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Phone : +91 22 4343 1313 (25 Lines) | Fax : +91 22 2389 4311
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INDUSTRIAL FASTENERS INSTITUTE
6363 Oak Tree Boulevard • Independence, Ohio 44131 USA, www.indfast.org

Why ISO Standards Should Be Preferred For Metric Fasteners?

The adoption of ISO Fastener Standards by suppliers and end users will end 40 years of fastener industry confusion. The adoption of ISO standards is good engineering practice, it simplifies inventory, it enhances assembly uniformity, and it makes export products more attractive to consumers outside the USA.

The "Big Three" stimulated the adoption of the metric system in the US.

The United states started moving into the use of metric fasteners in a significant way in the early 1970s when the "Big Three" (FORD, GM, and Chrysler) made a commitment to use the metric system for all new vehicle designs. Since the automotive industry then, and still today, use more threaded fasteners than any other industry, the major fastener suppliers in the USA started getting involved in the production of metric fasteners. This auto industry commitment to metric design was adopted so that one car design could be produced all over the world instead of having one design for North America and another design for all markets outside North America. The huge international equipment manufacturers like Caterpillar and John Deere soon followed suit.

Until that time relatively low volumes of metric fasteners were used in the United States. They were mostly used in maintenance applications for the maintenance of imported manufacturing equipment from Europe, with the majority coming from Germany. The German standards system is referred to as the DIN (Deutsches Institut fur Normung e. V.) system and most of the imported fasteners used to support the import equipment were made in Europe to the DIN fastener standards.

The Big Three decision to adopt the metric system of measurement in design impacted all industrialized countries in the world. The car manufacturers wanted to be able to source products anywhere in the world and have the components be compatible regardless of where the parts were made, purchased, or assembled. This decision drove the need for the creation and use of common world standards for all components including fasteners.

The ISO Fastener Committee was formed to commonize metric fastener systems.

At that time several European and Asian countries had their own designs of metric fasteners as defined by their country standards. To commonize these designs the ISO TC2 Fastener Committee was formed. The predominant metric fastener standard at the time was DIN so it became the foundational metric fastener standard system from which the eventual ISO fastener standards evolved.

The US joined the ISO efforts, but at the same time tried to mold a unique metric standard called the Optimum Metric Fastener System (OMFS). This work began in the Industrial Fasteners (IFI) Technical Committees and was later transitioned into the fastener committees in the American Society of Mechanical Engineers (ASME) B18 Committee and the American Society for Testing, Materials (ASTM) F16 Committee and the SAE Fastener Committee.

The concept behind the OMFS was to narrow the choices that were available in the other metric fastener systems in ways such as limiting the thread series to only course threads. OMFS included efforts to introduce an external spline-head design to replace hex heads on bolts and a new gaging system for threads in an effort to improve thread quality.

The work on the OMFS concept within the ASME, ASTM, and SAE committees resulted in an entire series of USA created metric fastener standards. Eventually most of the unique ideas in the OMFS program faded away and the resultant standards were interchangeable with, but not exactly like, the evolved ISO fastener standards. In retrospect, the USA effort just added another metric fastener standard option to metric fastener technology, increasing the complexity instead of achieving its goal of simplifying it. The OMFS concept was noble but its objectives never materialized.

In the meantime more and more countries joined the ISO fastener standards efforts and a true worldwide fastener standards system was created. The growing adoption of ISO fastener standards has resulted in most industrialized countries withdrawing their country-specific standards and formally adopting the ISO standards as their metric fastener system.

Germany withdraws DIN standards in 2001 to adopt ISO fastener standards.

The biggest endorsement of the ISO fastener standards was Germany's official withdrawal of their DIN fastener standards in 2001 which is documented in DIN 918, Supplement 3. A table showing the withdrawn DIN standards and the ISO standards that should now be used instead is included in this article.

International trade is increasing every day. USA exports are critical for controlling the USA balance of trade and reducing unemployment. USA firms should be adopting ISO fastener standards to assure what is produced in the USA is acceptable to purchasers outside the USA.

The good news is that with very few exceptions, fasteners made to the ISO standards, the withdrawn DIN standards, and the USA metric standards are interchangeable. The most significant differences are in the AF (across the flats) sizes on M10, M12, and M14 bolts and nuts. The DIN standards specify a one millimeter larger hex size than do the ISO and ASME standards. Fortunately, all designs have the same strength requirements and capabilities. The only practical difference is that installers will have to use different driver socket sizes depending on which metric standard the bolts or nuts are used in manufacturing.

A concerted effort is being made in the ASME B18 and ASTM F16 fastener committees to start systematically withdrawing their metric fastener standards. Users will be directed to the comparable ISO metric standard.

US metric fastener suppliers and end users should transition into the use of ISO standards.

It is understood today that a lot of the stocked imported metric fasteners are made to the DIN standards. The good news is that many of the product requirements are identical in the DIN and the ISO standards. Few of the differences adversely affect fit or function. Importers should start working with their suppliers to transition from following the DIN standards to following the ISO requirements. For many years Bossard has shown the references in their catalog for the comparable DIN, ISO, and ASME standards. All stocking metric fastener suppliers are encouraged to consider doing the same if they are not already doing so.

It is also understood that many end users are still referring to DIN fastener standards because they are unaware of DIN withdrawing their standards in preference for the ISO standards. Suppliers are encouraged to suggest to end users to adopt ISO fastener standards for all new designs and to transition into ISO standards away from the DIN standards where possible for current usage.

There is no law or rule that states that users cannot continue to use a withdrawn standard forever if they wish to do so. They should, however realize that of the DIN, ASME, and ISO metric fastener standards, only the ISO will be technically maintained and updated in the future.

ISO is the worldwide-accepted standard.

It is not good engineering practice to have more than one standard for any given product. Multiple metric fastener standards cause unnecessary confusion and adversely affect product uniformity. US industry has been in a state of confusion since the 1970s with its use of metric fasteners, because users have been given three standards to choose from for essentially the same products. It is time for all companies in the supply chain of metric fasteners to start an orderly transition towards the uniform adoption of fasteners made to the ISO fastener standards. To effectively compete in worldwide commerce, US product manufacturers need to utilize the worldwide-accepted ISO fastener standards.

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 7	ISO 2338	Parallel pins, of unhardened steel and austenitic stainless steel (ISO 2338:1997)
DIN 78	ISO 4753	Fasteners - Ends of parts with external ISO metric screw thread (ISO 4753: 1999)
DIN 84	ISO 1207	Slotted cheese head screws - Product grade A (ISO 1207:1992)
DIN 85	ISO 1580	Slotted pan head screws - Product grade A (ISO 1580:1994)
DIN 94	ISO 1234	Split pins (ISO 1234:1997)
DIN 125-1	ISO 7089	Plain washers - Normal series - Product grade A (ISO 7089:2000)
DIN 125-1	ISO 7090	Plain washers, chamfered - Normal series - Product grade A (ISO 7090: 2000)
DIN 125-2	ISO 7089	Plain washers - Normal series - Product grade A (ISO 7089:2000)
DIN 125-2	ISO 7090	Plain washers, chamfered - Normal series - Product grade A (ISO 7090: 2000)
DIN 126	ISO 7091	Plain washers - Normal series - Product grade C (ISO 7091:2000)
DIN 267-2	ISO 4759-1	Tolerances for fasteners - Part 1: Bolts, screws, studs and nuts - Product grades A, B and C (ISO 4759-1:2000)
DIN 267-3	ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1 : 1999)
DIN 267-5	ISO 3269	Fasteners - Acceptance inspection (ISO 3269:2000)
DIN 267-7	ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1 : 1999)
DIN 267-9	ISO 4042	Fasteners - Electroplated coatings (ISO 4042:1999)
DIN 267-10	ISO 10684	Fasteners - Hot dip galvanized coatings (ISO 10684:2004)
DIN 267-12	ISO 2702	Heat-treated steel tapping screws - Mechanical properties (ISO 2702: 1992)
DIN 267-15	ISO 2320	Prevailing torque type steel hexagon nuts - Mechanical and performance properties (ISO 2320: 1997)
DIN 267-15	ISO 3506-1	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 1: Bolts, screws and studs (ISO 3506-1 : 1997)
DIN 267-15	ISO 3506-2	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 2: Nuts (ISO 3506-2:1997)
DIN 267-15	ISO 3506-3	Mechanical properties of corrosion-resistant stainless steel fasteners - Part 3: Set screws and similar fasteners not under tensile stress (ISO 3506-3: 1997)
DIN 267-20	ISO 6157-2	Fasteners - Surface discontinuities - Part 2: Nuts (ISO 6157-2:1995)

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 267-21	ISO 10484	Widening test on nuts (ISO 10484:1997)
DIN 267-23	ISO 898-6	Mechanical properties of fasteners - Part 6: Nuts with fine pitch thread and specified proof load values (ISO 898-6:1994)
DIN 433-1	ISO 7092	Plain washers, small series - Product grade A (ISO 7092:2000)
DIN 433-2	ISO 7092	Plain washers, small series - Product grade A (ISO 7092:2000)
DIN 439-1	ISO 4036	Hexagon thin nuts (unchamfered) - Product grade B (ISO 4036:1999)
DIN 439-2	ISO 4035	Hexagon thin nuts (chamfered) - Product grades A and B (ISO 4035:1999)
DIN 439-2	ISO 8675	Hexagon thin nuts (chamfered) with metric fine pitch thread - Product grades A and B (ISO 8675: 1999)
DIN 427	ISO 2342	Slotted headless screws with shank (ISO 2342: 2003)
DIN 440	ISO 7094	Plain washers - Extra large series - Product grade C (ISO 7094: 2000)
DIN 522	ISO 4759-3	Tolerances for fasteners - Part 3: Plain washers for bolts, screws and nuts - Product grades A and C (ISO 4759-3: 2000)
DIN 555	ISO 4034	Hexagon nuts - Product grade C (ISO 4034: 1999)
DIN 558	ISO 4018	Hexagon head screws - Product grade C (ISO 4018:1999)
DIN 601	ISO 4016	Hexagon head bolts - Product grade C (ISO 4016:1999)
DIN 912	ISO 21269	Hexagon socket head cap screws with metric fine pitch thread (ISO 21269: 2004)
DIN 912	ISO 4762	Hexagon socket head cap screws (ISO 4762:2004)
DIN 913	ISO 4026	Hexagon socket set screws with flat point (ISO 4026:2003)
DIN 914	ISO 4027	Hexagon socket set screws with cone point (ISO 4027: 2003)
DIN 915	ISO 4028	Hexagon socket set screws with dog point (ISO 4028: 2003)
DIN 916	ISO 4029	Hexagon socket set screws with cup point (ISO 4029: 2003)
DIN 931-1	ISO 4014	Hexagon head bolts - Product grades A and B (ISO 4014:1999)
DIN 933	ISO 4017	Hexagon head screws - Product grades A and B (ISO 4017:1999)
DIN 934	ISO 4032	Hexagon nuts, style 1 - Product grades A and B (ISO 4032: 1999)
DIN 934	ISO 8673	Hexagon nuts, style 1, with metric fine pitch thread - Product grades A and B (ISO 8673:1999)
DIN 960	ISO 8765	Hexagon head bolts with metric fine pitch thread - Product grades A and B (ISO 8765:1999)
DIN 961	ISO 8676	Hexagon head screws with metric fine pitch thread - Product grades A and B (ISO 8676: 1999)
DIN 963	ISO 2009	Slotted countersunk flat head screws (common head style) - Product grade A (ISO 2009: 1994)

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 964	ISO 2010	Countersunk slotted raised head screws (common head style) - Product grade A (ISO 2010:1994)
DIN 965	ISO 7046-1	Countersunk flat head screws (common head style) with type H or type Z cross recess, product grade A - Part 1: Steel of property class 4.8 (ISO 7046-1:1994)
DIN 965	ISO 7046-2	Cross recessed countersunk flat head screws (common head style) (grade A) - Part 2: Steel of property class 8.8, stainless steel and non-ferrous metals (ISO 7046-2:1990)
DIN 966	ISO 7047	Countersunk raised head screws (common head style) with type H or type Z cross recess - Product grade A (ISO 7047:1994)
DIN 970	ISO 4032	Hexagon nuts, style 1 - Product grades A and B (ISO 4032: 1999)
DIN 971-1	ISO 8673	Hexagon nuts, style 1, with metric fine pitch thread - Product grades A and B (ISO 8673:1999)
DIN 971-2	ISO 8674	Hexagon nuts, style 2, with metric fine pitch thread - Product grades A and B (ISO 8674: 1999)
DIN 972	ISO 4034	Hexagon nuts - Product grade C (ISO 4034: 1999)
DIN 977	ISO 21670	Hexagon weld nuts with flange (ISO 21670: 2003)
DIN 980	ISO 10513	Prevailing torque type all-metal hexagon nuts, style 2, with metric fine pitch thread - Property classes 8, 10 and 12 (ISO 10513:1997)
DIN 980	ISO 7042	Prevailing torque type all-metal hexagon nuts, style 2 - Property classes 5, 8, 10 and 12 (ISO 7042:1997)
DIN 982	ISO 7040	Prevailing torque type hexagon nuts (with non-metallic insert), style 1 - Property classes 5, 8 and 10 (ISO 7040:1997)
DIN 982	ISO 10512	Prevailing torque type hexagon nuts (with non-metallic insert), style 1, with metric fine pitch thread - Property classes 6, 8 and 10 (ISO 10512:1997)
DIN 985	ISO 10511	Prevailing torque type hexagon thin nuts (with non-metallic insert) (ISO 10511 : 1997)
DIN 1470	ISO 8739	Grooved pins, full-length parallel grooved, with pilot (ISO 8739:1997)
DIN 1471	ISO 8744	Grooved pins, full-length taper grooved (ISO 8744:1997)
DIN 1472	ISO 8745	Grooved pins, half-length taper grooved (ISO 8745:1997)
DIN 1473	ISO 8740	Grooved pins, full-length parallel grooved, with chamfer (ISO 8740:1997)
DIN 1474	ISO 8741	Grooved pins, half-length reverse-taper grooved (ISO 8741:1997)
DIN 1475	ISO 8742	Grooved pins, one-third-length centre grooved (ISO 8742:1997)
DIN 1476	ISO 8746	Grooved pins with round head (ISO 8746:1997)
DIN 1477	ISO 8747	Grooved pins with countersunk head (ISO 8747:1997)

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 1481	ISO 8752	Spring-type straight pins - Slotted, heavy duty (ISO 8752:1997)
DIN 6325	ISO 8734	Parallel pins, of hardened steel or martensitic stainless steel (Dowel pins) (ISO 8734:1997)
DIN 6900	ISO 10644	Screw and washer assemblies with plain washers - Washer hardness classes 200 HV and 300 HV (ISO 10644:1998)
DIN 6901	ISO 10510	Tapping screw and washer assemblies with plain washers (ISO 10510:1999)
DIN 6902	ISO 10673	Plain washers for screw and washer assemblies - Small, normal and large series - Product grade A (ISO 10673:1998)
DIN 6903	ISO 10669	Plain washers for tapping screw and washer assemblies - Normal and large series - Product grade A (ISO 10669:1999)
DIN 6924	ISO 10512	Prevailing torque type hexagon nuts (with non-metallic insert), style 1, with metric fine pitch thread - Property classes 6, 8 and 10 (ISO 10512:1997)
DIN 6924	ISO 7040	Prevailing torque type hexagon nuts (with non-metallic insert), style 1 - Property classes 5, 8 and 10 (ISO 7040:1997)
DIN 6925	ISO 10513	Prevailing torque type all-metal hexagon nuts, style 2, with metric fine pitch thread - Property classes 8, 10 and 12 (ISO 10513:1997)
DIN 6925	ISO 7042	Prevailing torque type all-metal hexagon nuts, style 2 - Property classes 5, 8, 10 and 12 (ISO 7042:1997)
DIN 7337	ISO 14589	Blind rivets - Mechanical testing (ISO 14589: 2000)
DIN 7337	ISO 15977	Open end blind rivets with break pull mandrel and protruding head - AIA/St (ISO 15977: 2002)
DIN 7337	ISO 15978	Open end blind rivets with break pull mandrel and countersunk head - AIA/St (ISO 15978: 2002)
DIN 7337	ISO 15979	Open end blind rivets with break pull mandrel and protruding head - St/St (ISO 15979: 2002)
DIN 7337	ISO 15980	Open end blind rivets with break pull mandrel and countersunk head - St/St (ISO 15980: 2002)
DIN 7337	ISO 15981	Open end blind rivets with break pull mandrel and protruding head - AIA/AIA (ISO 15981:2002)
DIN 7337	ISO 15982	Open end blind rivets with break pull mandrel and countersunk head - AIA/AIA (ISO 15982: 2002)
DIN 7337	ISO 15983	Open end blind rivets with break pull mandrel and protruding head - A2/A2 (ISO 15983: 2002)
DIN 7337	ISO 15984	Open end blind rivets with break pull mandrel and countersunk head - A2/A2 (ISO 15984: 2002)

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 7337	ISO 16582	Open end blind rivets with break pull mandrel and protruding head - Cu/St or Cu/Br or Cu/SSt (ISO 16582: 2002)
DIN 7337	ISO 16583	Open end blind rivets with break pull mandrel and countersunk head - Cu/St or Cu/Br or Cu/SSt (ISO 16583:2002)
DIN 7337	ISO 16584	Open end blind rivets with break pull mandrel and protruding head - NiCu/St or NiCu/SSt (ISO 16584:2002)
DIN 7343	ISO 8750	Spring-type straight pins - Coiled, standard duty (ISO 8750:1997)
DIN 7344	ISO 8748	Spring-type straight pins - Coiled, heavy duty (ISO 8748:1997)
DIN 7346	ISO 13337	Spring-type straight pins, slotted, light duty (ISO 13337: 1997
DIN 7500-1	ISO 7085	Mechanical and performance requirements of case hardened and tempered metric thread rolling screws (ISO 7085: 1999)
DIN 7504	ISO 10666	Drilling screws with tapping screw thread - Mechanical and functional properties (ISO 10666:1999)
DIN 7504	ISO 15480	Hexagon washer head drilling screws with tapping screw thread (ISO 15480:1999)
DIN 7504	ISO 15481	Cross recessed pan head drilling screws with tapping screw thread (ISO 15481 : 1999)
DIN 7504	ISO 15482	Cross recessed countersunk head drilling screws with tapping screw thread (ISO 15482: 1999)
DIN 7504	ISO 15483	Cross recessed raised countersunk head drilling screws with tapping screw thread (ISO 15483:1999)
DIN 7962	ISO 4757	Cross recesses for screws (ISO 4757:1983)
DIN 7970	ISO 1478	Tapping screws thread (ISO 1478:1999)
DIN 7971	ISO 1481	Slotted pan head tapping screws (ISO 1481:1983)1)
DIN 7972	ISO 1482	Slotted countersunk (flat) head tapping screws (common head style) (ISO 1482:1983)1)
DIN 7973	ISO 1483	Slotted raised countersunk (oval) head tapping screws (common head style) (ISO 1483:1983) 1)
DIN 7976	ISO 1479	Hexagon head tapping screws (ISO 1479:1983) 1)
DIN 7979	ISO 8733	Parallel pins with internal thread, of unhardened steel and austenitic stainless steel (ISO 8733:1997)
DIN 7979	ISO 8735	Parallel pins with internal thread, of hardened steel and martensitic stainless steel (ISO 8735: 1997)
DIN 7981	ISO 7049	Cross recessed pan head tapping screws (ISO 7049:1983) 1)

Withdrawn DIN Standard	ISO Standard Replacement	Standards Title
DIN 7982	ISO 7050	Cross recessed countersunk (flat) head tapping screws (common head style) (ISO 7050:1983) 1)
DIN 7983	ISO 7051	Cross recessed raised countersunk (oval) head tapping screws (ISO 7051:1983)1)
DIN 7985	ISO 7045	Pan head screws with type H or type Z cross recess - Product grade A (ISO 7045:1994)
DIN 7991	ISO 10642	Hexagon socket countersunk head screws (ISO 10642:2004)
DIN 9021	ISO 7093-1	Plain washers - Large series - Part 1: Product grade A (ISO 7093-1 : 2000)
DIN 9021	ISO 7093-2	Plain washers - Large series - Part 2: Product grade C (ISO 7093-2: 2000)