of kickback has been controlled by the use of anti-kickback pawls or similar kickback force resisting devices.* *The anti-kickback device(s) is not required for operations that do not cut through the workpiece, for example, when using dado sets or molding heads or when making plunge or cove cuts.*
8.4 Guarding Performance Range For hazards capable of changing position during all intended machine functions, guarding of the hazard throughout its intended range of motion shall be provided.	
8.4.1 Guarding Below the Table The saw blade and moving parts of the saw blade drive mechanism beneath the table shall be guarded to reduce the likelihood of unintentional contact. The saw frame, cabinet, motor, including a motor shipped detached from the saw, exhaust hood, and other enclosures under the table may be considered as a portion of the guarding.	
9 Setup, Operation and Maintenance	
9.1 Machine Set-Up The employer shall establish machine set-up procedures in accordance with the supplier's recommendations.	
9.1.1 Responsibilities During Set-Up, Operation or Maintenance Work: The employer shall ensure risk reduction measures	

acceptably reduce the risk of contact with all sections of the cutting tool.	
9.1.2 Guards The employer shall ensure that all guards are in place and functioning such that: a) fixed guards are in place; b) movable guards are appropriately adjusted after each tooling change or set-up; and c) interlocked barrier guards are interfaced with the machine control system such that no hazardous motion can occur if the interlock is open.	
9.1.3 Tools	
9.1.3.1 Speed Rating Cutting tools shall not be operated at speeds which exceed their rated speed.	
9.1.4 Workpiece Hold-Down Guiding Fixture	
9.1.4.1 Workpiece Hold-Down Guiding Fixture Provision A suitable means of holding and guiding the workpiece past the cutting tool shall be provided to make it unnecessary for the operator's hands to be in close proximity to the cutting tool unless risk reduction measures acceptably reduce the risk of inadvertent contact with the cutting tool.	*E9.1.5.1 Workpiece Hold-Down Guiding Fixture Provision* *"Close proximity" has usually been accepted to be approximately 12 in.*
9.1.4.2 Non-Working Side of Cutting Tool(S): When a fence is used, engineering control devices shall acceptably reduce the risk of inadvertent contact with the cutting tool behind the fence and the arbor end.	
9.1.4.3 Small or Difficult to Hold Workpieces Clamping, fixturing, or automatic feeding shall be used for small or difficult to hold workpiece(s).	

9.1.5 Feed Direction The operator shall ensure the workpiece is fed to the cutter(s) against the direction of the spindle rotation.	
9.2 Maintenance	
9.2.1 Maintenance - Manufacturer Responsibility The equipment manufacturer shall provide the necessary instruction to the user so that they can maintain the equipment in a safe operating state.	
9.2.1.1 Maintenance - Lockout/Tagout The manufacturer shall advise, in the instruction manual, the proper means for lockout/tagout of the machine. Machines shall be properly locked out in accordance with ANSI Z244.1-2024: *Control of Hazardous Energy: Lockout, Tagout* and/or applicable governmental regulations during the removal of scrap and other debris from beneath the table.	
9.2.2 Maintenance - User Responsibility The user/employer shall ensure the equipment is maintained in a safe state and all engineering control devices are in place	
9.2.2.1 Maintenance - User Procedures The user shall follow supplier's instructions and recommendations to establish procedures for the maintenance of the machine.	
9.2.2.2 Maintenance - Supervision The user shall ensure that instructions, procedures and recommendations for the maintenance of the machine are provided and used.	*E9.2.2.2 Supervision* *Maintenance personnel should follow procedures set forth by the user. Examples of maintaining equipment in a safe manner may include:* *• following all recommended safety practices and procedures that apply to their work;* *• notifying their supervisor when they observe an unsafe practice or condition;* *• studying and understanding the material related to their job;* *• installing or adjusting safety equipment, devices, guards, or shields, as set forth by the user.*

	Factory training classes are often available to provide training for maintenance personnel. *The frequency of maintenance and inspections can vary depending on the use of the machine. The user should consider the supplier's recommendations when determining the period between inspections.* *If the machine or its associated equipment is modified, the user should ensure that maintenance instructions and procedures are updated and maintenance personnel are trained in the revised procedures.*
9.2.2.3 Maintenance - Training Personnel The user shall ensure maintenance personnel are properly trained and provided with maintenance manual(s).	
9.2.2.4 Maintenance - Authorized Personnel The user shall ensure that only persons specifically trained to do so shall perform maintenance on the machine and its associated equipment.	
9.2.2.5 Maintenance - Machine Inspection The user shall ensure that the machine and its associated equipment are inspected and maintained as required for continuing safe operation.	
9.2.2.6 Maintenance - Risk Reduction Impairments - Authorization Maintenance personnel shall not alter, remove, or disable any risk reduction measure without authorization as established in the user's maintenance procedure.	
9.2.2.7 Maintenance - Risk Reduction Impairments – Alternative Means When it is necessary to disable risk reduction measures to be able to perform maintenance, the user shall provide alternate means of risk reduction.	
9.2.2.8 Maintenance - Risk Reduction Impairments – Return to Service The machine shall not be returned to service until the risk reduction measure is re-established.	

9.2.2.9 Maintenance - Supervising Personnel The user shall ensure that the operation of the machine is supervised by trained personnel. The designated supervisor shall ensure that user's operating and maintenance procedures are within the guidelines as described in the supplier's operating manual.	
9.2.3 Personal Protective Equipment The user shall ensure compliance with manufacturer required personal protective equipment and determine what personal protective equipment is needed when operating or maintaining machines. The user shall enforce the proper use of this equipment.	*E9.2.3 Personal Protective Equipment* *See also ANSI B11.0, Safety of Machinery, and 29 CFR 1910 Sub-part I standards (1910.132 – 138 and appendices).*
9.2.4 Training The user shall establish personnel training programs that ensure the following:	*E9.2.4 Training* *The user should refer to the supplier's recommendations when establishing a training program.*
9.2.4.1 Training – Safe Working Procedures The user shall ensure that personnel are properly trained in safe working procedures and are qualified to perform the functions they are assigned.	*E9.2.4.1 Training – Safe Working Procedures* *Examples of training program elements include:* *• description of the assigned task;* *• function of operator controls to be encountered in performing the assigned task;* *• hazards associated with the assigned task;* *• designated method of risk reduction measures;* *• methods of function-testing or otherwise assuring the proper function of risk reduction measures.*

9.2.4.2 Training – Operators The user shall instruct all operators in the operation of the machine. Instructions shall include the following requirements: a) Instruct the operator in the proper method(s) of operation for each production set–up before the machine is placed into production; and b) Require that all operators demonstrate their knowledge of the proper operation of the machine.	*E9.2.4.2 Training – Operators* *The user should place particular emphasis on the training, instruction, and supervision of workers who are inexperienced in the operation of the machine or have difficulty communicating verbally.* *Instructions should include guidelines to ensure that:* *• all personnel are in a safe location before operating the machine;* *• operators know and understand the start-up and stopping procedures;* *• operators know and understand the safe working procedures established by the user;* *• operators know and understand the risk reduction measure(s) required for the operation;* *• operators know they should report to their supervisor any apparent defect, damage, malfunction or inconsistent or unpredictable performance of the machine.*
9.2.4.3 Training – Set-up Personnel The user shall instruct all set– up personnel in the proper procedures for installing and utilizing fixtures/tooling. Training shall include: a) following all recommended safety practices and procedures listed in this standard that apply to their work; b) proper risk reduction measures; c) removal, transport, and storage of fixtures/tools; and d) system operation.	
9.2.4.4 Training – Inspection The user shall ensure that supervisors and maintenance personnel are trained in safe working procedures for inspecting and maintaining the machine.	*E9.2.4.4 Training – Inspection* *The user should make supplier's instructions and recommendations readily available to maintenance personnel.*
9.2.4.5 Training – Hazardous Energy Controls The user shall train personnel, as required by	

assigned functions, in the safe working procedures for lockout/tagout of hazardous energy sources in accordance with Z244.1-2024: *Control of Hazardous Energy: Lockout, Tagout.*	
9.2.5 Initiation of normal operation The initiation of normal operation of the machine shall only be allowed where all the following conditions are satisfied: a) operating personnel have been properly trained on the use of the machine; b) the associated engineering controls are in place and functioning; c) no people are present within the hazard zone(s); and d) proper safe working procedures are followed.	
10 Instructions and Markings	
10.1 Markings	
10.1.1 Riving Knife The thickness of the riving knife or extended riving knife and the range of the saw blade diameters, body thicknesses and kerf widths for which it is intended, shall be permanently marked on the riving knife.	*E10.1.1 Riving Knife* *Examples of permanent marking are engraved, stamped or etched.*
10.1.2 Direction of Arbor Rotation Marking Table saws shall be marked with the direction of rotation of the spindle, indicated in a visible location on the table saw in the vicinity of the saw blade access panel by an arrow raised or recessed or by any other means no less visible and indelible.	
10.1.3 Saw Blade Size Marking Table saws shall be marked with the recommended saw blade diameter.	
10.2 Instructions	
10.2.1 General Instructions The manufacturer provided instruction manual for the table saw shall include the following:	

a) Definition of the terms through-sawing, push-stick, kickback, and freehand as they relate to a sawing operation, b) Explanation of the proper use of the blade guard and riving knife for through-sawing, c) Details on how to reduce the risk of kickback, and [UL] e) Instructions describing how to install the machine.	
10.2.2 Riving Knife The manufacturer shall provide information in the instruction manual to explain: a. when and how to install, adjust, maintain and use the riving knife or extended riving knife, b. How to properly match the saw blade diameter and the saw blade body and kerf dimensions to the riving knife thickness.	
10.2.3 Table Insert Table saws provided by the manufacturer with a zero-clearance table insert shall include information on how to prepare the table insert for use in the manufacturer provided instruction manual.	
10.2.4 Work Helpers [UL] The manufacturer provided instruction manual shall include proper use and guidelines for making a push stick, auxiliary fence, feather boards and push block.	
10.2.5 Manual Braking [UL] The manufacturer provided instruction manual for a saw with manual braking shall include the word DANGER and the following or the equivalent: Coasting Cutting Tool Can Be Dangerous – Apply brake immediately to stop cutting tool when the switch is turned off.	

It shall also include a warning that the torque developed during braking may loosen the saw blade-retaining nut, and that the nut should be checked periodically and tightened, if necessary, especially after braking.	

ANNEX A

Splitter Mounted Guards

The intent of this standard is to require the use of modular guards whenever physically possible on rebuilt machines. This Annex is provided for guidance to help meet the requirements of Clause 8, Risk Reduction Measures, when rebuilding existing machines that were originally provided with splitter or provided with no splitter and cannot be modified to support a riving knife. For those machines, the table saw should be provided with a splitter. The splitter may be used to attach and support the blade guard and antikickback assemblies or used together with an over-arm guard.

When using a self-adjusting blade guard, that guard should perform the following functions:

a) Portions of the blade guard that may incidentally contact the rotating blade should be made of material that is unlikely to cause tooth breakage;

b) the guard hood assembly should automatically adjust to the thickness of the workpiece and remain in contact with the workpiece for all depths of cut and bevel positions of the blade;

c) the blade guard hood assembly should enclose the top and the sides of the saw blade above the table except for the openings needed for feeding the workpiece, openings generated by the beveling function, or openings generated by the workpiece during the cutting process;

d) the blade guard hood assembly should rest on the table with either one or both sides, when the blade is set at 90° position. If one side rests on the table with the blade set at its 90° position, the other side shall rest on the table when the blade is tilted to its 45° position; and

e) Allow the cutting edge of the blade to be visible from the operator's normal position when the guard is in the rest position on the table.

When using an adjustable over-arm guard, warnings and instructions should be provided to adjust the guard to contact the table surface for all through cuts. The guard shall still be capable of covering the top and sides of the exposed blade and auto-adjusting to accommodate the workpiece during the cutting operation.

The blade guard may have an opening for the ejection or collection of sawdust.

Openings in the top or sides of the blade guard provided for blade visibility or ejection/collection of the saw dust should be designed to assure that the discharge is directed away from the operator and should not hinder the vision of the user when the user is in the normal operating position and in addition should not allow a 0.5 inch (12.7 mm) diameter probe to contact the blade when inserted 2.5 inches (63.5 mm) into the opening.

A self-adjusting blade guard and any guard mounting means should not offer any considerable resistance to the initial entrance of the workpiece to the saw blade or to the passage of material being sawed.

The splitter shall:

(a) Have attachment points for the guard and/or antikickback device that allow for passage of a workpiece thickness equal to the maximum blade height above the tabletop;
(b) Be thinner than the kerf of the thinnest saw blade recommended by the saw manufacturer;
(c) Have faces that are smooth, parallel and have a chamfered leading edge;
(d) Not interfering with table saw operations, shall be within the planes defined by the kerf of the blade supplied with the saw and will maintain alignment with the plane of the blade throughout the entire bevel and depth of cut setting range;
(e) The spreader shall be made of steel with a hardness of between 38 HRC and 48 HRC and a resistance to rupture at least equal to 800 Mpa or other equivalent material; and
(f) If intended to be removed for non-thru sawing operations, the splitter be designed so that it can be removed and replaced with no need for readjustment or realignment.

During saw use:

(a) the blade guard should be supported to limit sideways displacement such that the blade will not touch any part of the guard surface, and
(b) the splitter should not be misaligned so much that it would obstruct workpiece feeding.

NOTE: Gravity can exert a sideways force on a beveled guard and/or splitter. Similarly, angled contact with the leading edge of the workpiece can exert a sideways force on the guard and splitter.

When in use, the splitter should be aligned with the saw blade and should move automatically with the arbor when the saw is set for bevel cuts.

A splitter should be designed to prevent material from squeezing the saw blade. The splitter should remain in true alignment with the saw blade for 90-degree cutoff and the entire bevel range. The means for attaching the splitter should be such that:

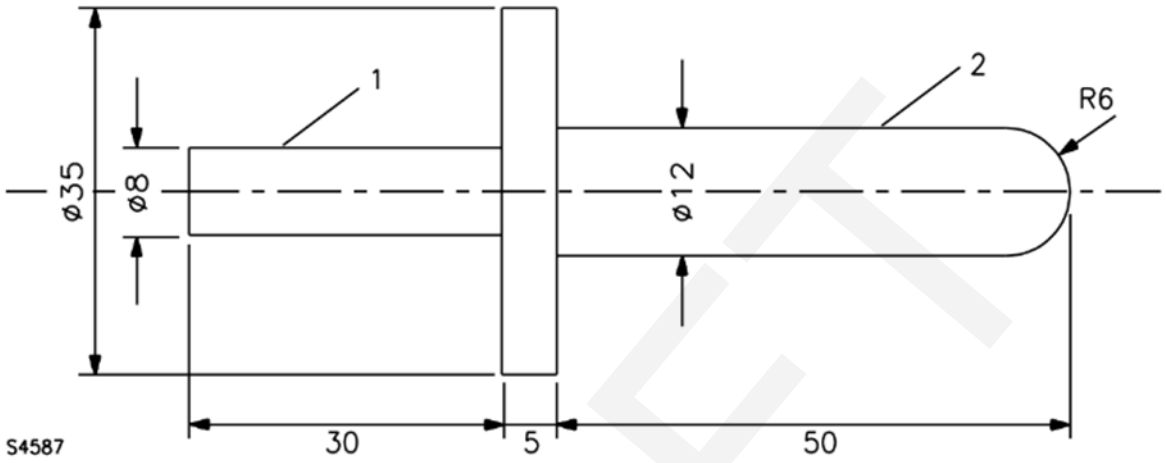
a) The splitter can be readily attached in the correct location; and

b) It is difficult or impossible to mount the splitter in an incorrect location or a location that would involve a risk of injury to persons.

ANNEX B

Figures and Tables

Figure 43.1
Test probe "a"



Dimensions in mm

1 Handle section

1 Handle section

Figure 43.2
Table saw probe application

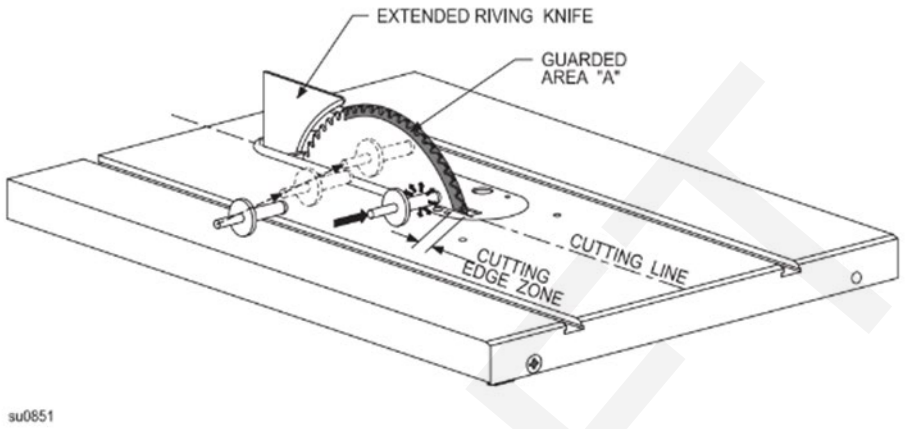
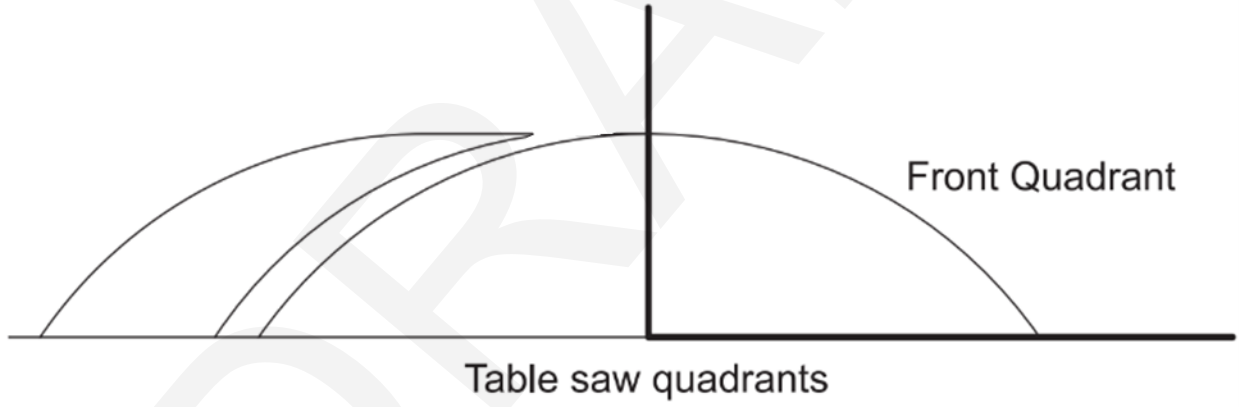


Figure 43.3
Table saw quadrants



s5622

Figure 43.4
Distance between riving knife and blade

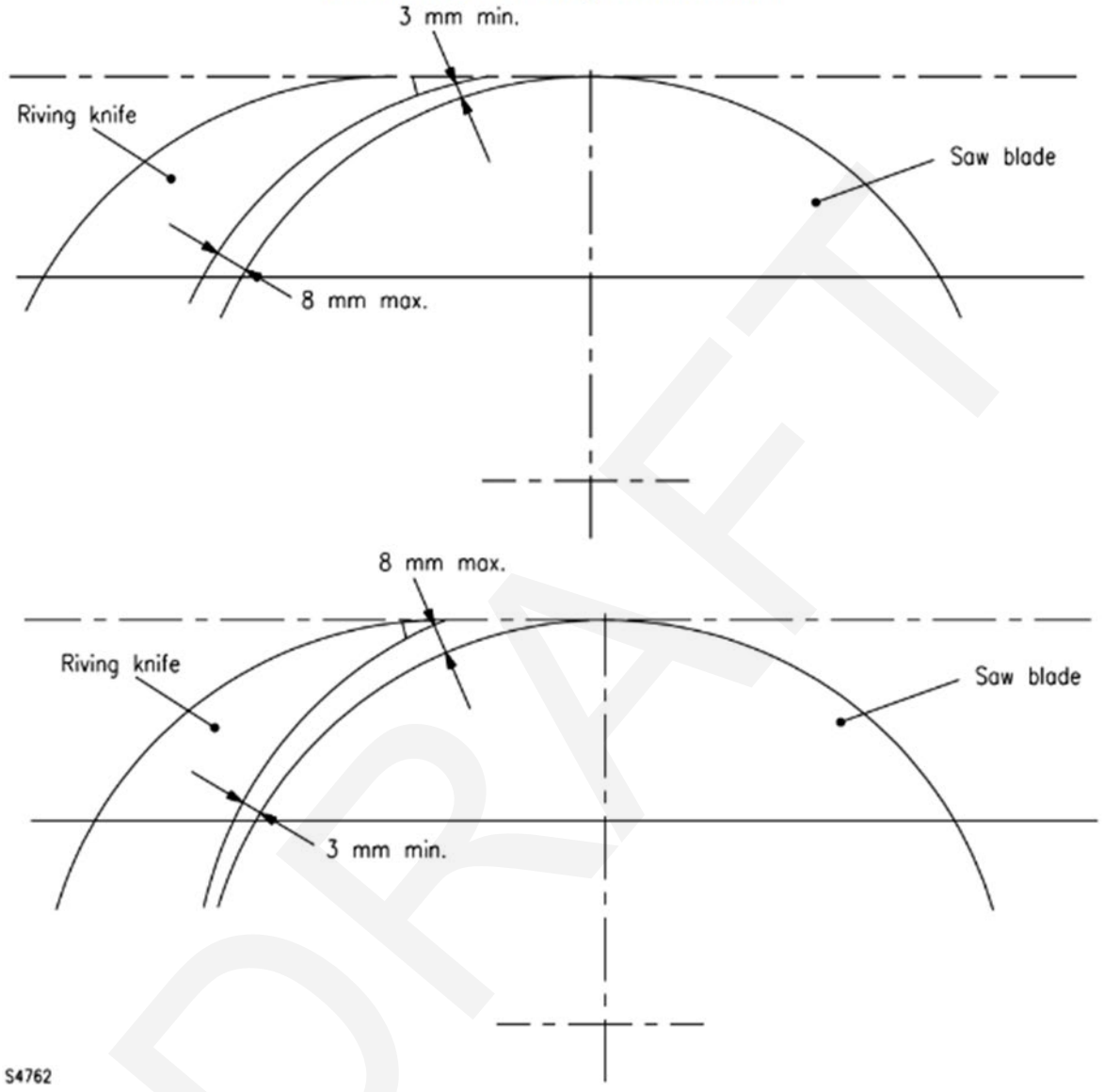
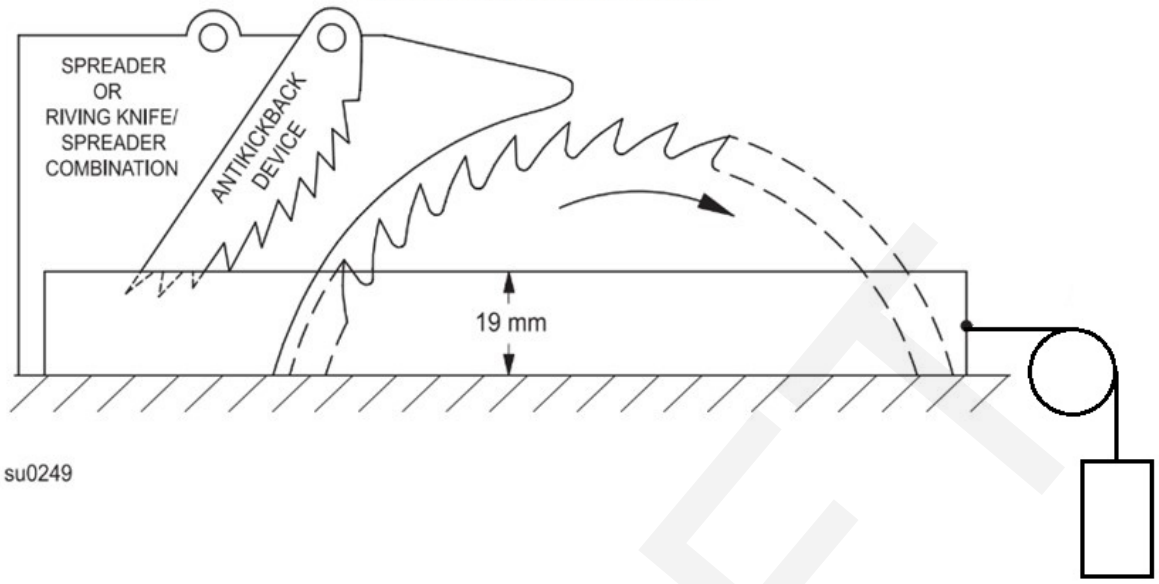


Figure 43.8
Antikickback device test block

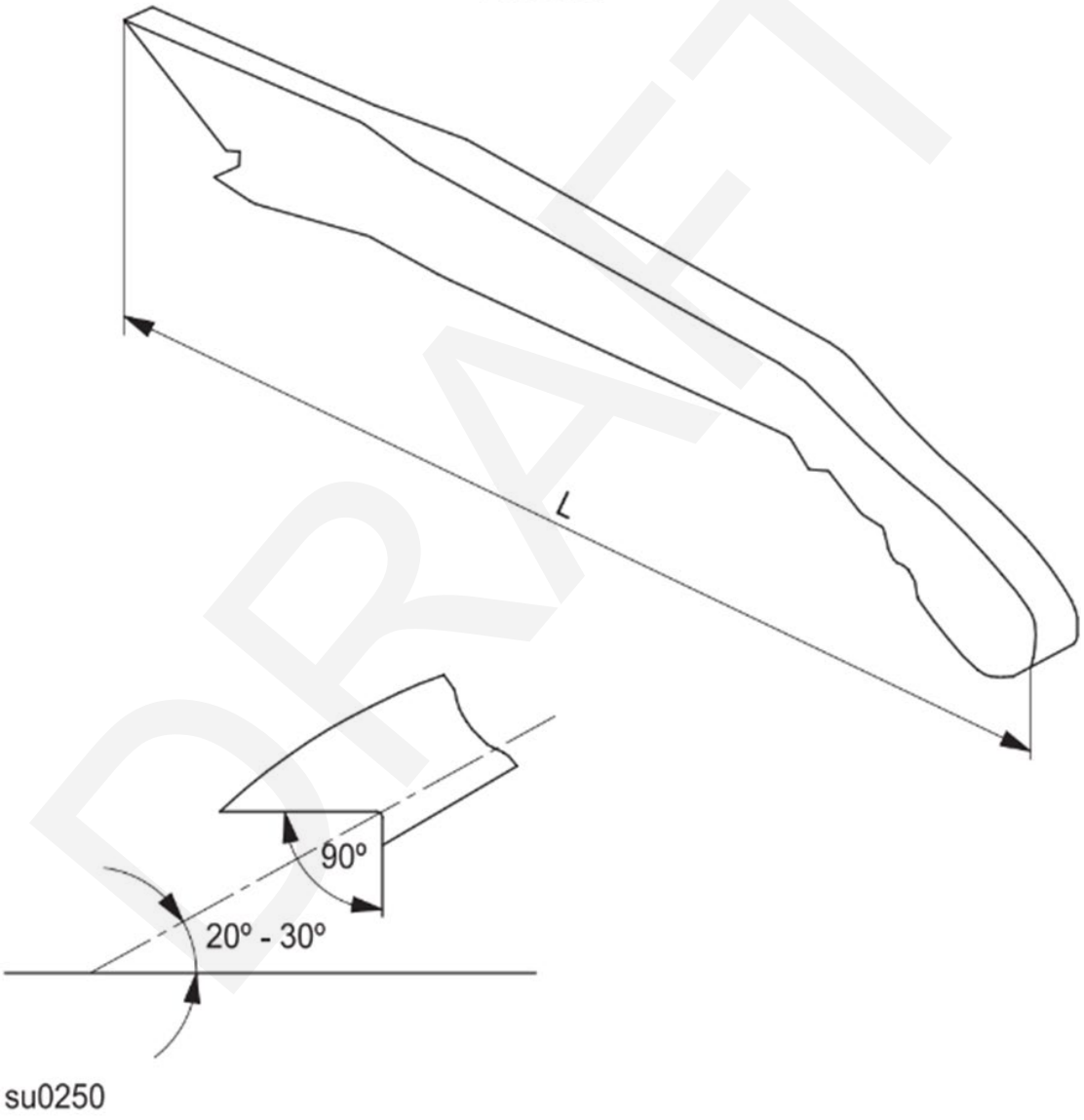


su0249

Table 43.2
Minimum push stick length

Blade diameter		Push stick length L	
Inch	mm	Inch	mm
D ≥ 10	D ≥ 254	15.7	400
10 > D ≤ 5.5	254 > D ≤ 140	12.6	320
D < 5.5	D ≤ 140	10.2	260

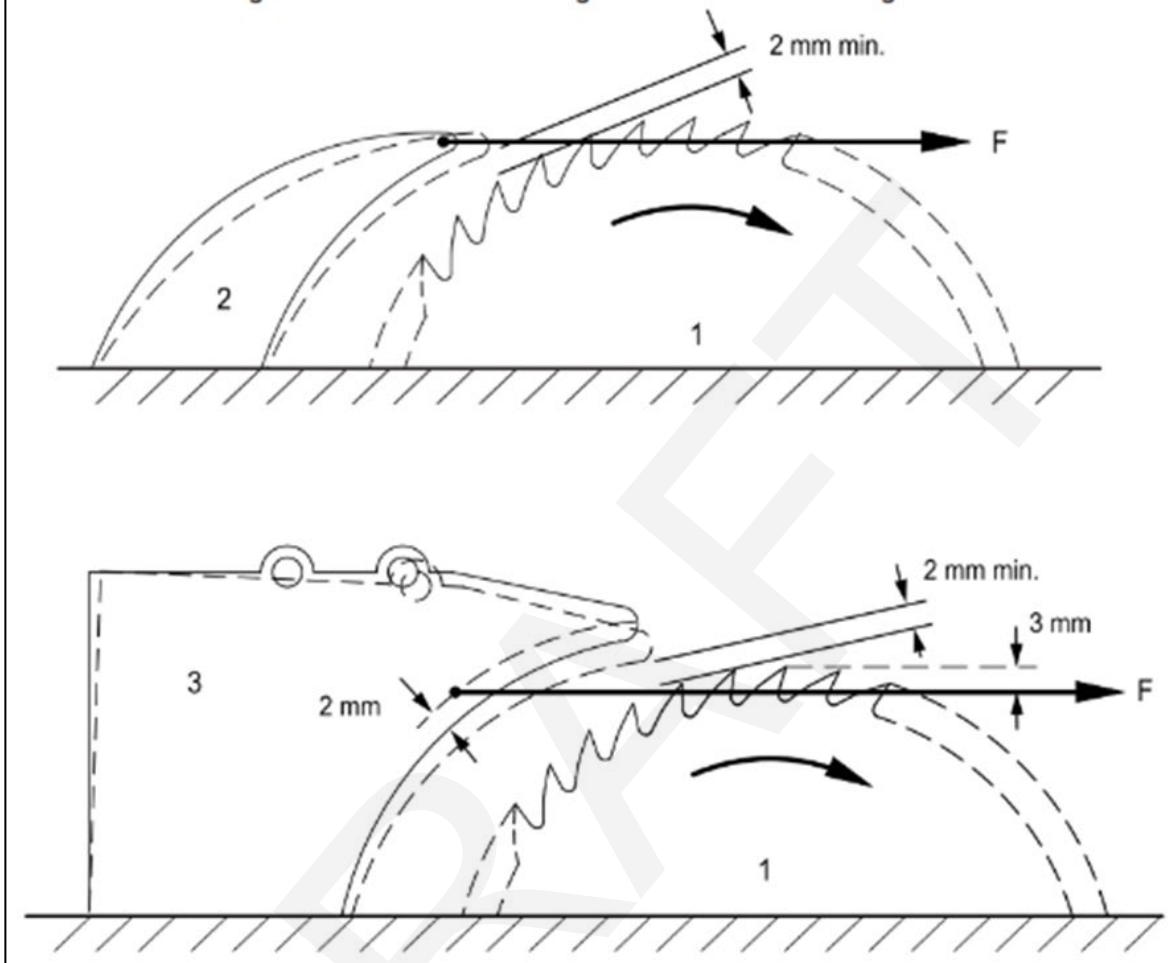
Figure 43.9
Push stick



su0250

From UL 62841-3-1

Figure 108 – Pull test for riving knife and extended riving knife



su2021

Key

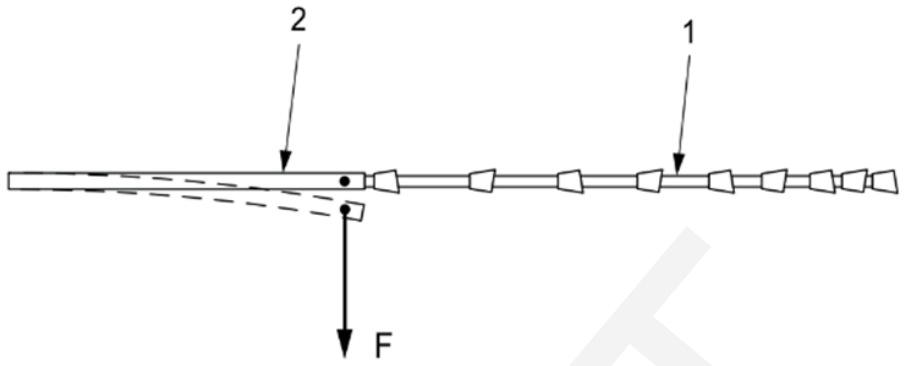
1 saw blade

2 **riving knife**

3 fixed or **adjustable extended riving knife**

F pull force

Figure 109 – Side pull test for riving knife and extended riving knife



su2022

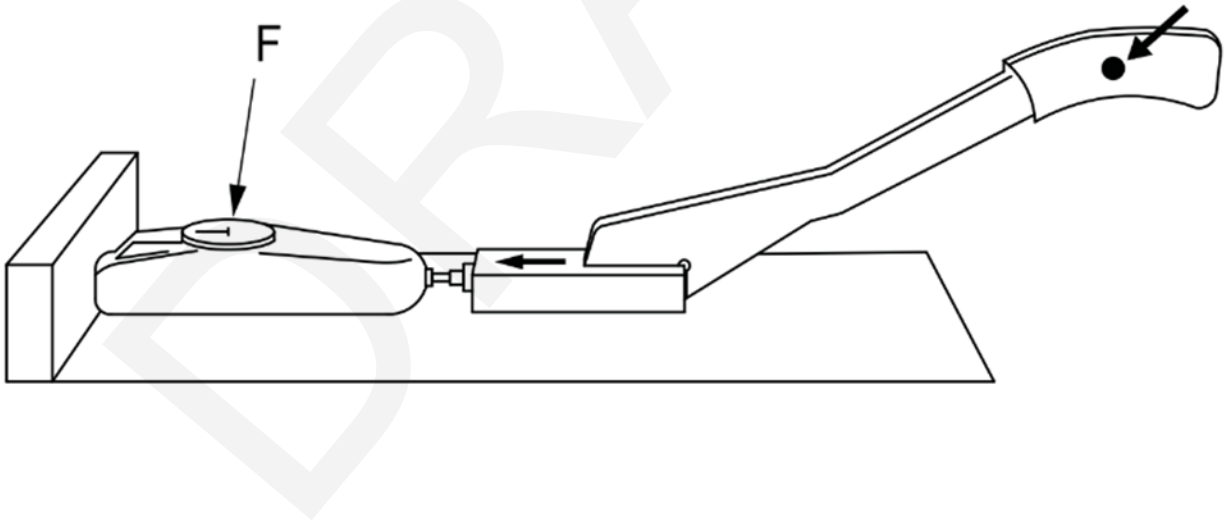
Key

1 saw blade

2 **riving knife**

F pull force

Figure 111 – Push stick force test

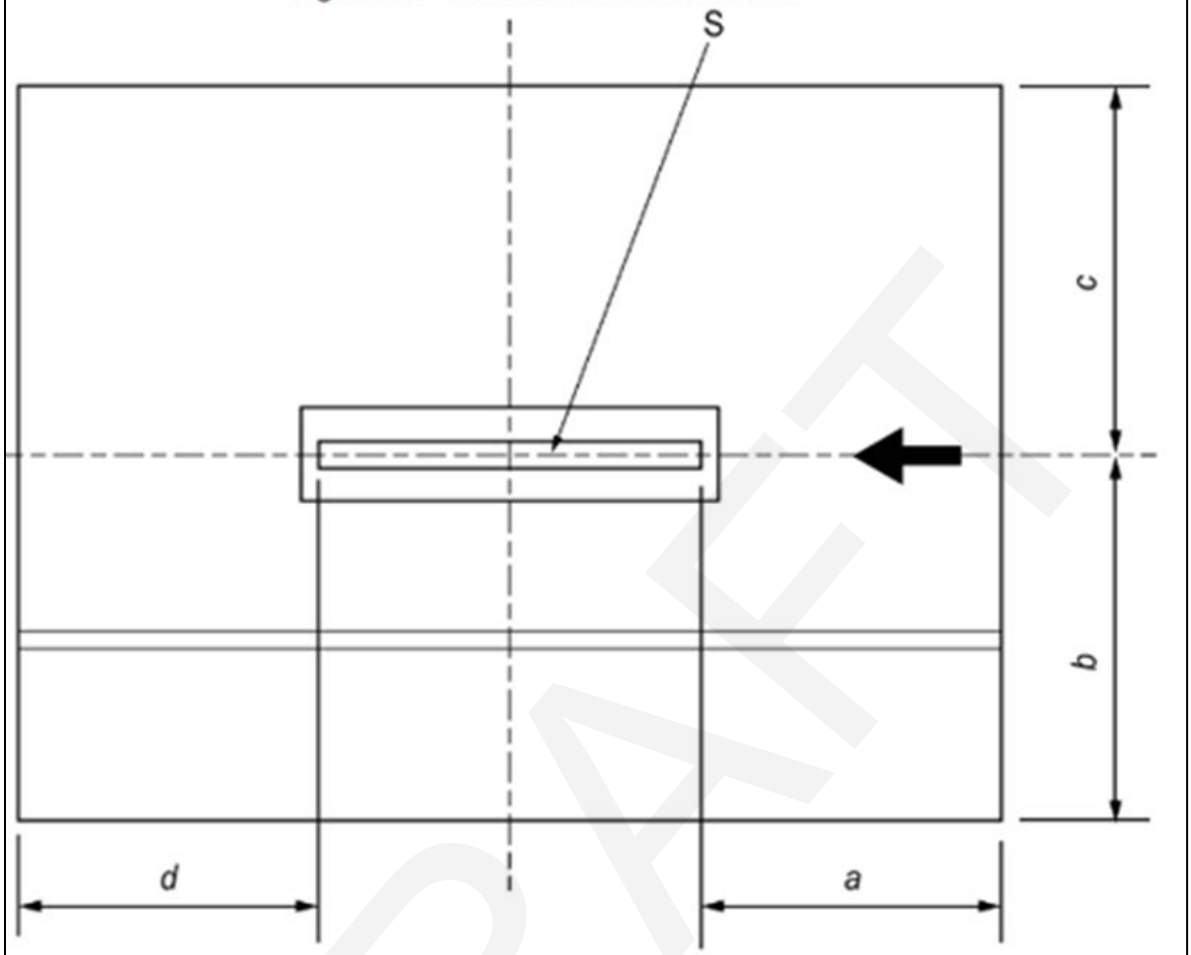


su2024

Key

F Measurement of the horizontal component of the force

Figure 113 – Dimensions of the saw table



su2026

Key

S section of the saw blade intersected by the **table top** at **maximum cutting capacity**

a **table top** dimension at the front

b **table top** dimension on left side

c **table top** dimension on right side

d **table top** dimension at the back

→ feed direction