



® **INDUSTRIAL FASTENERS INSTITUTE**

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Experts from our fastener industry have been hard at work within consensus standards organizations such as ASTM, ASME, ISO, SAE and API. This spring is no exception with significant standards development activities in the works.

### **ASTM Committee F16 on Fasteners and Committee B08 on Coatings**

ASTM Committee F16 on Fasteners last met in Orlando, FL, November 13-16. The big news to report is that ASTM A354 which has been under revision for the past two years, passed final Main Committee Letter Ballot (MCLB). This was the final hurdle and the new standard which is currently under publication and is to be released very soon. It is worth reminding that the revision to ASTM A354, *Quenched and Tempered Alloy Steel Externally Threaded Fasteners*, was triggered by the high profile anchor rod failures in the Oakland-San Francisco Bay Bridge (2013). The objective of the revision was to introduce provisions that already exist in other fastener standards such as ASTM F3125 and ISO 898-1 designed to prevent the type of deficiencies that occurred on the failed Bay Bridge anchor rods.

Another very important activity in ASTM on the subject of hydrogen embrittlement (HE) avoidance is the initiation of revision to ASTM B633 *Electrodeposited Coatings of Zinc on Iron and Steel to bring it back in line* with ASTM F1941/F1941M, *Electrodeposited Coatings on Mechanical Fasteners*. Many of you are aware that a 2007 Committee B08 on Coatings made a significant change to B633 whereby the mandatory baking requirement was reduced from above 1200 MPa (~39 HRC) to above 1000 MPa (~31 HRC). ASTM F1941/F1941M requires baking above 39 HRC, but does not require baking below 39 HRC. The contradiction that was created between the two standards has caused a great deal of confusion, controversy even legal action in the industry. It is worth noting the two standards were consistent until 2007 without any problems related to HE. B633 has been around for much longer than F1941 and is widely referenced on fastener prints. The concerns of the fastener industry are being advocated by committee F16 on Fasteners. Our position is supported by scientific research findings and test data in conjunction the overwhelming industrial experience over the course of the past 40 years. The result of the discussions has been the creation of a task group within B08, which includes members of F16 to eliminate the contradiction. A second draft proposal is ready for subcommittee letter ballot and will be circulated this month (March).

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The next meetings of ASTM Committees F16, A01 and B08 will take place in Toronto, the week of May 8, 2017.

## **ISO/TC 2 – Technical Committee on Fasteners**

ISO Committee TC 2 on Fasteners met in Shanghai, China, October 17-21. North America was represented by two excellent delegations from USA and Canada. A number of important standards are under revision. One of the most important is ISO 4042, *Electroplated Coatings*. The current ISO 4042:1999 has undergone as many as 21 revision drafts over the course of 4 years. From a North American perspective, we have ensured that ISO 4042 and ASTM F1941/F1941M will be consistent in their requirements, especially regarding avoidance of hydrogen embrittlement. ISO 4042 Committee Draft (CD) was moved to Draft International Standard (DIS) stage. This is a significant step forward! Final technical revisions will be made before moving to Final Draft International Standard (FDIS) stage and then onto publication. At the current pace, we expect the document to be published in 2018, a full 19 years since the last revision!

Another very important document that is nearing publication is a technical report, ISO TR 20491, titled *Fundamentals of Fastener Hydrogen Embrittlement*. After two years of very careful review by the national committees and several revisions within TC 2/SC 14 Subcommittee on Coatings, the technical report has reached the stage of final editorial review. We expect ISO TR 2049 to be published in the middle of 2017.

(Note: the ISO technical report is based on a white paper by the same that is available for free on the IFI website <http://www.indfast.org/info/free-technical-info.asp>.)

The next plenary meeting of ISO TC 2 will take place the week of October 16 in Berlin, with ad hoc group activities leading up to the plenary meeting

## **Subsea Bolting Task Group**

In December, 2012, a Chevron offshore oil rig lower marine riser package separated from the blowout preventer, releasing a small amount of synthetic drilling fluids into the Gulf of Mexico. The incident was the result of the failure of H4 connector bolts. The Bureau of Safety and Environmental Enforcement (BSEE) issued a Safety Alert which triggered immediate measures by the offshore oil and gas industry, notably the replacement of H4 connector bolts worldwide. Although, the root cause of the failures was never determined, initial analysis report mistakenly ascribed the cause to Internal Hydrogen Embrittlement (IHE). This error has caused a great deal of confusion in the industry. A similar but separate occurrence in 2014 has given rise to fears that the problem is pervasive and has made headlines in the Wall Street Journal.

A public “Bolting Forum” held by BSEE held in Washington, DC on August 29 was intended to outline the actions being taken to address the issue. For example, earlier this year, BSEE asked the American Petroleum Institute Subcommittee 21 on Materials (API SC21) to make recommendations to prevent any future occurrence of such a failure. API SC 21 Task Group on Multi-Segment Bolting in Subsea Applications was created as a result of the BSEE request. The task group (TG) includes a broad range of experts from the fastener and oil and gas industries. The mandate of the task group is to conduct research and testing aimed and to propose data driven recommendations to improve Oil & Gas industry standards and practices relative to bolting. More precisely, the TG will be examining the selection of fastener materials and the selection of coatings. The proposals will eventually result in changes to the API Specification 20E, Alloy and Carbon Steel Bolting for Use in the Petroleum and Natural Gas Industries. I will keep our industry informed as the work progresses.

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## STANDARDS REVISION COMPLETED IN THE PAST YEAR

### ASTM Committee F16 – Fasteners

- **ASTM F836M-16** - Standard Specification for Style 1 Stainless Steel Metric Nuts (Metric)
- **ASTM F837M-16** - Standard Specification for Stainless Steel Socket Head Cap Screws [Metric]
- **ASTM F879M-16** - Standard Specification for Stainless Steel Socket Button and Flat Countersunk Head Cap Screws (Metric)
- **ASTM F1554-15e1** - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

See recent article on the publication of this standard on the AISC website

<http://msc.aisc.org/globalassets/modern-steel/archives/2016/01/something.pdf>

- **ASTM F2832-11(2016)** - Standard Guide for Accelerated Corrosion Testing for Mechanical Fasteners
- **ASTM F3043-15** - Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Alloy Steel, Heat Treated, 200 ksi Minimum Tensile Strength
- **ASTM F3111-16** - Standard Specification for Heavy Hex Structural Bolt/Nut/Washer Assemblies, Alloy Steel, Heat Treated, 200 ksi Minimum Tensile Strength
- **ASTM F3125/F3125M-15a** - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

See recent article on the publication of this standard on the ASTM website:

<http://www.astm.org/standardization-news/spotlight/aligned-and-combined-ma15.html>

- **ASTM F3148-15** - Standard Specification for High Strength Structural Bolt Assemblies, Steel and Alloy Steel, Heat Treated, 144ksi Minimum Tensile Strength, Inch Dimensions

### ASTM Committee A01 – Steel – (SC A01.22 Bolting Materials)

- **ASTM A193/A193M-16** Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications
- **ASTM A194/A194M-16** Standard Specification for Carbon Steel, Alloy Steel, and Stainless Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
- **ASTM A320/A320M-15a** Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low-Temperature Service
- **ASTM A962/A962M-16a** Standard Specification for Common Requirements for Bolting Intended for Use at Any Temperature from Cryogenic to the Creep Range

### ASME Committee B1 – Screw Threads

- **ASME B1.16M** – 2016 - Gages and Gaging for Metric M Screw Threads

### ASME Committee B18 – Fasteners

- **ASME B18.1.1** – 2016 - Small Solid Rivets
- **ASME B18.1.2** – 2016 - Large Rivets
- **ASME B18.1.3M** – 2016 - Metric Small Solid Rivets
- **ASME B18.10** – 2016 - Track Bolts and Nuts
- **ASME B18.31.1M** – 2016 - Metric Continuous and Double End Studs
- **ASME B18.24** - 2015 – Fastener Part Identification Numbering System

### ISO Committee TC2 – Fastener

- **ISO 2320:2015** Fasteners-Prevailing torque steel nuts-Functional properties

### SAE Committee – Fasteners

- **SAE J773** Conical Spring Washers Aug 31, 2016 Stabilized

### **A FEW NOTABLE STANDARDS IN THE REVISION PROCESS**

- **ASME B18.2.1**, Bolts and Cap Screws (inch series).
- **ASME B18.2.6**, Structural Fasteners (inch series).
- **ASTM A354**, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners. **PASSED FINAL BALLOT!**
- **ASTM F606/F606M**, Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets.
- **ASTM F2282** Quality Assurance Requirements for Carbon and Alloy Steel Wire, Rods, and Bars for Mechanical Fasteners.
- **ASTM B633** Electrodeposited Coatings of Zinc on Iron and Steel
- **ISO 4042** Fasteners – Electroplating – moved from CD to DIS stage
- **ISO 3269** Fastener - acceptance - WD stage
- **ISO 15330** Fasteners - Preloading test for the detection of hydrogen embrittlement - Parallel bearing surface method – WD stage
- **ISO/TR 20491** Fundamentals of Hydrogen Embrittlement in Steel Fasteners.  
**UNDEGOING FINAL EDITORIAL REVISION**

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