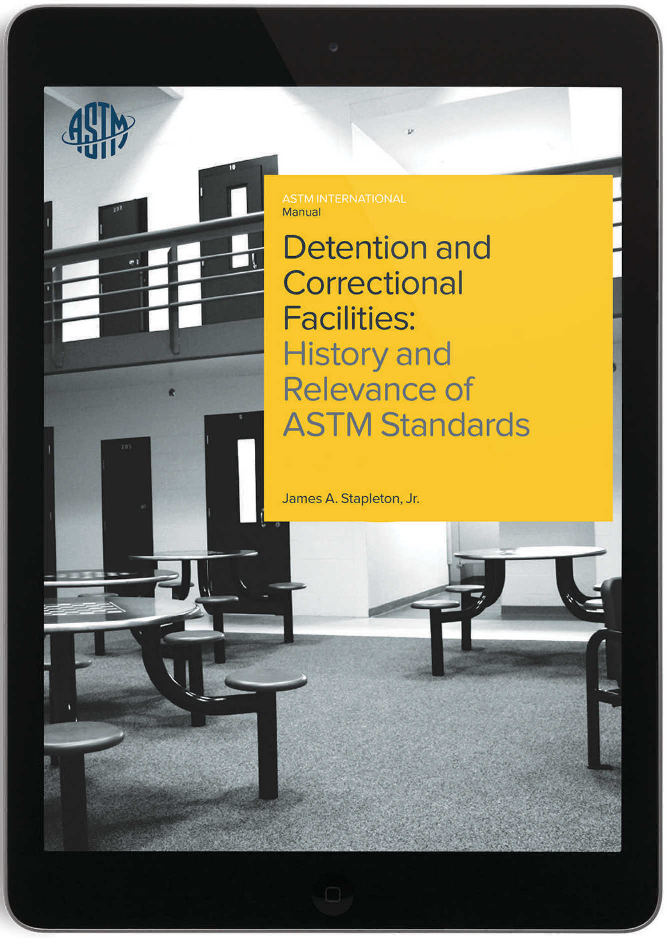
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History and Relevance of ASTM Standards
James A. Stapleton, Jr.

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Foreword

THIS PUBLICATION, *Detention and Correctional Facilities: History and Relevance of ASTM Standards*, was sponsored by ASTM Committee F33 on Detention and Correctional Facilities. This is Manual 76 in ASTM International's manual series.

James A. Stapleton, Jr.
Habersham Metal Products Co.
264 Stapleton Rd.
Cornelia, GA 30531

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Introduction

This book is not only a history of ASTM Committee F33 on Detention and Correctional Facilities but also a walk through the thinking, the analyses, the debates, and the innovation of hundreds of correctional industry professionals over a period of five decades, all in the pursuit of assuring that security products, materials, and systems provided for detention and correctional facilities perform as intended, thereby providing a safe environment for occupants and staff as well as providing for public safety and security. Since its startup, Committee F33 has published and maintained 14 standards that address everything from test methods of opening assemblies, walls, and ceilings to selection guides for security controls and fire testing of cushioning material for bunks. Also, there are 16 more topics for potential standards development listed in the committee's long-range plan, six of which are already in draft format and prioritized for balloting.

The objective of the committee as stated in the foreword of the compilation *ASTM Standards on Detention and Correctional Facilities*, second edition, is:

> The promotion of knowledge and the development of standards for materials, products, assemblies, and systems used in the construction or renovation and operation of detention and correctional facilities for adults and juveniles. Its subcommittees include physical barriers, detention hardware, furnishings and equipment, and operational controls.

This book will go into many of the details of the test methods and guide standards, along with the rationale and experimental testing that went into their development. If the reader understands the reasoning behind the criteria for the test methods as developed and debated over the many years as well as the specifications and the guidance material, he or she can better apply the standards to his or her particular applications and project specifications. This is a commonplace approach to many guidebooks, manuals, and journals that explain the "Why?" and "Where did this come from?" of not only industry best practices but other technical fields. The results of industry practitioners gaining insight into the technical bases of these standards will be the creation of project contract documents that will reasonably ensure that products, materials, and systems designed and specified will perform as needed once they are placed into service.

This book also includes commentary on plans for the development of future standards, thereby providing assistance and planning milestones to industry practitioners and allowing assessment of progress toward the advancement of the stated committee objective. The ongoing research and development regarding detention security products and systems is of great importance to the safety and security of facility occupants, staff, and the general public. Staying the course for standards development in this field of endeavor is, and should always be, top priority for the detention and corrections industry.

The Beginnings of Standardization Efforts

The best approach, as may be true with any work of this kind, is to start at the beginning of the first efforts toward detention and corrections industry product and system performance standardization. This would be the early work of the ASTM task group (A01.02.03) on detention steel products, along with the early and almost concurrent work of the Hollow Metal Manufacturers' Association (HMMA), a division of the National Association of Architectural Metal Manufacturers (NAAMM), specifically their committee of manufacturers charged with developing specifications for safe and durable products and systems for the detention and corrections industry, circa the 1970s.

The work of the ASTM task group during the 1960s, 1970s, and early 1980s was focused primarily on two main areas. One was the maintenance of the two published standards for tool resistant bar and plate, ASTM **A627**, *Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities*, and **A629**, *Standard Specification for Tool-Resisting Steel Flat Bars and Shapes for Security Applications* (withdrawn in 2004 and replaced by ASTM **A627**), both of which were under the task group's jurisdiction (A01.02.03). The other was the development of specifications for detention doors, frames, hardware, glazing, and glazed vision systems.

At that time, there was much discussion in committee meetings regarding the details of the specifications and the methods that should be used to perform "simulated service" testing. The group finally agreed to focus on the test methods. After that decision, there was rapid progress toward development of the first simulated service test method for full-scale door, frame, hardware, and glazing assemblies that were completely operational and installed in test walls as they would be in actual detention and correctional facilities.

Parallel to this effort, HMMA established a technical subcommittee to develop an industrywide detention door and frame specification. Several HMMA members had extensive experience manufacturing detention hollow metal and, therefore, got off to a quick start with their new specification. The group decided right away that the specification should not only be prescriptive, providing basic guidelines for detention hollow metal fabrication, but should also include a rigorous testing protocol that would closely simulate various attack and abuse scenarios. There was good coordination from the beginning between ASTM's work and the efforts of HMMA, with members serving in both efforts; consequently, both groups made rapid progress on the test methods and the specifications.

During this time, there was a steadily increasing trend in newly constructed or renovated detention and correctional facilities toward the use of heavily constructed hollow metal instead of traditional bar grille cell fronts. The thinking behind this was to improve facility safety and environmental conditions while maintaining the security capabilities of door openings and glazed assemblies. This trend was first reported in an article published in the NAAMM quarterly magazine *Architectural Metals* in 1979 [1]. The article, entitled "Economical Hollow Metal is a Versatile Choice for Many Security Applications," discussed the versatility and economy of heavily constructed hollow metal doors, windows, and interior borrowed lights. Compared to traditional bar grille—such as Otis's cell in the old TV program *The Andy Griffith Show*—other benefits that were also pointed out included fully enclosed electronic hardware and associated wiring, sound retardation capabilities, ease of cleaning and sanitizing, availability of fire-rated assemblies, and excellent freedom of design, to name a few.

Follow-up articles also published in *Architectural Metals* in 1981 [2] and 1982 [3] reported the research and development of testing methods for doors and glazed vision systems, along with associated hardware and glazing retention systems. The articles, "Evaluating Security Doors" and "Evaluating Security Doors II," went into detail regarding the performance test methods of that time and the new test methods that were under development, along with the associated rationale. The lead statement for the first article was, "Existing performance test methods have helped improve the design and construction of security hollow metal systems. But, have they gone far enough? Several new test methods may more accurately reflect how the doors will withstand actual adverse field conditions." The article goes on to describe the test method known as the "impact test" that was being developed and that simulates a sustained battering-ram type breakthrough attempt during a riot situation as one of the new test methods being considered.

One of the main topics of "Evaluating Security Doors" was the dual test method—the "static load" and "rack test"—typically included in security door specifications during that time. These two tests had been in use for a number of years and had become the "consensus" standards for door performance. However, as the article discussed, there were drawbacks to these test methods.

First, the static load test procedure was criticized as follows:

> (1) The sample tested is not an actual door prepared for various required hardware, glass, and other equipment. The actual door is what is expected to perform in the field, not a blank panel. (2) The test does not accurately duplicate the punishment a door may receive in the field. In fact, it does not even remotely resemble possible adverse field conditions. The static load test evaluates how well a sample door panel performs as a simply supported beam, which is not a field application. (3) The required standards described in the test assume that maximum rigidity is a virtue, which is not true. This assumption should be questioned since there are definite performance advantages associated with the qualities of limited flexibility and resilience in a door exposed to field conditions [2,3].

Second, the rack test was also found to be lacking, although not as much so as the static load test: "The rack test may be more meaningful than the static load test since it is possible that in a riot, inmates may attempt to pry a door open at the top or bottom subjecting the door to end torque. However, we are again dealing with a door panel not prepared for hardware or other options" [2,3].

Counterpoint to this criticism, the static load and rack tests routinely included in security hollow metal specifications at that time did satisfy a need for performance specification because, prior to their introduction, there were no criteria. Architects wrote hollow metal specifications based upon their knowledge of tried and proven metal structures and fabrication methods. With the proliferation of static load and rack tests, architects were ensured that the materials and methods of assembly met at least a minimum standard of performance. This provided extra protection for them and for owners against inferior workmanship and deviation from the specifications. Although static load and rack tests did not simulate adverse field conditions, they were better than nothing, and, at that time, did provide a basis for the determination of basic quality of design and fabrication, welding techniques, and strengths of materials.

As mentioned earlier, this article continued by reporting the development of the door impact test, a test that utilizes a swinging pendulum steel battering-ram apparatus, whereby a ram of a certain weight is pulled back to a certain height in order to generate a certain impact energy and then released against a target area on a sample door multiple times, thus simulating a battering-ram attack. During much discussion with corrections industry professionals, several concerns arose regarding the security of openings such as doors and glazed vision systems. A primary concern was the outbreak of a disturbance involving several inmates that could possibly, and often did, explode into a full-scale riot. Could the openings stand up to inevitable attack? In this situation, staff need 30 min or longer to regain control. Another concern was that, during this type of disturbance, inmates sometimes dislodge heavy implements such as bunks or tables and use them for battering devices. A prison official once described how inmates could tie bedsheets to a bunk or table and swing it back and forth multiple times against a door or borrowed light in order to break through it.

Using this information, and with much experimentation and calculation, test equipment was designed that would simulate the riot situation and that would address all concerns. As part of this research and development effort, the impact test was compared to another similar impact test method that was already in publication. In 1976, the National Institute of Law Enforcement and Criminal Justice (NILECJ) published the standard *Physical Security of Door Assemblies and Components* [4]. This standard was researched for possible inclusion or use in the development of the impact test. However, it was found that even the highest level of security testing defined by this document would not adequately address the concerns because of two drawbacks: (1) The NILECJ standard called for an impact foam "buffer" to be attached to the door or vision system to cushion the blow. This, of course, was not representative of an actual field attack, and (2) there were only eight blows specified, two blows of four impact energy levels ranging from 59 ft·lbf up to 148 ft·lbf. This also did not adequately simulate a field attack and was not even close to the 400 blows at 200 ft·lb each that would eventually be required by the detention security impact test.

There was also research done into existing attack tests advocated by some departments of corrections that involved technicians using a variety of tools over specified time durations. Although true in real life and also used in some security glazing tests then and today, this approach was found to be flawed because of the possibility—and likelihood—that the actual damage or punishment inflicted on the test sample was difficult to accurately measure. Therefore, the testing, along with the results, possibly could vary widely from one testing laboratory to another. ASTM/HMMA impact testing, conducted using a mechanized apparatus, could be accurately measured from one blow to the next, blow after blow, maintaining consistent impact energy levels, and the test procedure was easily repeatable from one laboratory to another.

After all of this development work, the first impact test standard and design of associated equipment was completed in 1981; by 1982, as reported in the follow-up article, "Evaluating Security Doors II," the impact test was fine-tuned and finalized for preparation to be included in the first NAAMM/HMMA, *Guide Specification for Detention Security Hollow Doors and Frames*, published in 1983 [**5**]. This video clip shows a current version of the impact test equipment in action and a test in process **CLICK HERE**. Note that the pendulum ram swings from the same height, at the same speed, blow after blow. Again, the test is very accurate and very repeatable. **Fig. 1** shows how much damage is inflicted on the sample and demonstrates the importance of robust door and frame construction along with structurally strong hardware and glazing preparations and reinforcements.

In the following few years, there was considerable coordinated effort toward standards development among the manufacturing, contracting, and architectural communities. In 1985 and 1988, there were articles published in *Doors and Hardware* [**6**,**7**], the journal of the Door and Hardware Institute, which promoted and documented the work of NAAMM/HMMA. Following the work of HMMA, the impact test and other relevant test methods were further developed and written into ASTM **F1450**, *Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities*, the first of the test methods by the ASTM group, which was initially published in 1991 [**8**]. Other standards were developed addressing products that would benefit from the test methods developed for ASTM **F1450**, and these publications followed in rapid succession. The result was the creation of a suite of test methods, to be discussed later, that covered coordinated security requirements for all products and systems within the security envelope, thereby providing assurance that there would be no "weak links in the chain."

Growth and Progress

In the face of a prison construction boom during the 1980s, there was an increasingly urgent need in the architectural community for the development of consistent performance standards for critical security products and systems. By that time, participation in the ASTM task group by corrections professionals who were clamoring for standards had increased, and the task group rapidly progressed through reorganization into a subcommittee under A01 (A01.16). Then, in 1989, the group urgently applied to be reorganized again into a full committee.

FIG. 1

ASTM **F1450** impact surface after test.

That same year, recognizing the urgent need for standards development and hearing the outcry of the industry, ASTM authorized the organization of a full committee on detention and correctional facilities, F33. During the organizational meeting of the full ASTM Committee F33 on Detention and Correctional Facilities in 1989, a large contingent of industry practitioners were present, along with design, construction, and manufacturing professionals. All were very concerned about the need for credible standards for security products and systems in the face of a tremendous demand for new facilities. Because of the work that was already taking place within ASTM Subcommittee A01.16 and the historical credibility and legal enforceability of ASTM standards, it was agreed by all that ASTM provided the best venue to develop these much-needed standards.

Out of that meeting came an extensive list of products, materials, and systems that the group agreed were the most critical regarding the need for standards development. This list included doors, hardware, and glazed vision systems as well as the work that had already been accomplished by HMMA as well as work that was about to be completed by ASTM Subcommittee A01.16. From this emerged the various subcommittees for the newly formed ASTM Committee F33. During the development of these standards, the committee considered and coordinated the input of product and system manufacturers and installers, architects, state and federal agencies, testing laboratories, and security consultants.

Fast forwarding to the present, the committee's standards address security walls, doors, vision systems, glazing, locks, hinges, sliding door devices, security control systems, perimeter security systems, grilles, tool-resistant bars, chain link fencing, steel bunks, and cushioning material. Additional work is being done in the areas of noncontact visitation booths, security ceilings, security fasteners, digital video recording (DVR) systems, digital video network (DVN) systems, access panels and doors, and operable windows. The published standards that have been developed by the committee are as follows:

- ASTM **A627–03** (2011), *Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities*
- ASTM **F1450–12a**, *Test Method for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities*
- ASTM **F1465–03**, *Guide for the Selection of Security Control Systems*
- ASTM **F1534–10**, *Test Method for Determining Changes in Fire-Test-Response Characteristics of Cushioning Materials After Water Leaching*
- ASTM **F1550–10**, *Test Method for Determination of Fire-Test-Response Characteristics of Components or Composites of Mattresses or Furniture for Use in Correctional Facilities After Exposure to Vandalism, by Employing a Bench Scale Oxygen Consumption Calorimeter*
- ASTM **F1577–05** (2012), *Test Methods for Detention Locks for Swinging Doors*
- ASTM **F1592–12**, *Test Methods for Detention Hollow Metal Vision Systems*
- ASTM **F1643–05** (2012), *Test Methods for Detention Sliding Door Locking Device Assemblies*
- ASTM **F1758–05** (2012), *Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors*
- ASTM **F1870–11**, *Guide for the Selection of Fire Test Methods for the Assessment of Upholstered Furnishings in Detention and Correctional Facilities*
- ASTM **F1915–05**, *Test Methods for Glazing for Detention and Correctional Facilities*
- ASTM **F1916–98**, *Specifications for Selecting Chain Link Barrier Systems with Coated Chain Link Fence Fabric and Round Posts for Detention Applications*
- ASTM **F2322–03** (2012), *Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities*
- ASTM **F2542–05** (2012), *Test Methods for Physical Assault of Ventilation Grilles for Detention and Correctional Facilities*

It is important to note that six of these methods are closely related to each other and that, in effect, create the "hard-line" security envelope of an occupied space within detention and correctional facilities: ASTM **F1450**, ASTM **F1577**, ASTM **F1592**, ASTM **F1643**, ASTM **F1758**, and ASTM **F1915**. Each of these test methods has an appendix section entitled "Related Standards" that offers guidance to the design professional regarding how these can be incorporated into project specifications for the best effectiveness. The section reads as follows:

> X2.1 These test methods are part of a family of interrelated standards developed to work together using common testing approaches and grade classifications to address the specific needs of detention and correctional facilities, including the following: Test Methods **F1450**, **F1577**, **F1592**, **F1643**, **F1758**, and **F1915**.
>
> X2.2 This Appendix is intended to explain some of the common approaches underlying the test methods noted above, including how to distinguish between primary and secondary materials and test objectives.
>
> X2.3 Primary is typically an entire full-scale operating assembly of many components and materials that are tested together, whereas secondary is individual components that are only a portion of a whole assembly.
>
> X2.4 In some instances, components that are secondary in one test become primary under a distinct and separate related standard developed specifically for that component. These separate standards typically apply more rigorous test methods to fully exploit susceptibilities unique to that component.
>
> X2.5 Titles of related standards indicated above pertain to performance objectives for the primary component or assembly. This is explained further in examples below.
>
> X2.6 Each related standard contains grades or levels of performance developed: to restrict passage to unauthorized areas, to delay and frustrate escape attempts, and to resist vandalism. These grades or levels were developed based on an attacker's predicted ingenuity using "riot-like" attack methods, modified depending upon strengths and weaknesses of various components. Attack sequence format(s), impact intensities, test duration(s), and tools utilized are comparable from one standard to another. Using the established security grades, a user is given reasonable assurance that components and assemblies will perform satisfactorily at their tested security grade levels. These security grades establish specific measurements of performance of the primary assembly or component material.
>
> X2.7 *Test Methods **F1450***—Attack impact test methods incorporated into Test Methods **F1450** address performance characteristics of door assemblies, including constituent doors, door frames, and sub-components installed and operating as they would normally function in an actual detention or correctional facility. Components installed in test doors and frames are intended to be certified by their applicable separate component standard performance. For example, separately certify components to standards as follows: locks to Test Methods **F1577**, hinges to Test Methods **F1758**, sliding door devices to Test Methods **F1643**, and glazing to Test Methods **F1915**.
>
> X2.8 *Test Methods **F1592***
>
> X2.8.1 Impact test method(s) for Test Methods **F1592** address not only the performance characteristics of doors and door frames, but also sidelight

and multiple light frame assemblies, again, with all necessary components installed to form a full scale operating assembly. Once again, it is intended that individual components should be certified under their separate applicable standards.

X2.8.2 Users of detention components should review the related standards applicable to those components and their test reports for comparable attack testing grade or level of performance.

X2.8.3 Since the primary subjects of attack under Test Methods **F1592** are the frame construction, glazing stops, and fasteners, a consistent steel impact "panel" may be substituted for uniformity of test results, instead of using actual security glazing. This substitution also applies to Test Methods **F1450** door vision lights.

X2.9 *Complementary/Dual Certifications*

X2.9.1 Manufacturers of components may work together to obtain multiple complementary certifications. For example, a lock manufacturer may team with a hollow metal manufacturer to conduct impact testing on an assembly under Test Methods **F1450** and obtain dual certifications for impact test portions of both Test Methods **F1450** and **F1577**, since the test methods in both are comparable.

X2.9.2 In another example, a security glazing manufacturer may team with a hollow metal manufacturer to obtain a complementary certification under Test Methods **F1592**. However, in this case, Test Methods **F1915** requires additional testing of the security glazing that involves sharp as well as blunt attack tools, and application of heat using a torch during a blunt impact test. A security glazing product that performs well under Test Methods **F1592** hollow metal frame testing may not satisfy all of the separate requirements of Test Methods **F1915**. Separate certification under Test Methods **F1915** must also be obtained.

X2.10 *Components Tested for Specific Susceptibilities*—Differences in attack testing under these two test methods (Test Methods **F1915** and **F1592**) are related to performance degradation of some security glazing, undergoing attack testing at various thermal conditioning exposures, as well as the specific number of impacts. Test Methods **F1915** contains impact tool attacks under both severe hot and cold conditioning, as well as a torch sequence combined with impact from blunt tools. Typically, heavily constructed detention hollow metal sheet is not as susceptible to these temperature changes, which is the reason why temperature conditioning is not included in impact testing for Test Methods **F1592** or **F1450** (except temperature conditioning for bullet resisting Underwriters' Laboratories [UL] 752). Consequently, security glazing tested and certified under Test Methods **F1915** provides superior assurance of performance across a range of environmental conditions not tested under most other previously existing standards.

X2.11 In conclusion, by choosing consistent grade levels from these related standards, a user can obtain greater assurance that both the security assembly and the multitude of constituent components are integrated to deliver the security performance required.

Additionally, this appendix section in all of these test methods will be revised during the next review cycle to include the published standard ASTM **F2322**, *Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities*, and the recently published ASTM **F2697–15**, *Standard Test Methods for Physical Assault on Overhead Horizontal Fixed Barriers for Detention and Correctional Facilities*. The guidelines for using these related standards will then apply to eight standard test methods for products and systems that together encompass the "security envelope."

Another useful appendix that is commonplace in most of the F33 test methods is the appendix "Combined Testing and Testing Schedule." The following, Appendix X4, is taken from one of the six aforementioned test methods, ASTM **F1450**, and it applies to others as well as is shown in the standards. The underlined statement in paragraph X.4.3 highlights the importance of periodic testing and the associated importance of requiring test reports to comply. The committee has discussed this through the years, and architects and manufacturers alike agree that, although costly, the requirement for periodic retesting is beneficial to the industry. In fact, some manufacturers voluntarily run periodic testing as described (or even more frequently) because the testing is instrumental in proving out new product designs and innovations as well as providing a periodic quality assurance check to be sure that existing designs and methods are consistently providing good-quality finished products.

This is consistent with the fact that the committee recognized early on that well-developed scientific testing backed by clear guidance for application and usage of the standards is very important in order to serve one of the prime objectives of the committee and of ASTM International, which is to provide credible and enforceable standards for public use throughout the world.

> X.4.1 The test methods described in ASTM **F1450** and ASTM **F1592** are closely related and the test samples may be tested in various combinations in order to minimize duplicate or redundant testing.
>
> X.4.2 If such a combined test schedule is used, combined reporting may be incorporated, provided all required assemblies are addressed and subject to testing laboratory approval.
>
> X.4.3 The detention and corrections industry relies heavily upon the credibility of the testing of security door and vision system assemblies in accordance with these test methods, and the performance that successful testing helps to ensure. In consideration of the importance placed by the industry upon this product performance testing, the developers and reviewers of these test methods agree that retesting every five (5) years will help ensure that product designs and production methods remain reliable and do not exhibit performance degradation over time. This five (5) year retesting schedule coordinates well with the five (5) year review that is mandated by ASTM for all standards. By following this schedule, the industry is ensured that if a review precipitates changes or additions to the testing procedures, then these new procedures will be utilized by the manufacturers and laboratories upon their next retesting cycle, thereby providing assurance that products are always being tested and

retested in accordance with the most current revisions of the standards. However, in the interest of not requiring unnecessary testing, if the revisions to a standard during its review are editorial only, or if the standard is reapproved with no changes, retesting may be waived.

For the design professional who is relatively new to the detention and corrections industry, there is much to absorb with regard to the application of the F33 standards in order to create the best specifications that will ensure quality and functionality of security products and systems. One of the challenges is not only to understand the procedures and guidelines within the standards but also to enforce compliance by reviewing the test reports and other submittals required by the standards. In some cases, the standards will require listings and certifications of products along with associated labeling under the services of testing laboratories having factory follow-up inspection services. Not only that, the various testing laboratories enlisted by manufacturers and system providers may use different formats for their test reports, certifications, and listings. In order to assist the design professional in sorting all of this out, the manufacturing and architectural communities often create various checklists. An example of such a checklist for detention hollow metal doors, "Test Report Quick Check," is shown in **Fig. 2** with a copy of the associated standard, ASTM **F1450-12a** (shown in **Fig. 3**) for ease of interpretation and reference. Similar checklists can be written for other types of products and systems test reports and certifications. Various versions of this systematic "check the box" approach have been in use by many in the design world for years to review and approve submittals or to deny approval and require resubmittal, when necessary. When this approach is utilized, the design professional will be able to manage these documents and submittals, to sort out the "wheat from the chaff" (so to speak), and to either approve or disapprove them with confidence. And, in the case of disapproval, the design professional will be able to defend his/her position against any resistance or dispute.

Continuing with the subject of hollow metal, but applicable to other products and systems and in addition to utilizing a checklist, it will be prudent to ask a few key questions related to the manufacturer's designs, materials, and fabrication techniques. For example:

- Are there any aspects of your design that require welding or attachment of vastly different thicknesses of metal? The reason for this question is that an overlying principle in the process of welding steel components together, particularly resistance spot welding, is that the strength of a weld is directly proportional to the thickness of the thinnest material being welded. For example, welding together two 12-gage (0.093 in., 2.3 mm) components creates weld nugget strength typical of 12 gages. However, welding a 16-gage (0.053 in., 1.3 mm) component to a 12-gage component results in a weld nugget strength typical of 16 gages. This is good to know because even if a design passes the required tests, the incorporation of radically different thicknesses of material within the design can have an adverse effect

FIG. 2

Test report quick check.

Detention Hollow Metal Door
Performance Test Report Quick Check

Any negative response indicates non-compliance with the requirements of ANSI/HMMA 863 and ASTM F1450-12a

ANSI/HMMA 863 and ASTM F1450 Test Requirements Manufacturer: ____________	**Static Load** Yes	No	**Rack Load** Yes	No	**Impact Load** Yes	No	**Edge Crush Test** Yes	No
Description of Test Doors:								
Door size 3'0" x 7'0"	☐	☐	☐	☐	☐	☐	☐	☐
Minimum door face sheet thickness (in. (mm) gage):								
Grades 1 & 2, 0.093 in. (2.3 mm) 12	☐	☐	☐	☐	☐	☐	☐	☐
Grades 3 & 4, 0.067 in. (1.7 mm) 14	☐	☐	☐	☐	☐	☐	☐	☐
Hardware:								
All samples provided with hinges (3) 4 1/2 (114 mm) full mortised	☐	☐	☐	☐	☐	☐	☐	☐
One sample for each test with door mounted pocket lock	☐	☐	☐	☐	☐	☐	☐	☐
One sample for each test with jamb mounted lock	☐	☐	☐	☐	☐	☐	☐	☐
All samples provided with glass preparations, clear openings per F1450-12a, Fig. 1 & 2	☐	☐	☐	☐	☐	☐	☐	☐
Static Load Test:								
Two (2) doors tested, one (1) with pocket lock prep. and one (1) with strike prep for jamb mounted lock, per ANSI/HMMA 863	☐	☐						
Each door supported 4" maximum at each end	☐	☐						
Loaded at quarter points	☐	☐						
Total Load on each door: 14,000 lbf. (62 272N) for Grades 1 & 2,	☐	☐						
11,000 lbf. (48 939N) for Grades 3 & 4	☐	☐						
Maximum Center Point Deflection of each door:	☐	☐						
.580 in. (14.7 mm) center point deflection measured at center of each door per Figure 9, not at door edge.	☐	☐						
Maximum deflection of each door after release of load: 0.100 in. (2.5 mm)	☐	☐						
Rack Load Test:								
Two (2) doors tested, one (1) with pocket lock prep. and one (1) with strike prep for jamb mounted lock, per ANSI/HMMA 863			☐	☐				
Each door supported 6 in. (152 mm) maximum from bottom			☐	☐				
Each door supported 6 in. x 6 in. (152 mm x 152 mm) maximum at top hinge edge			☐	☐				
Load applied within 3 in. (76 mm) maximum from top and lock edges of each door			☐	☐				
Total load on each door: 7500 lbf. (33 360N) for Grades 1 & 2,			☐	☐				
5500 lbf. (24 470N) for Grades 3 & 4			☐	☐				
Maximum corner deflection of each door: 3.55 in. (90.2 mm) per Fig. 10			☐	☐				
Maximum corner deflection of each door after release of load: 1.40 in. (35.5 mm) maximum			☐	☐				

FIG. 2

(Continued)

Detention Hollow Metal Door
Performance Test Report Quick Check

Any negative response indicates non-compliance with the requirements of ANSI/HMMA 863 and ASTM F1450-12a

ANSI/HMMA 863 and ASTM F1450-12a Test Requirements Manufacturer: ______________	**Static Load** Yes No	**Rack Load** Yes No	**Impact Load** Yes No	**Edge Crush Test** Yes No
Impact Load Test on each test door described in "Description of Test Doors":				
Frame/door assembly installed in masonry or concrete wall per ASTM F1450:			☐ ☐	
Impact ram 80 lbs. (36.3 kg)			☐ ☐	
Striking surface of ram 4 sq. in. (25.8 sq. cm.)			☐ ☐	
Impact energy 200 ft. lbf. (271.2J)			☐ ☐	
Impact sequence/quantity				
Impacts at Lock — 600 - Grade 1			☐ ☐	
400 - Grade 2			☐ ☐	
200 - Grade 3			☐ ☐	
100 - Grade 4			☐ ☐	
Impacts At Each Hinge (Cycles of 25) — 200 - Grade 1			☐ ☐	
150 - Grade 2			☐ ☐	
75 - Grade 3			☐ ☐	
35 - Grade 4			☐ ☐	
Impacts at Glazing — 100 (all grades)			☐ ☐	
Total Impacts — 1300 - Grade 1			☐ ☐	
950 - Grade 2			☐ ☐	
525 - Grade 3			☐ ☐	
305 - Grade 4			☐ ☐	

(Continued)

FIG. 2

(Continued)

Detention Hollow Metal Door
Performance Test Report Quick Check

Any negative response indicates non-compliance with the requirements of ANSI/HMMA 863 and ASTM F1450-12a

ANSI/HMMA 863 and ASTM F1450-12a Test Requirements Manufacturer: ____________________	**Static Load** Yes No	**Rack Load** Yes No	**Impact Load** Yes No	**Edge Crush Test** Yes No
Edge Crush Test:				
Door installed in test fixture and dial indicator set to measure vertical downward progress of the ram into the door edge per ASTM F1450-12a, Figure 13.				☐ ☐
Contact bar required to be 1.5 in. (38 mm) dia.				☐ ☐
Door not supported anywhere on its vertical surfaces. Guides rods only per ASTM F1450-12a, Fig. 13.				☐ ☐
Force applied at edge deflection of .25 in. (6 mm) or less: 8000 lbf. (35 580N) for all grades.				☐ ☐
Total force applied without failure of the door structure: 15,000 lbf. (66 700 N) for Grades 1 & 2, 10,000 lbf. (44 480 N) for Grades 3 & 4				☐ ☐

on long-term durability. This is not to say that these designs are necessarily flawed, but it is good to at least question if this condition exists in the design and to ask for information regarding product track record. **Fig. 4** is from the *Resistance Welding Manual* published by the Resistance Welding Manufacturers' Association [9], which provides excellent guidance in this regard.

- Will you be furnishing all glazing stop screws preinstalled in the openings and, if so, how are they grout guarded? You might be thinking, why give this attention to fasteners for glazing retention systems? First of all, on a typical size detention center or correctional institute, there are tens of thousands of glazing stop screws that, when preinstalled, must be removed and then re-installed when the glazing is set. Preinstalling all of the glazing stop is good because proper fit of the stop can be ensured at the factory and modifying stops to fit in the field can be avoided. But precautions must be taken to ensure that field glazing goes smoothly, and grout guarding these screws is a very important precaution. Detention security walls are nearly all grout-filled concrete masonry or steel wall panels or are either precast or cast-in-place concrete. If screws are not grout guarded properly, they will end up embedded in hardened grout, the heads will break off upon removal

FIG. 3

ASTM **F1450-12a**.

Designation: F1450 – 12a

Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities[1]

This standard is issued under the fixed designation F1450; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (´) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods cover requirements for mechanical tests, simulated service test, and testing equipment for determining the performance characteristics of swinging detention hollow metal door assemblies of various styles and types of construction for use in wall openings designed to incarcerate inmates in detention/correctional institutions.

1.2 These test methods test the capability of a swinging door assembly to prevent, delay, and frustrate escape, to limit or control access to unauthorized or secure areas, and to resist common types of vandalism.

1.3 These test methods apply primarily to detention door assemblies to and from secure areas generally found inside detention/correctional facilities, such as: day rooms, control rooms, cells, and sally ports.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F1577 Test Methods for Detention Locks for Swinging Doors

F1592 Test Methods for Detention Hollow Metal Vision Systems

F1643 Test Methods for Detention Sliding Door Locking Device Assembly

F1758 Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors

F1915 Test Methods for Glazing for Detention Facilities

2.2 *ANSI/NAAMM/HMMA Standard:*[3]

ANSI/NAAMM/HMMA 863 Guide Specifications for Detention Security Hollow Metal Doors and Frames

2.3 *NFPA Standard:*[4]

252 Methods of Fire Tests of Door Assemblies

2.4 *UL Standards:*[5]

UL-10 (B) Fire Tests of Door Assemblies

UL-10 (C) Fire Tests of Door Assemblies

UL-437 Standard for Key Locks

UL-752 Bullet Resisting Equipment

UL-1034 Standard for Burglary Resistant Electric Locking Mechanisms

3. Terminology

3.1 *Definitions:*

3.1.1 *bolt*—metal bar which, when actuated, is projected (or thrown) either horizontally or vertically into a retaining member, such as a strike plate, to prevent a door from moving or opening.

3.1.2 *bolt projection (or bolt throw)*—distance from the edge of the door or frame, at the bolt center line, to the farthest point on the bolt in the projected position.

3.1.3 *component*—a subassembly, as distinguished from a part, that combines with other components to make up a total door assembly.

3.1.3.1 *Discussion*—The prime components of a door assembly include the following: door, lock, hinges, wall, and door frame (includes hinge jamb, strike jamb, and header).

[1] These test methods are under the jurisdiction of ASTM Committee F33 on Detention and Correctional Facilities and are the direct responsibility of Subcommittee F33.02 on Physical Barriers.

Current edition approved June 1, 2012. Published July 2012. Originally approved in 1992. Last previous edition approved in 2012 as F1450 – 12. DOI: 10.1520/F1450-12A.

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

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

[5] Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, http://www.ul.com.

(Continued)

FIG. 3

(*Continued*)

3.1.4 *detention security*—assurance of the restriction of mobility of inmates to designated areas within a correctional or detention facility.

3.1.5 *door assembly*—unit composed of a group of parts or components that make up an opening barrier for a passageway through a wall.

3.1.5.1 *Discussion*—For the purpose of these test methods, a door assembly consists of the following parts: door; hinges; locking device or devices; operation contacts (such as handles, knobs, or flush pulls); security glazing and glazing molding; miscellaneous hardware and closers; the frame, including the head and jambs plus anchorage devices to the surrounding wall; and a portion of the surrounding wall extending 32 in. (81.3 cm) from each side of the jambs and 16 in. (40.65 cm) above the head.

3.1.6 *forcible egress*—ability to pass a 5 × 8 × 8 in. (127 mm × 203 mm × 203 mm) rigid rectangular box through an opening in the test sample created by destructive testing procedures using no more than 10 lbf (44.5 N).

3.1.7 *frame*—assembly of members surrounding and supporting a door or doors.

3.1.8 *hinged door*—door equipped with hinges that permit it to swing about the vertical hinge axis, either right-hand, left-hand, right-hand reverse bevel, or left-hand reverse bevel, depending upon hardware configuration.

3.1.9 *hollow metal*—term used in reference to such items as doors, frames, partitions, enclosures, and other items that are fabricated from metal sheet, typically cold-rolled or hot-rolled pickled-and-oiled carbon steel.

3.1.9.1 *Discussion*—These products are internally reinforced but hollow, hence the term *hollow metal*. Typically, the voids in doors and partitions are filled with insulation. When installed in masonry walls, the voids in frame jambs, headers, and mullions may be grouted or left hollow.

3.1.10 *manufacturer*—party responsible for the fabrication of the test samples.

3.1.11 *panel*—for the purposes of these test methods, the *panel* is a steel plate at least 0.375 in. (9.5 mm), installed in order to transfer impact energy to the glazing stops and the assembly.

3.1.12 *performance characteristic*—response of the door assembly in any one of the tests described herein.

3.1.13 *test completion*—conduct of one test sequence for each of the door assemblies.

3.1.14 *testing laboratory*—independent materials testing laboratory not associated with the manufacturer.

4. Significance and Use

4.1 A major concern for prison administrative officials is security barriers used in detention/correctional facilities. These test methods are designed to aid in identifying levels of physical security for swinging detention hollow metal door assemblies.

4.2 The construction and size of test doors and all hardware components are representative of the application under investigation, and are the same construction and size throughout all of the tests.

4.3 These test methods are not intended to provide a measure of resistance for a door assembly subjected to attack by corrosive agents, by high-powered rifles, explosives, sawing, or other such methods. These test methods are intended to evaluate the resistance of a door assembly to violent attacks using battering devices, such as benches, bunks, or tables; by handguns up to and including .44 magnum, UL-752 Level 3; by prying devices; by devices used to deform the door and render it inoperable; and by fires started by using mattresses, books, and other flammable materials.

4.4 The primary purpose or result of these test methods is to approximate the levels of abuse to which door assemblies are potentially subjected in the field. The desired result of its use is to help provide insurance of protection to the public, to facility administrative personnel, and to the inmates themselves.

4.5 It is recommended that detention/correctional facility administration provide adequate training, supervision, and preventative maintenance programs to enable door assemblies to function as intended throughout the expected service life.

5. Sampling

5.1 Sample door and frame assemblies shall be constructed in accordance with 6.1.

5.2 The manufacturer shall permanently mark the test samples and retain them at the manufacturing facility for future reference for a period of at least one year from test date. Instead of test samples, the manufacturer has potential to contract with the testing laboratory to provide a certified procedure for the construction of tested assemblies with factory follow-up service as an option (see 8.2).

5.3 Test reports shall include complete details of the test assemblies, details, photographs, or a combination thereof, of the testing apparatus, and installation instructions including templates for all items of hardware (see Section 9).

5.4 In the event of failure in one or more of the performance tests, the manufacturer shall provide another complete test sample including door, frame, and hardware assembly along with test wall where applicable. If the test is performed only on the door, as in the door rack test (7.4), only the door need be provided for retesting.

6. Specimen Preparation

6.1 *Construction*:

6.1.1 A total of four (4) doors, for each impact, static load, and rack test, shall be constructed as described in 6.1.2 and 6.1.3. Two of the doors shall be constructed in accordance with the door elevation described in section 6.1.2. Two of the doors shall be constructed in accordance with the door elevation described in section 6.1.3. A fifth door for rack testing only shall be constructed and tested in accordance with section 6.1.4.

6.1.2 The first door elevation (Door Elevation #1) is described as a flush door with a single narrow vision light.

6.1.2.1 The construction and size of the test door assemblies consisting of single doors, frames, and all hardware components shall be representative of the application under investigation within the following guidelines:

6.1.2.2 The same construction and size of test doors and assemblies shall apply to all tests.

FIG. 3

(*Continued*)

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6.1.2.3 Each test door shall be equipped with a 100 in.^{2} (64 516 mm^2) vision light with impact panel installed, 4 by 25 in. (102 by 635 mm) clear opening positioned generally as shown in Fig. 1.

6.1.2.4 The first door shall swing on three full mortised butt hinges and shall be locked using a door-mounted, pocket-type detention security lock with bolt size not to exceed 2 in. (51 mm) high by ¾ in. (19 mm) wide and latch bolt engagement not to exceed ⅞ in. (22.3 mm).

6.1.2.5 The second door shall swing on three full mortised butt hinges and shall be locked using a jamb-mounted security lock with bolt size not to exceed 2 in. (51 mm) high by ¾ in. (19 mm) wide and latch bolt engagement not to exceed ⅞ in. (22.3 mm).

6.1.2.6 Required results indicated in Table 1 are based upon a nominal door size of 3 by 7 ft (914 by 2133 mm).

6.1.3 The second door elevation (Door Elevation #2) is described as a vision light door with two large vision lights as shown in Fig. 2.

6.1.3.1 The construction and size of the test door assemblies consisting of single doors, frames, and all hardware components shall be representative of the application under investigation within the following guidelines:

6.1.3.2 The same construction and size of test doors and assemblies shall apply to all tests.

6.1.3.3 Each test door shall be equipped with two vision lights centered horizontally and located generally as shown in Fig. 2. The top vision light shall be a 532 in.^{2} (343 225 mm^2) vision light with impact panel installed, 19 by 28 in. (483 by 711 mm) clear opening positioned generally as shown in Fig. 2. The bottom vision light shall be a 342 in.^{2} (220 645 mm^2) vision light with impact panel installed, 19 by 18 in. (483 by

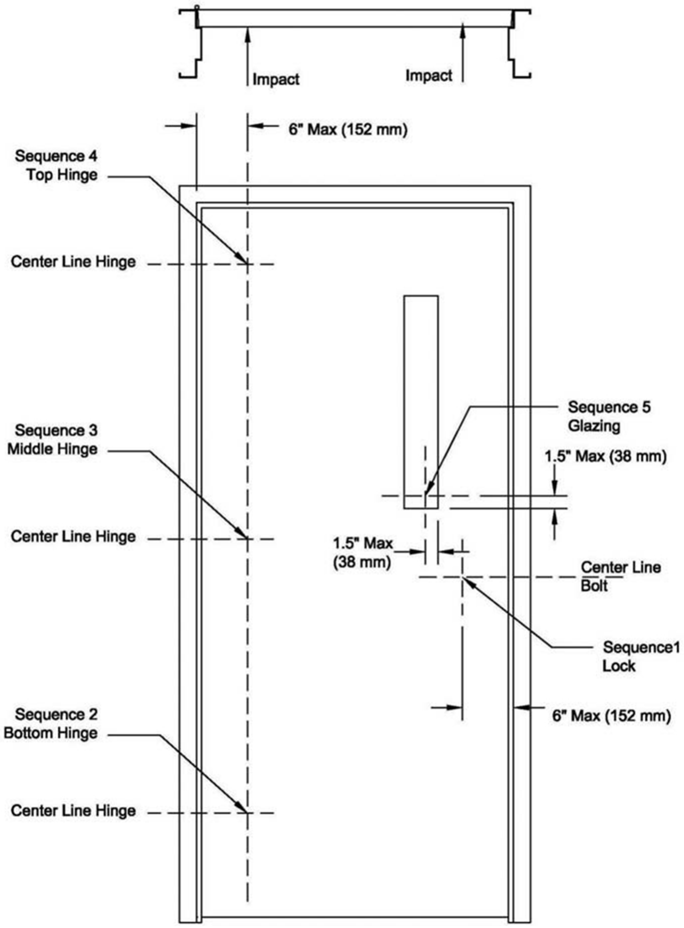

FIG. 1 Test Assembly Door Elevation #1 Location of Strike Points Described in Table 1

3

(*Continued*)

FIG. 3

(Continued)

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TABLE 1 Security Grades and Test Load Requirements Door Elevation #1[A]

Grade Number (Impacts)	Recommended Door Face Sheet and Frame Thickness, in. (mm) gauge, min	Static Load Test, lbf (N)	Rack Load Test, lbf (N)	Impact Test A Impact Energy = 200 ft·lbf (271.2 J)			ASTM Reference Standards
				Lock Impacts	Hinge Impacts	Glazing/ Panel Impacts	
1 (1600 impacts 2 h 40 min)	0.093 (2.3) 12	14 000 (62 275)	7500 (33 360)	600	200	400	F1592, F1577, F1643
2 (1050 impacts 1 h 45 min)	0.093 (2.3) 12	14 000 (62 275)	7500 (33 360)	400	150	200	F1592, F1577, F1643
3 (525 impacts 53 min)	0.067 (1.7) 14	11 000 (48 930)	5500 (24 465)	200	75	100	F1592, F1577, F1643
4 (305 impacts 30 min)	0.067 (1.7) 14	11 000 (48 930)	5500 (24 465)	100	35	100	F1592, F1577, F1643

[A] The cyclic sequence of impacts on the hinge side shall be 25 hits per hinge location and then moving to the next hinge location.

457 mm) clear opening positioned generally as shown in Fig. 2. The impact plate in the top vision panel shall be installed using face mount "Z" type or "P" type removable surface applied glazing stops as shown in Fig. 2 Section B-B or Section C-C. The impact plate in the bottom vision light shall be installed using pressed angle type removable glazing stops as shown in Fig. 2 Section A-A.

6.1.3.4 The first door shall swing on three full mortised butt hinges and shall be locked using a door-mounted, pocket-type detention security lock with bolt size not to exceed 2 in. (51 mm) high by ¾ in. (19 mm) wide and latch bolt engagement not to exceed ⅞ in. (22.3 mm).

6.1.3.5 The second door shall swing on three full mortised butt hinges and shall be locked using a jamb-mounted security lock with bolt size not to exceed 2 in. (51 mm) high by ¾ in. (19 mm) wide and latch bolt engagement not to exceed ⅞ in. (22.3 mm).

6.1.3.6 Required results indicated in Table 2 are based upon a nominal door size of 3 by 7 ft (914 by 2133 mm).

6.1.4 The third door elevation, Elevation #3 (Fig. 3), is described as a 12 ga., 0.093 in. (2.3 mm) vision light door with two large vision lights as shown in Fig. 2, with the addition of an "Edge Cut" food pass / cuff port, opening size 5 in. (127 mm) high × 14.25 in. (362 mm) long, located 36.5 in. (927 mm) from the bottom of the door to the centerline of the opening.

6.2 *Impact Test Fixture*:

6.2.1 The door assembly support fixture and wall shall simulate the rigidity normally provided to a door assembly in a building by the ceiling, floor, and walls. Fig. 4 illustrates an acceptance fixture.

6.2.2 The fixture is designed to accommodate two test samples; however, it is permissible to construct a test fixture that accommodates one sample only, if the manufacturer so chooses.

6.2.3 *Description of the Test Wall*—The door assembly shall be mounted in a vertical wall section constructed suitably to retain the sample(s) throughout the testing procedure. Typical wall details shown in Figs. 4-7 describe an acceptance wall. The wall specification shall be included as part of the test report.

6.3 *Mounting for Impact Testing*:

6.3.1 Mount the swinging doors so as to open away from the working area. Position the impact test ram opposite the door side of the assembly so that the door opens away from the ram.

6.3.2 Prepare doors and door jambs for the installation of locksets and hinges in conformance with the hardware manufacturer's instructions and templates. Follow the hollow metal door assembly manufacturer's instructions for fastening the jamb to the support fixture described in 7.2.

6.3.3 Install components such as test doors, door frames, hinges, and hardware in the component test fixture described in 7.2. Provide clearances on the lock side, hinge side, and top of the door ⅛ in. ± 1⁄16 in. (3.2 ± 1.5 mm) maximum. Clearance at the threshold is not considered critical in these tests.

7. Procedures

7.1 *Bullet Penetration*:

7.1.1 When specified by the contract documents of a detention/correctional facility project, test door assemblies for bullet penetration in accordance with UL-752.

7.1.2 Testing of the door, frame, hardware, and security glazing preparation as individual components is acceptable if conducted in accordance with UL-752. The level of performance shall meet the rating of .44 magnum, Level 3.

7.1.3 The pass/fail criteria shall be in accordance with UL-752.

7.2 *Door Assembly Impact Test*:

7.2.1 *Scope*—This test method is designed to evaluate the capability of a complete swinging detention door assembly including frame, door, wall anchoring, lock, hinges, and other options as required by the manufacturer, to resist repetitive impact forces at the designated critical areas.

7.2.2 *Significance and Use*:

7.2.2.1 This test method is intended to closely simulate a sustained battering ram style attack and provide an evaluation of the capability of the assembly to prevent, delay, and frustrate escape or access, or both, to unauthorized areas. The test has the potential to be used to aid in identifying a level of physical security for various configurations of swinging detention hollow metal door assemblies.

FIG. 3

(*Continued*)

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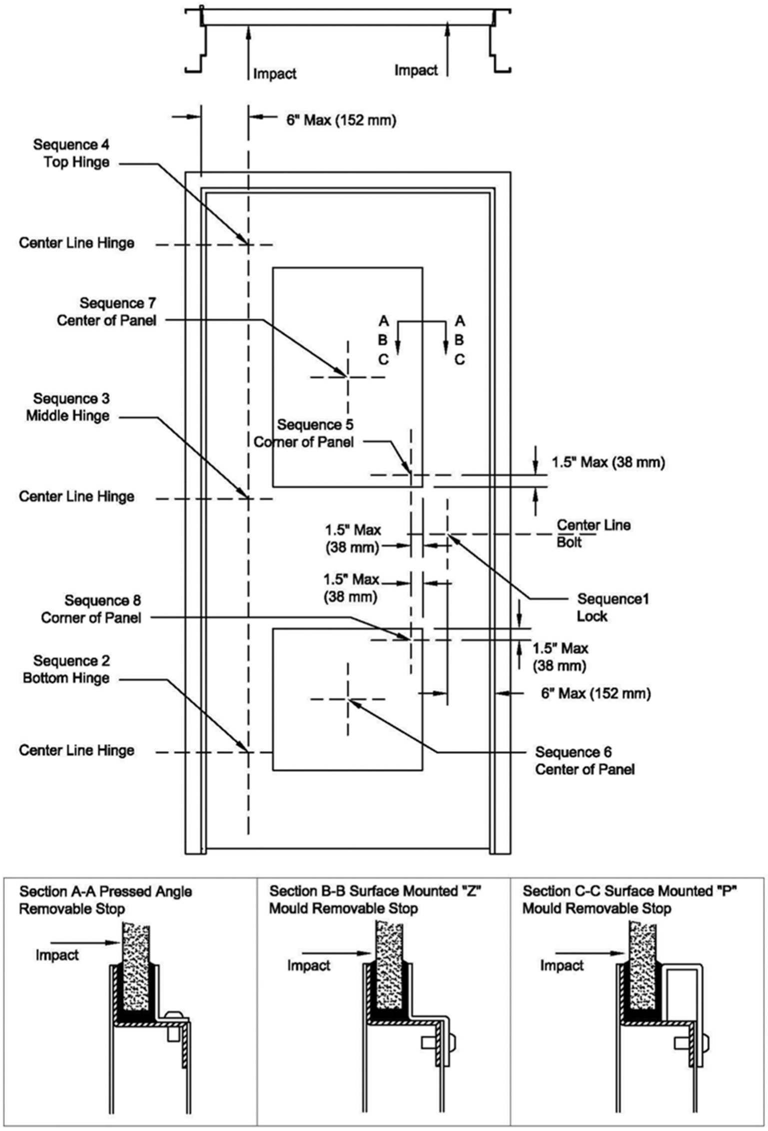

FIG. 2 Test Assembly Door Elevation #2 Location of Strike Points Described in Table 2

7.2.2.2 An impact test of this design performed on a complete assembly evaluates the impact fatigue strength of the assembly and its components as well as quality of fabrication techniques and strength of materials used.

7.2.3 *Apparatus*:

7.2.3.1 *Door Ram*—The door ram shall be a pendulum system with steel weight capable of delivering horizontal impacts of up to 200 ft·lbf (271.2 J). The weight of the ram shall be 80 lb (36 kg) ± 0.25 lb (0.10 kg). The striking nose of the ram shall be made from C1010–1020 carbon steel, the striking surface area of which shall be 4.0 ± 0.04 in.^{2} (2580 mm^2 ± 25.8 mm^2) (see Fig. 8).

7.2.4 *Procedure*:

7.2.4.1 With the test fixture and test apparatus, deliver the series of impacts listed in Table 1 (and shown in Fig. 1) to the assembly on the push side of the door. For door elevation #2

(*Continued*)

FIG. 3

(Continued)

F1450 – 12a

TABLE 2 Security Grades and Test Load Requirements Door Elevation #2 (Two Large Vision Lights)[A]

Grade Number	Recommended Door Face Sheet and Frame Thickness, in. (mm) gauge, min	Static Load Test, lbf (N)	Rack Load Test, lbf (N)	ASTM Reference Standards
1	0.093 (2.3) 12	14 000 (62 275)	7500 (33 360)	F1592, F1577, F1643
2	0.093 (2.3) 12	14 000 (62 275)	7500 (33 360)	F1592, F1577, F1643
3	0.067 (1.7) 14	11 000 (48 930)	5500 (24 465)	F1592, F1577, F1643
4	0.067 (1.7) 14	11 000 (48 930)	5500 (24 465)	F1592, F1577, F1643

Impact Series for Door Assembly Impact Test, Door Elevation #2 (Two Large Vision Lights)[A]

Sequence[A]	Number of Blows Grade 1	Number of Blows Grade 2	Number of Blows Grade 3	Number of Blows Grade 4	Impact Energy of Each Blow ft·lbf (J)	Location of Blows
1	600	400	200	100	200 (271.2)	Centerline of the lock bolt, 6 in. max from door edge
2	200	150	75	35	200 (271.2)	Centerline of bottom Hinge 6 in. max from door edge[A]
3	200	150	75	35	200 (271.2)	Centerline of middle Hinge 6 in. max from door edge[A]
4	200	150	75	35	200 (271.2)	Centerline of top Hinge 6 in. max from door edge[A]
5	400	200	100	100	200 (271.2)	Lower corner, nearest the lock edge, of upper glazing/ panel within 1.5 in. of the glazing stop
6	400	200	100	100	200 (271.2)	Center of lower glazing/ panel
7	400	200	100	100	200 (271.2)	Center of upper glazing/ panel
8	400	200	100	100	200 (271.2)	Upper corner, nearest lock edge, of lower glazing/ panel within 1.5 in. of the glazing stop
Total Impacts	2800	1650	825	605		
Total approximate Time	4 h 40 min	2 h 45 min	1 h 25 min	1 h		

[A] The cyclic sequence of impacts on the hinge side shall be 25 hits per hinge location and then moving to the next hinge location.

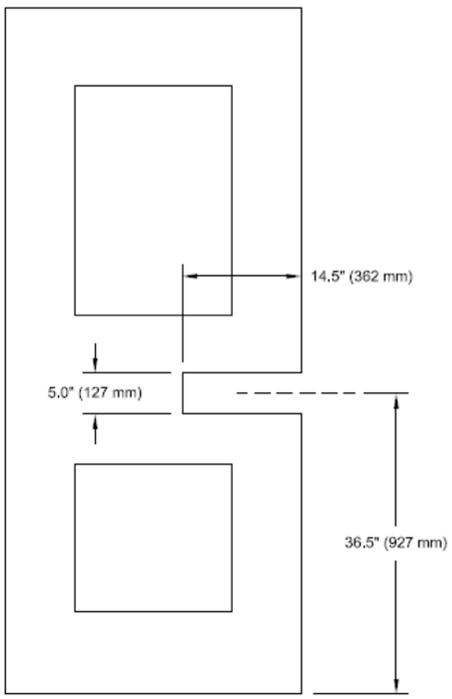

FIG. 3 Door Elevation #3

FIG. 3

(*Continued*)

F1450 – 12a

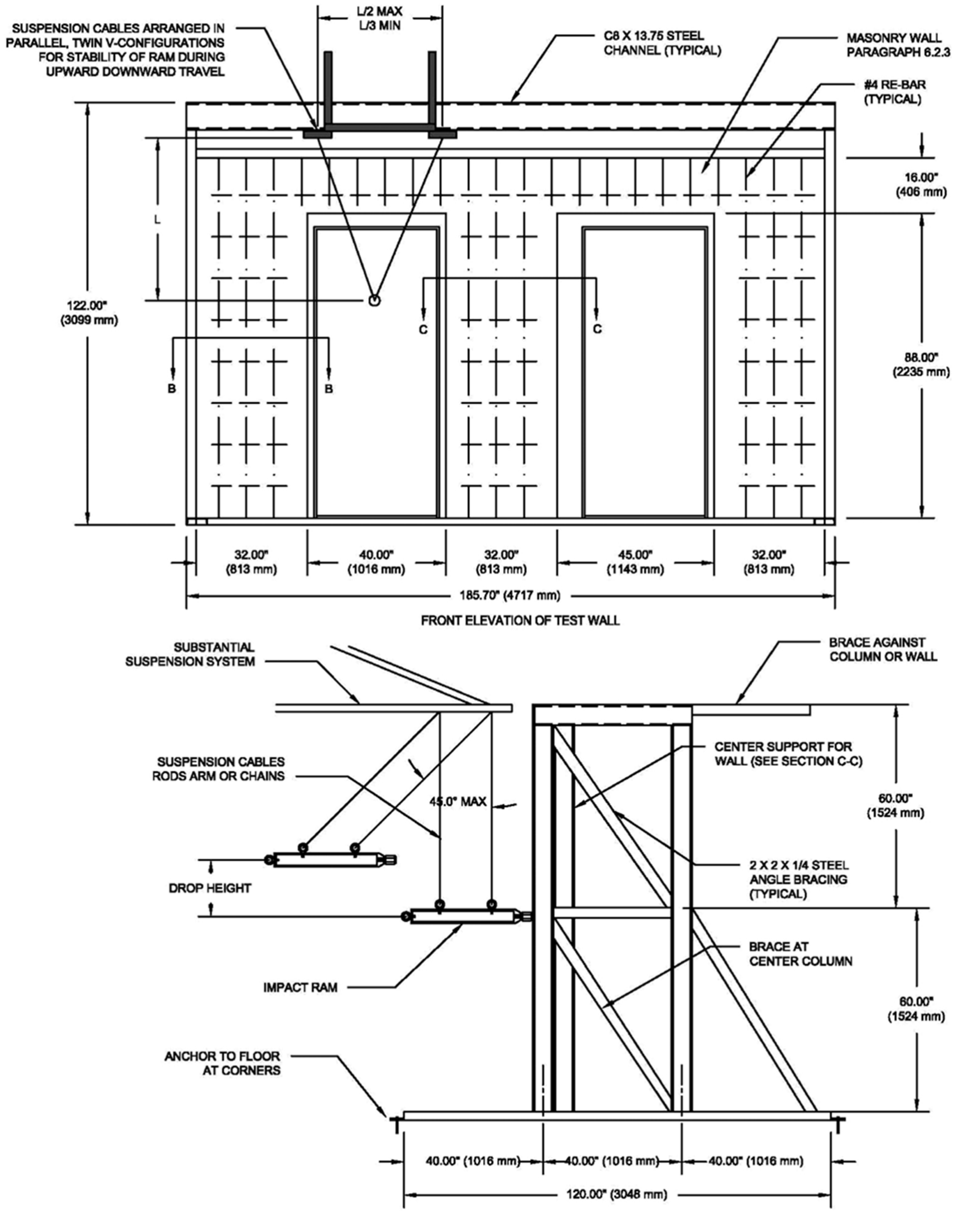

FIG. 4 Test Wall

(two large vision lights), deliver the series of impacts in Table 2 (and shown in Fig. 2) to the push side of the door.

7.2.4.2 Keep the door closed and locked, and keep security glazing, if used in the assembly, in place throughout the testing procedure. Failure is constituted by the door assembly being damaged to the extent that forcible egress can be achieved. This does not apply to the passage of contraband.

(*Continued*)

FIG. 3

(*Continued*)

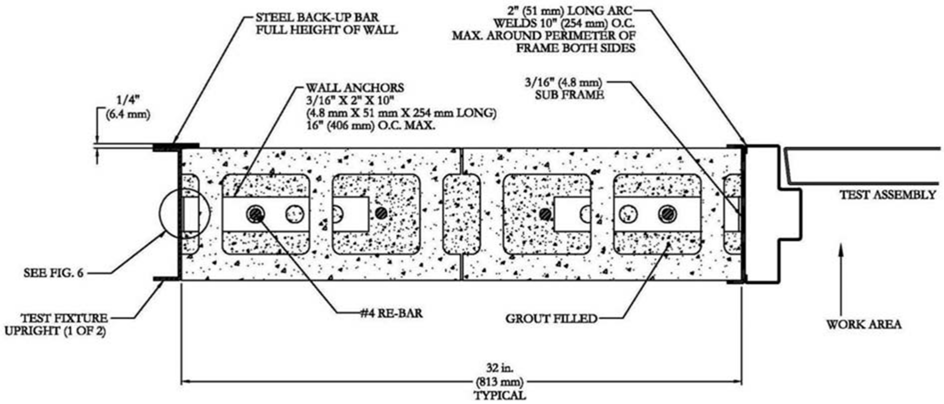

FIG. 5 Section B-B from Fig. 4

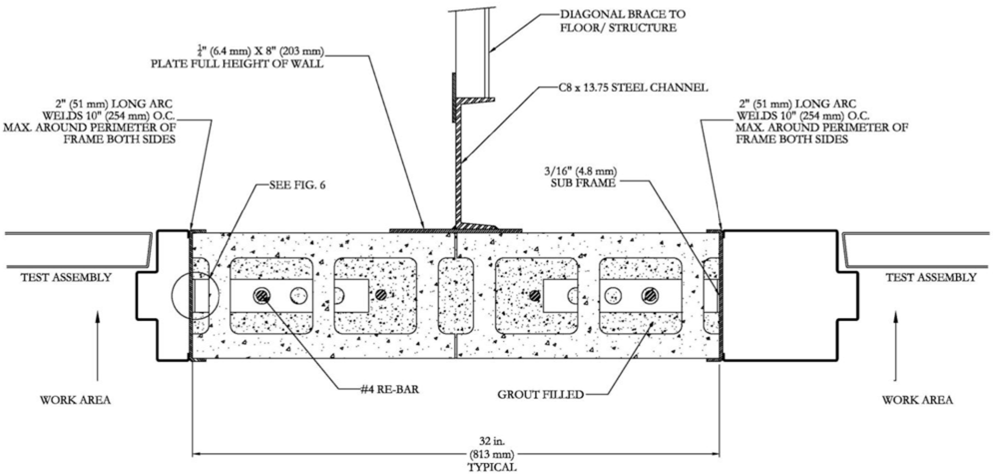

FIG. 6 Section C-C from Fig. 4

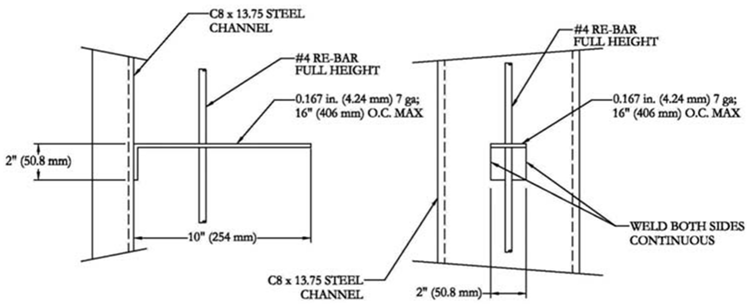

FIG. 7 Wall Anchor Welding Detention Hollow Metal Vision Systems

7.2.4.3 After impact testing is completed, keep the doors locked and secure such that forcible egress cannot be achieved.

7.2.4.4 Disengage or remove the lock electrically or manually. If the lock will not disengage normally, disengage it using

FIG. 3

(*Continued*)

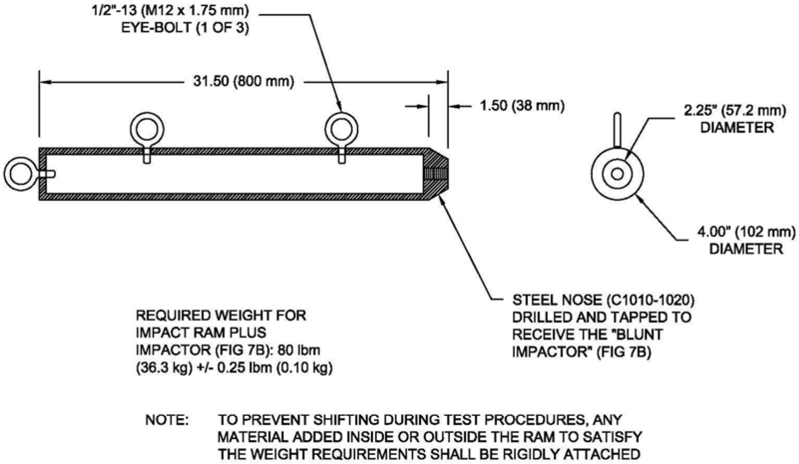

FIG 7A: STEEL IMPACT RAM

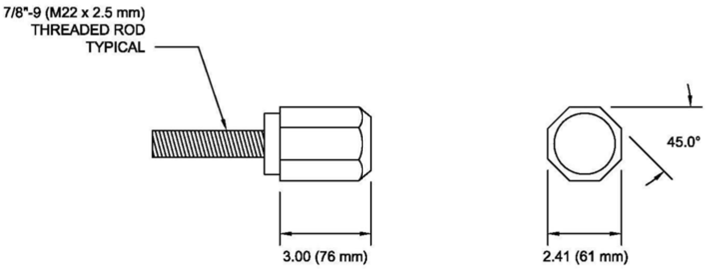

FIG 7B: BLUNT IMPACTOR

FIG. 8 Steel Impact Ram Assembly

tools commonly carried in a correctional facility maintenance tool kit, such as: hand screwdrivers (various sizes and tip configurations including tips for coverplate security screws), claw hammer, ball peen hammer, chisel, pliers (any common size), and vice grips.

7.2.4.5 Once the lock is disengaged or removed, open the door enough to provide normal personnel egress.

7.2.4.6 If the lock cannot be disengaged or removed with conventional hand tools as listed, or the door cannot be opened enough to provide personnel egress, the assembly shall be judged to have failed the impact test.

7.2.5 *Precision and Bias*:

7.2.5.1 The precision and bias of this test method for evaluating the impact fatigue strength of the swinging detention hollow metal door assembly are being determined.

7.3 *Door Static Load Test*:

7.3.1 *Scope*—This test method is designed to evaluate the capability of a detention hollow metal door prepared for hardware and other options, not installed in the frame to resist a steadily increasing force applied at quarter points on its surface.

7.3.2 *Significance and Use*:

7.3.2.1 Although this test method is not intended to simulate a particular field condition or abuse, it is considered a prerequisite test for adequacy of fabrication methods, door design, quality of joints, strength of materials used, and rigidity.

7.3.2.2 The results of this test method have the potential to be used to assist in identifying a level of physical security for various configurations of swinging detention hollow metal door assemblies.

7.3.3 *Apparatus*:

(*Continued*)

FIG. 3

(*Continued*)

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7.3.3.1 *Static Load Test Fixture*, constructed using steel tubing, I-beam, angle and plate to provide a means to place a detention security door in the horizontal position, and to apply an increasing static load at quarter points. The door shall be uniformly supported over its width and no more than 4 in. (102 mm) from each end. An acceptance fixture is shown in Fig. 9.

7.3.3.2 *1-in. (2.54 cm) Travel Dial Indicator*, with resolution of 0.001 in. (0.02 mm) and support stand, such that center point deflection of the test sample can be accurately measured as the static load is applied.

7.3.3.3 *Hydraulic Ram and Pump*, equipped with a gage or load cell, to provide the static load. The pump, ram, and gage

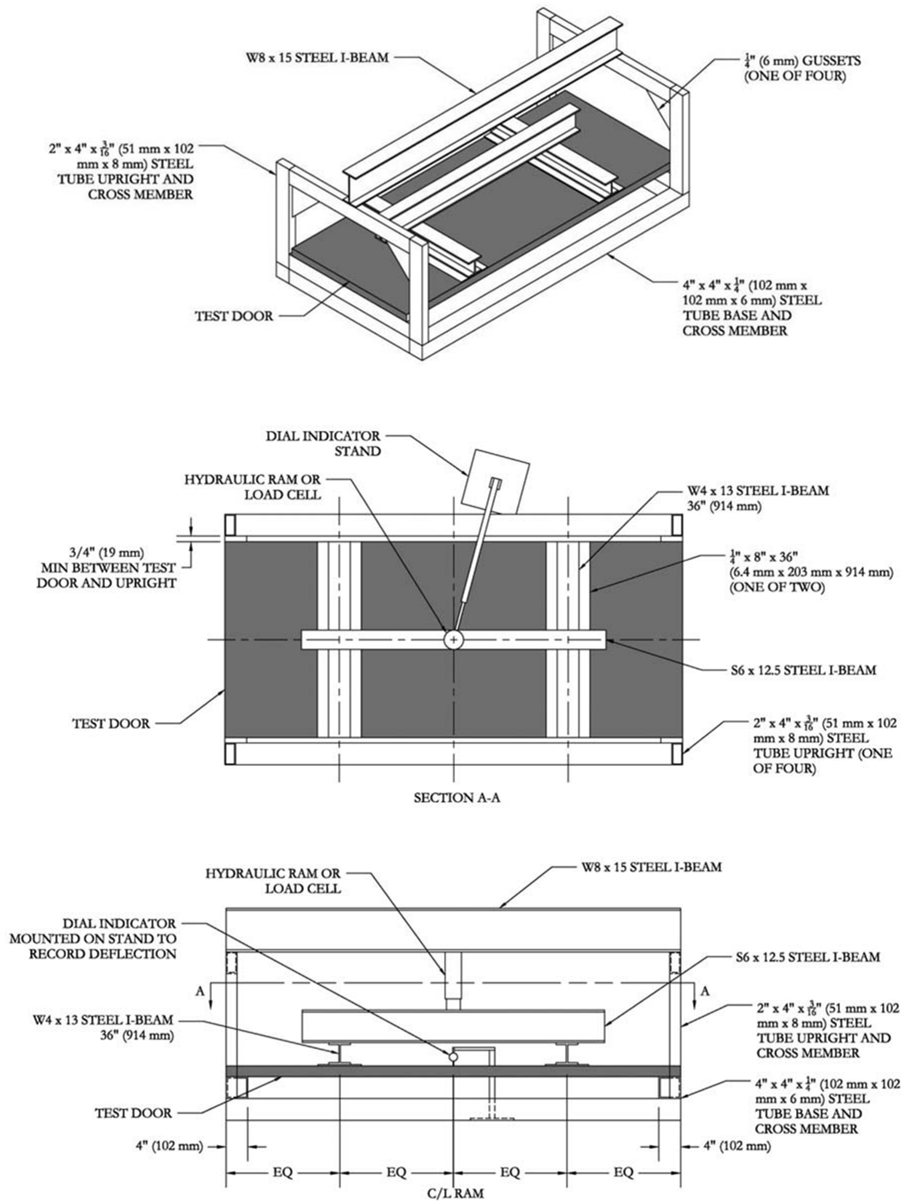

FIG. 9 Static Load Test Apparatus

10

FIG. 3

(Continued)

shall be calibrated by the testing laboratory and a chart provided that converts pounds-force per square inch gage (Newtons per square millimetre, kPa) to pounds-force (Newtons). If a load cell is used, it shall be certified by the testing laboratory prior to use.

7.3.3.4 It is acceptable to submit load testing fixtures of alternate designs other than that shown in Fig. 9 to the testing laboratory for evaluation and possible approval.

7.3.4 *Procedure*:

7.3.4.1 Each of four detention hollow metal doors prepared for hardware and other options, which are identical in design and construction to those provided for the impact test, and with hardware installed, shall be tested.

7.3.4.2 Support each sample door in the horizontal position no more than 4 in. (102 mm) from each end, in the test apparatus described in Fig. 9. Position I-beams, plates, and hydraulic ram on top of the sample as shown in Fig. 9. Position the 1-in. (2.54-cm) travel dial indicator vertically such that the stem contacts the center point of the sample and is depressed at least 80 % of its travel. Set the dial indicator at 0 and as the static load is applied, the dial indicator stem will extend as the sample moves, thereby displaying the deflection within 0.001 in. (0.02 mm) accuracy.

7.3.4.3 Record force (pound-force (newtons)) and deflection (inches (millimetres)) at 2000 lbf (8900 N) increments to produce a graph of static load versus deflection. Increase the static load until target loads for each sample are reached (see 7.3.4.4).

7.3.4.4 After reaching maximum load and recording maximum deflection, release ram pressure and reduce static load to zero. Record deflection within 1 minute after release of load.

7.3.4.5 *Required Results*—The required loads and impacts are as shown in Table 1 for door elevation #1 and in Table 2 for door elevation #2 for the security grades being obtained. For all grades, the required maximum deflection shall be 0.580 in. (14.73 mm) and the maximum deflection after release of load shall be 0.100 in. (2.54 mm).

7.3.5 *Precision and Bias*—The precision and bias of this test method are being determined.

7.4 *Door Rack Test*:

7.4.1 *Scope*—This test method is designed to evaluate the capability of a detention hollow metal door, prepared for hardware and other options, not installed in the frame, to resist a steadily applied racking (twisting) force.

7.4.2 *Significance and Use*:

7.4.2.1 This test method is intended to closely simulate the racking (twisting) force to which a door is potentially subjected in the field if inmates attempt to force the door open using a pry bar or similar device applied to the top or bottom corner, lock side. A racking force of the specified level tests the adequacy of fabrication methods, strength of materials used, and rigidity of the door.

7.4.2.2 As in the impact test, the results of this test have the potential to be used to aid in identifying a level of physical security for various configurations of swinging detention hollow metal door assemblies.

7.4.3 *Apparatus*:

7.4.3.1 *Rack Test Fixture*—The rack test fixture shall consist of a rigid frame designed to clamp the top of the door in the horizontal flat position. The fixture shall also include a support block to support the bottom hinge-edge corner of the door, leaving the bottom, lock-edge corner unsupported. The unsupported corner shall receive static vertical downward force using a load cell or hydraulic ram that has been fitted with a laboratory certified calibrated gage, and is capable of exerting a static force up to 7500 lbf (33 360 N) (see Figs. 10-12). It is acceptable to submit test fixtures of alternate designs other than that shown in Figs. 10-12 to the testing laboratory for evaluation and possible approval.

7.4.4 *Procedure*:

7.4.4.1 Each of four detention hollow metal doors prepared for hardware and other options, which are identical in design and construction to those provided for the impact test, and with hardware installed, shall be tested.

7.4.4.2 Mount each detention hollow metal door, not installed in the frame and with hardware installed, into the rack test fixture, leaving the lock-edge bottom corner unsupported (see Figs. 10-12). These doors must be identical in construction to the impact test doors.

7.4.4.3 Place a calibrated load cell or hydraulic ram capable of exerting up to 7500 lbf (33 360 N) on top of the unsupported corner with its centerline 3.0 in. (7.6 cm) from the bottom of the door and 3.0 in. from the lock edge. The travel/stroke of the load cell or ram shall be a minimum of 4.0 in. (10.16 cm) to accommodate the maximum allowable deflection specified herein.

7.4.4.4 Place the base of the load cell/hydraulic ram against a fixed object so that when the hydraulic pressure is applied,

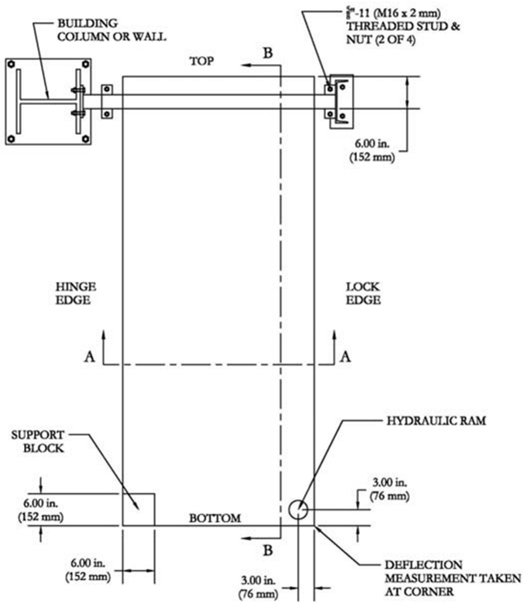

FIG. 10 Rack Test Fixture (Plan View)

(Continued)

FIG. 3

(*Continued*)

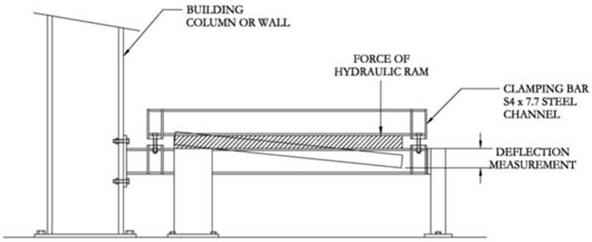

FIG. 11 Section A-A from Fig. 10 Rack Test Fixture

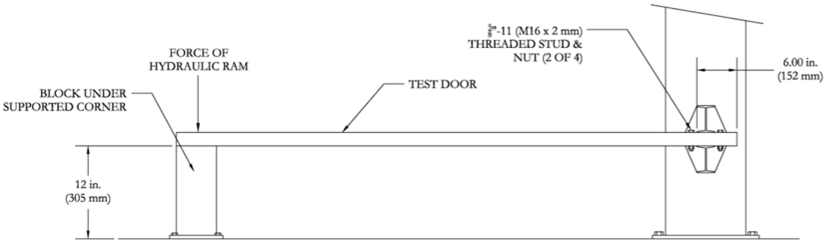

FIG. 12 Section B-B from Fig. 10 Rack Test Fixture

the resulting force will be in the downward direction against the unsupported corner of the door.

7.4.4.5 A hydraulic ram and pump equipped with a gage or load cell shall be used to provide the static load. The pump, ram, and gage shall be calibrated by the testing laboratory and a chart provided that converts pounds-force per square inch gage (Newtons per square millimetre, kPa) to pounds-force (Newtons). If a load cell is used, it shall be certified by the testing laboratory prior to use.

7.4.4.6 Apply hydraulic pressure steadily to the ram until the force on the corner of the door has reached the force required by Table 1 for door elevation #1 and by Table 2 for door elevation #2 for the security grade being obtained.

7.4.4.7 Measure the deflection of the unsupported corner at the corner where the bottom edge of the door meets the lock edge. Measured deflection shall not exceed 3.55 in. (9.0 cm) at the required load. Corner deflection exceeding 3.55 in. at the required load constitutes failure.

7.4.4.8 After reaching maximum load and recording maximum deflection, release ram pressure and reduce static load to zero. Record deflection within 1 minute after release of load.

7.4.4.9 The maximum acceptable deflection after release of load is 1.40 in. (3.6 cm). Deflection after release of load in excess of this value constitutes failure.

7.4.4.10 The rack test shall be performed on Door Elevation #3 (section 6.1.4).

7.4.4.11 Under an applied load of 3000 lbf (13 345 N), corner deflection shall not exceed 2.1 in. (53 mm). A corner deflection exceeding 2.1 in. (53 mm) at the required load constitutes failure.

7.4.5 *Precision and Bias*—The precision and bias of this test method are being determined.

7.5 *Door Assembly Fire Test*:

7.5.1 When specified by the contract documents of a detention/correctional facility project, door assemblies shall be fire protection rating tested in accordance with UL-10 (B), UL-10 (C), or NFPA 252.

7.5.2 Manufacturers shall be permitted to omit or add options at their discretion, recognizing that the omission of an option in the fire test will prevent them from including that option in production models that are required to carry a fire rating.

7.5.3 The pass/fail criteria and criteria for assignment of fire protection ratings shall be in accordance with Test Method UL-10 (B), UL-10 (C), or NFPA 252.

7.6 *Door Assembly and Hardware Tool Attack Test (Prying/Picking Devices)*:

7.6.1 When specified by the contract documents of a detention/correctional facility project, door assemblies shall be tested for resistance to tool attack. Attacks similar to those described in UL-1034 and UL-437 shall be performed.

7.6.2 Testing of the door, frame, hardware, or security glazing as individual components is acceptable if conducted in accordance with 7.6.1. The level of performance shall meet the rating of small tool attack.

7.6.3 The pass/fail criteria shall be similar to those established by UL-1034 and UL-437.

7.7 *Door Edge Crush Test*:

7.7.1 *Scope*—This test is designed to measure the ability of the edge of a detention hollow metal door, prepared for hardware and other options, not installed in the frame, to resist a load applied perpendicularly to the edge in the plane of the door leaf.

7.7.2 *Significance and Use*:

7.7.2.1 Damage to swinging doors is frequently affected by placing objects between the jamb and door and forcing the door

FIG. 3

(*Continued*)

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against the object. If the door is sufficiently dented to be unserviceable, it is possible that security will be impaired.

7.7.2.2 This test has the potential to be used to assist in identifying a required resistance to such vandalism.

7.7.3 *Apparatus*:

7.7.3.1 *Framework*, constructed to hold a sample door. The framework shall be constructed so that a calibrated load cell or hydraulic ram can be used to apply force to the edge of the door, with the ram acting in the plane of the door leaf and perpendicular to the door edge. Fig. 13 shows an acceptance apparatus.

7.7.3.2 *Endpiece*, provided for the ram, comprising a 1.5 in. (38 mm) diameter steel cylinder mounted to the ram so that the axis of the cylinder is perpendicular to the surface of the door leaf.

7.7.3.3 *Attachment Point*, provided so that a dial indicator having at least 1 in. (25.4 mm) of travel with resolution of 0.001 in. (0.02 mm) can be attached to the framework and measure the travel of the hydraulic ram once it is in contact with the edge of the sample door.

7.7.3.4 It is acceptable to submit load testing fixtures of alternate designs other than that shown in Fig. 13 to the testing laboratory for evaluation and possible approval.

7.7.4 *Procedure*:

7.7.4.1 One detention hollow metal door prepared for hardware and other options, which is identical in design and construction to either of the doors provided for the impact test, with hardware installed, shall be tested.

7.7.4.2 Install the door in the framework, hinge side up. Install the calibrated load cell or hydraulic ram and load it with sufficient pressure to prevent it from falling out of position. Attach the dial indicator with its stem parallel with the travel of the ram, so that it measures the progress of the ram into the door edge.

7.7.4.3 Apply pressure to the door until required loads in Table 3 are reached and record deflections as required.

7.7.4.4 Remove the door from the framework. Place the door back into the framework, with the lock side up, and then repeat the test procedure.

7.7.5 *Required Results*:

7.7.5.1 Both the hinge edge and the lock edge must meet the required results set forth in Table 3.

7.7.5.2 If load values and deflections are not achieved, this shall constitute failure.

7.7.6 *Precision and Bias*—The precision and bias of this test are being determined.

8. Certification

8.1 *Certification*—The manufacturer shall provide test reports by an independent testing laboratory which certify that the assemblies were successfully tested in accordance with these test methods and which comply with Section 9, Report.

8.2 *Manufacturer's Procedure*—The manufacturer shall be permitted to contract with the testing laboratory to provide the manufacturer with a certified procedure and security labeling service for the construction of tested assemblies with factory follow-up inspection service as an option.

9. Report

9.1 Report the following information:

9.1.1 Name and address of laboratory,

9.1.2 Date laboratory completed tests,

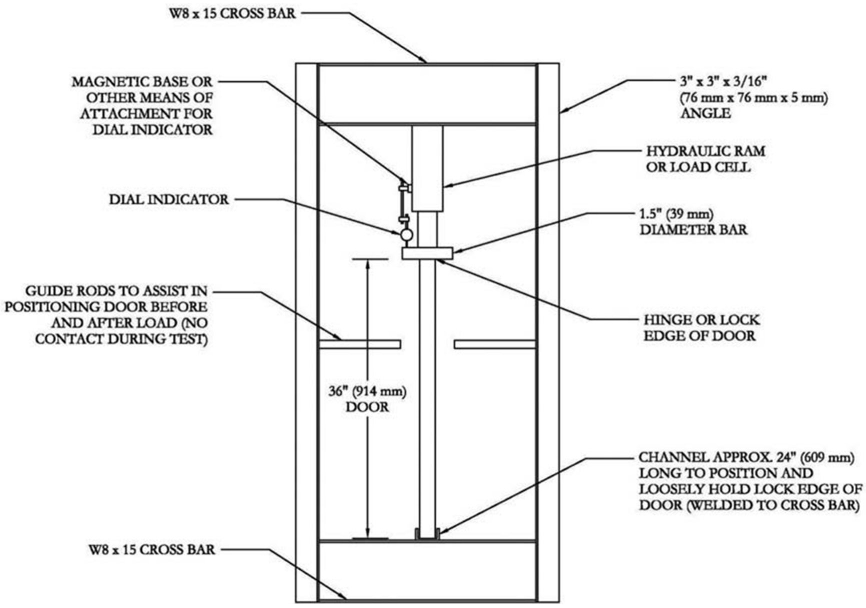

FIG. 13 Edge Crush Test Fixture (End View)

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FIG. 3

(*Continued*)

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TABLE 3 Required Loads for Door Edge Crush Test

Minimum Face Sheet Thickness, in. (mm) gauge	Security Grades (Table 1)	Load Supported at Deflection Less Than 0.25 in. (6 mm)	Total Load Supported
0.093 (2.3) 12	Grades 1 and 2	8000 lbf (35 585 N)	15 000 lbf (66 725 N)
0.067 (1.7) 14	Grades 3 and 4	8000 lbf (35 585 N)	10 000 lbf (44 480 N)

9.1.3 Name and address of door assembly manufacturer,

9.1.4 Description of identifying markings on all components of test assembly,

9.1.5 Location of testing equipment,

9.1.6 Diagrams, details, and photographs of testing equipment,

9.1.7 Specifications and details of components of test assembly including test assembly drawings, door and frame component drawings, hardware templates and instructions, wall specifications, and details on anchoring devices, and

9.1.8 All test data and load deflection graphs.

10. Keywords

10.1 battering ram; correctional facility; detention facility; detention hollow metal; detention security; door; escape; fire test (door); frame; hardware; hinges; hollow metal; impact test (door); lock; physical security; rack test (door); security hollow metal; static load test (door); swinging detention hollow metal door assemblies

APPENDIXES

(Nonmandatory Information)

X1. TEST APPARATUS

X1.1 Test equipment suitable for use in evaluating the physical security of door assemblies and components is described in this appendix. While certain commercial instruments are identified to adequately describe the test equipment, in no case does such identification imply recommendation or endorsement, nor does it imply that the material or equipment described is necessarily the best for the purpose.

X1.2 Figs. 1-13 show the test wall and fixtures necessary to carry out the test methods described in 7.2-7.4, and 7.7.

X1.3 Information on equipment necessary to perform the tests described in 7.1, 7.5, and 7.6 is included in the referenced test methods.

X2. RELATED STANDARDS

X2.1 These test methods are part of a family of interrelated standards developed to work together using common testing approaches and grade classifications to address the specific needs of detention and correctional facilities, including the following: Test Methods F1450, F1577, F1592, F1643, F1758, and F1915.

X2.2 This Appendix is intended to explain some of the common approaches underlying the test methods noted above, including how to distinguish between primary and secondary materials and test objectives.

X2.3 Primary is typically an entire full-scale operating assembly of many components and materials that are tested together, whereas secondary is individual components that are only a portion of a whole assembly.

X2.4 In some instances, components that are secondary in one test become primary under a distinct and separate related standard developed specifically for that component. These separate standards typically apply more rigorous test methods to fully exploit susceptibilities unique to that component.

X2.5 Titles of related standards indicated above pertain to performance objectives for the primary component or assembly. This is explained further in examples below.

X2.6 Each related standard contains grades or levels of performance developed: to restrict passage to unauthorized areas, to delay and frustrate escape attempts, and to resist vandalism. These grades or levels were developed based on an attacker's predicted ingenuity using "riot-like" attack methods, modified depending upon strengths and weaknesses of various components. Attack sequence format(s), impact intensities, test duration(s), and tools utilized are comparable from one standard to another. Using the established security grades, a user is given reasonable assurance that components and assemblies will perform satisfactorily at their tested security grade levels. These security grades establish specific measurements of performance of the primary assembly or component material.

X2.7 *Test Methods* F1450—Attack impact test methods incorporated into Test Methods F1450 address performance characteristics of door assemblies, including constituent doors, door frames, and sub-components installed and operating as they would normally function in an actual detention or correctional facility. Components installed in test doors and frames

FIG. 3

(*Continued*)

are intended to be certified by their applicable separate component standard performance. For example, separately certify components to standards as follows: locks to Test Methods F1577, hinges to Test Methods F1758, sliding door devices to Test Methods F1643, and glazing to Test Methods F1915.

X2.8 *Test Methods* F1592:

X2.8.1 Impact test method(s) for Test Methods F1592 address not only the performance characteristics of doors and door frames, but also side light and multiple light frame assemblies, again, with all necessary components installed to form a full scale operating assembly. Once again, it is intended that individual components should be certified under their separate applicable standards.

X2.8.2 Users of detention components should review the related standards applicable to those components and their test reports for comparable attack testing grade or level of performance.

X2.8.3 Since the primary subjects of attack under Test Methods F1592 are the frame construction, glazing stops, and fasteners, a consistent steel impact "panel" may be substituted for uniformity of test results, instead of using actual security glazing. This substitution also applies to Test Methods F1450 door vision lights.

X2.9 *Complementary/Dual Certifications*:

X2.9.1 Manufacturers of components may work together to obtain multiple complementary certifications. For example, a lock manufacturer may team with a hollow metal manufacturer to conduct impact testing on an assembly under Test Methods F1450 and obtain dual certifications for impact test portions of both Test Methods F1450 and F1577, since the test methods in both are comparable.

X2.9.2 In another example, a security glazing manufacturer may team with a hollow metal manufacturer to obtain a complementary certification under Test Methods F1592. However, in this case, Test Methods F1915 requires additional testing of the security glazing that involves sharp as well as blunt attack tools, and application of heat using a torch during a blunt impact test. A security glazing product that performs well under Test Methods F1592 hollow metal frame testing may not satisfy all of the separate requirements of Test Methods F1915. Separate certification under Test Methods F1915 must also be obtained.

X2.10 *Components Tested for Specific Susceptibilities*—Differences in attack testing under these two test methods (Test Methods F1915 and F1592) are related to performance degradation of some security glazing, undergoing attack testing at various thermal conditioning exposures, as well as the specific number of impacts. Test Methods F1915 contains impact tool attacks under both severe hot and cold conditioning, as well as a torch sequence combined with impact from blunt tools. Typically, heavily constructed detention hollow metal sheet is not as susceptible to these temperature changes, which is the reason why temperature conditioning is not included in impact testing for Test Methods F1592 or F1450 (except temperature conditioning for bullet resisting UL-752). Consequently, security glazing tested and certified under Test Methods F1915 provides superior assurance of performance across a range of environmental conditions not tested under most other previously existing standards.

X2.11 In conclusion, by choosing consistent grade levels from these related standards, a user can obtain greater assurance that both the security assembly and the multitude of constituent components are integrated to deliver the security performance required.

X3. REPRESENTATIVE BARRIER DURATION TIME

X3.1 The element of time shown in Tables 1 and 2, is based upon historical testing observation that indicates that sustained manpower can deliver 600 blows of 200 ft·lb (271.2 J) each in one (1) hour. The Table includes total numbers of impacts for each Grade Level, and total approximate times to deliver these numbers, excluding set up times for cyclic sequences. This is offered solely as supplementary design information to assist the user in matching security grades with the attack resistance times and staff response times required for each opening in the facility.

X4. COMBINATION TESTING AND TESTING SCHEDULE

X4.1 The test methods described in Test Methods F1450 and Test Methods F1592 are closely related and the test samples may be tested in various combinations in order to minimize duplicate or redundant testing.

X4.2 If such a combined test schedule is used, combined reporting may be incorporated, provided all required assemblies are addressed and subject to testing laboratory approval.

X4.3 The detention and corrections industry relies heavily upon the credibility of the testing of security door and vision system assemblies in accordance with these test methods, and the performance that successful testing helps to ensure. In consideration of the importance placed by the industry upon this product performance testing, the developers and reviewers of these test methods agree that retesting every five (5) years will help ensure that product designs and production methods remain reliable and do not exhibit performance degradation over time. This five (5) year retesting schedule coordinates well with the five (5) year review that is mandated by ASTM for all standards. By following this schedule, the industry is assured that if a review precipitates changes or additions to the testing procedures, then these new procedures will be utilized by the

(*Continued*)

FIG. 3

(*Continued*)

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manufacturers and laboratories upon their next retesting cycle, thereby providing assurance that products are always being tested and retested in accordance with the most current revisions of the standards. However, in the interest of not requiring unnecessary testing, if the revisions to a standard during its review are editorial only, or if the standard is reapproved with no changes, retesting may be waived.

X5. DOOR ELEVATION #2

X5.1 Door elevation #2 has been added to the required list of samples to be tested under this standard because it is representative of door elevations that are commonly needed in detention and correctional facilities. The large glass openings are necessary to provide adequate visibility, and to facilitate good supervision of inmates by facility staff.

X5.2 It is widely held by the design community that this door type is not only important, but is routinely needed in maximum security applications where Grade 1 or Grade 2 performance is required.

X5.3 Detention door manufacturers involved in the development of this revision agree that the internal construction for Door Elevation #2 is significantly more material and design intensive in order to achieve Grades 1 and 2.

X5.4 This appendix section is intended to offer this explanation and to inform the design community that this door type, tested and certified to Grades 1 and 2, will be significantly more costly to produce than the same door type certified to Grades 3 and 4, and therefore, will be somewhat expensive.

FIG. 4

Resistance Welding Manual, Table 2, "Spot Welding."

THICKNESS "T" OF THINNEST OUTSIDE PIECE	ELECTRODE DIAMETER AND SHAPE		NET ELECTRODE FORCE	WELD TIME (SINGLE IMPULSE)	WELDING CURRENT (APPROX.)	MINIMUM CONTACTING OVERLAP	MINIMUM WELD SPACING ℄ TO ℄	DIAMETER OF FUSED ZONE Dw	MINIMUM SHEAR STRENGTH LB. ULTIMATE TENSILE STRENGTH OF METAL		THICKNESS "T" OF THINNEST OUTSIDE PIECE
INCHES	D, IN., MIN.	d, IN., MAX.	LB.	CYCLES (60 PER SEC.)	AMPS	IN.	IN.	IN., APPROX.	TENSILE STRENGTH BELOW 70000PSI	TENSILE STRENGTH 70000PSI AND ABOVE	
0.010	3/8	1/8	200	4	4000	3/8	1/4	0.10	130	180	0.010
0.021	3/8	3/16	300	6	6500	7/16	3/8	0.13	320	440	0.021
0 031	3/8	3/16	400	8	8000	7/16	1/2	0.16	570	800	0.031
0.040	1/2	1/4	500	10	9500	1/2	3/4	0.19	920	1200	0.040
0.050	1/2	1/4	650	12	10500	9/16	7/8	0.22	1350	— —	0.050
0.062	1/2	1/4	800	14	12000	5/8	1	0.25	1650	— —	0.062
0.078	5/8	5/16	1100	17	14000	11/16	1 1/4	0.29	2700	— —	0.078
0.094	5/8	5/16	1300	20	15500	3/4	1 1/2	0.31	3450	— —	0.094
0.109	5/8	3/8	1600	25	17500	13/16	1 5/8	0.32	4150	— —	0.109
0.125	7/8	3/8	1800	26	1[illegible]000	7/8	1 3/4	0.33	5000	— —	0 125

NOTES:
1. TYPE OF STEEL – SAE 1010
2. MATERIAL SHOULD BE FREE FROM SCALE, OXIDES, PAINT, GREASE AND OIL
3. WELDING CONDITIONS DETERMINED BY THICKNESS OF THINNEST OUTSIDE PIECE "T"
4. DATA FOR TOTAL THICKNESS OF PILE-UP NOT EXCEEDING 4 "T". MAXIMUM RATIO BETWEEN TWO THICKNESSES 3 TO 1
5. ELECTRODE MATERIAL, CLASS 2
   MINIMUM CONDUCTIVITY – 75 % OF COPPER
   MINIMUM HARDNESS – 75 ROCKWELL "B"
6. MINIMUM WELD SPACING IS THAT SPACING FOR TWO PIECES FOR WHICH NO SPECIAL PRECAUTIONS NEED BE TAKEN TO COMPENSATE FOR SHUNTED CURRENT EFFECT OF ADJACENT WELDS. FOR THREE PIECES INCREASE SPACING 30 PER CENT.

attempts, and then drilling and tapping will be required, not to mention hundreds of replacement screws.

- Also, you might think this third question is a little strange. Are the drive sockets the standard size for the screw size required, or are they oversized? But the rationale behind this question is that preinstalled screws are painted with primer along with the rest of the door and frame, and primer can cake up in the sockets causing a certain amount of field work to enable the driver bits to be inserted. In addition, commonplace standard screw sizes that meet ASTM **F1592** testing, and that have been successfully utilized for glazing stop for many years, are 1/4–20 and 1/4–28, both of which are recommended at certain maximum installation spacing by HMMA in the detention hollow metal standard in conjunction with the American National Standards Institute ANSI/HMMA-863. The standard socket size for this screw size is rather small, depending upon socket design and shape, and has been known to cause difficulties with regard to drive bit breakage, both in production at the manufacturer and in the field, causing irritating delays. A good trick that some manufacturers use, in the example of pinned Torx, is to order their 1/4–20 or 1/4–28 screws with T30 oversize drive sockets instead of the standard T27s. (Other designations may apply to other socket designs.) The additional cost is minimal, and the benefit in addressing both of these problems is significant.

These are just three examples pertaining to detention hollow metal. Within the subcommittees for other products and systems, there are tens, if not hundreds, of other helpful tips that member industry professionals have learned through experience and have been happy to share at meetings, through F33 communications, and through articles in industry publications. In fact, over the years, meetings have become like an industry forum where a cross-section of architects, contractors, manufacturers, and corrections officials network and discuss a wide variety of topics of concern and the latest innovations. For those that can take the time to participate, F33 meetings are definitely a worthwhile use of time and funding.

Rewinding for a moment back to the committee's original scope, it is important to discuss the subject of tool-resistant bars and plates because ASTM **A627** and ASTM **A629** were under the committee's jurisdiction from the time when it was still a task group under Committee A01 on Steel, Stainless Steel, and Related Alloys. This is a subject of significant committee work and debate that took place over a period of several meetings, resulting in an up-to-date and comprehensive combined standard, ASTM **A627-03** (reapproved in 2011). This extensive revision involved input and expressions of concern from member architects, corrections officials, and—most especially—the manufacturers of these products. Much of the development and debate revolved around the then new innovation of composite tool-resistant bars and their impressive capabilities. The concern at that time related to the protection of openings such as ventilation grilles in locations that are critical to security and yet very seldom supervised, creating a security challenge that demands an integral bar grille barrier that would far exceed prior testing requirements in order to resist potential threats. This product was the first of its kind to adequately address that concern. The resulting adjustments to the testing protocol are summarized in **Fig. 5**. Since the 2003 revision, ASTM **A627** has been confidently used by the industry as the premier standard for tool-resistant steel bars, plates, and shapes.

Along with the hard-line security requirements of various components and systems in a facility, security control systems play a critical role in the functionality and effectiveness of the entire system. ASTM **F1465** is an excellent comprehensive resource that points out critical issues that should be considered and provides assistance in the decision-making process involved in facility control system design.

In the "Significance and Use" section, the guide points out that it "should be used early in the planning stages of the project so the proper security scope is established at the same time that facility mission is established." Again, in this section of the standard, "This guide shows the planner(s) the steps required to establish the necessary and sufficient requirements for the application, and frame those, how to evaluate the possible technologies for conformance to those requirements. …

FIG. 5

ASTM **A627** TR bar performance tables.

X1. MINIMUM ACCEPTABLE PERFORMANCE CHARACTERISTICS FOR COMPOSITE AND HOMOGENEOUSTOOL-RESISTING STEELS

NOTE X1.1—The steel types below reflect the currently available technology and this standard is not meant to restrict in any way the future development of alternate or emerging technologies, or both, of steels or other composite materials that could meet the performance criteria for the grades in Tables X1.1 and X1.2.

TABLE X1.1 Round, Tool-Resisting Steel Bars—Security Grades

Grade No.	Steel Type	Nominal Bar Diameter		Drop Weight Test, 50 Blows		Deflection Test, Permanent Set		Cutting Test Minimum to Sever the Bar	Time Duration	
		in.	(mm)	ft-lb	(J)	lbf	(N)		h	min
1	Composite T.R. Steel	1	(25.4)	150	(203)	8500	(37810)	144	12	720
2	Composite T.R. Steel	1	(25.4)	150	(203)	8500	(37810)	72	6	360
3	Homogeneous T.R. Steel	1	(25.4)	150	(203)	8500	(37810)	6	0.5	30
4	Homogeneous T.R. Steel	7/8	(22.2)	100	(136)	6000	(26690)	2	0.2	10

TABLE X1.2 Flat, Tool-Resisting Steel Bars—Security Grades

Grade No.	Steel Type	Dimensions		Hardness Test Rockwell C	Cutting Test Minimum Number	Time Minimum	
		in.	(mm)				
1	Composite T. R. Steel	$^{3}/_{8}$ by $2^{1}/_{2}$	(9.5 by 63.5)	Maximum HRC-45	72	6	360
2	Composite T. R. Steel	$^{3}/_{8}$ by $2^{1}/_{2}$	(9.5 by 63.5)	Maximum HRC-45	36	3	180
3	Homogeneous T. R. Steel	$^{5}/_{16}$ by $2^{1}/_{4}$	(7.9 by 57.2)	Maximum HRC-45	3	0.25	15
4	Homogeneous T. R. Steel	$^{1}/_{4}$ by 2	(6.4 by 50.8)	Maximum HRC-45	2	0.17	10

Using this guide, the planner(s) should be able to produce a more complete and accurate specification that meets the operational goals of the facility."

As of this writing, ASTM **F1465** is under task group review and, so far, there have been many knowledgeable comments from experienced industry professionals that relate to significant technological advancements since its last publication in 2003. These comments, along with the most recent meeting discussions and decisions, may result in a new revision that will be even more useful and technologically relevant than its predecessor. The committee looks forward with enthusiasm to the update of ASTM **F1465**.

Committee Operations and Relationships

The committee's focus is managed by members of Executive Subcommittee F33.90, who communicate constantly with the industry through various associations, such as the American Correctional Association (ACA), the American Jail Association (AJA), the American Institute of Architects (AIA) and its Committee on Architecture for Justice (CAJ), and the Construction Maintenance Institute (CMI). In fact, Executive Subcommittee F33 has conducted seminars for these organizations in order to keep them abreast of new and developing security standards. One example is the one-day program that Executive Subcommittee F33 conducted for the CAJ/AIA Business Meeting in the summer of 1995 at a prominent testing laboratory whose location was in close proximity to the meeting site.

The program was described in an article in the May 1996 edition of *Standardization News* that featured "Physical Security" [10]. The program included security and fire testing of samples under UL-10C and International Organization for Standardization (ISO) 3008 (the then newly established standards for fire testing of openings under positive pressure) that included a detention sliding door and a single swing detention door with a food pass/cuff port; both of these did well and were landmark innovative product development achievements for that time. The article can be found in its entirety on the ASTM Web site (**www.astm.org**) and includes the program write-up. The committee has also conducted part-day seminars and testing demonstrations for CMI and the National Fire Protection Association (NFPA), accomplishing the F33 executive committee's desire to showcase the newly developed standards and providing educational opportunities to learn the value of testing through "live" full-scale demonstrations.

Also noteworthy, liaison work is ongoing with other committees such as ASTM Committee F12 on Security Systems and Equipment, ASTM Committee E54 on Homeland Security Applications, and ASTM Committee F14 on Fences, as well as with other related organizations, including NAAMM and its HMMA division (as it has been from the beginning); the Detention Equipment Manufacturers' Association (DEMA), a new division of NAAMM; and NFPA's Technical Committee on Detention and Corrections. The committee has demonstrated flexibility and responsiveness to broaden or redirect efforts to meet the industry's needs at any time through close contact with these organizations.

The F33 Compilation mentioned earlier includes the ANSI-accredited standard ANSI/NAAMM/HMMA-863-04, which was recently updated as *Guide Specifications for Detention Security Hollow Metal Doors and Frames* [11], which is published by NAAMM for HMMA. First published in 1983 and ANSI-approved in 1990, this standard incorporates both of the F33 door and frame test methods, ASTM **F1450** and ASTM **F1592**, as well as other industry-recognized test standards for fire resistance, fire protection, and bullet resistance. Because HMMA-863 has become such an integral part of facility design and is closely linked to the body of F33 standards, it was thought to be appropriate for inclusion in the compilation. The 2014 sixth edition is available to the public as a free download from the NAAMM Web site. (Go to **www.naamm.org** and click on the HMMA division Web site. Then click on "Technical Literature" and scroll down to view and download all HMMA publications and standards.)

This is in addition to the already revised and ANSI-reapproved ANSI/NAAMM/HMMA-862-13, *Guide Specifications for Commercial Security Hollow Metal Doors and Frames*, which includes guidance for the specification and testing of forced-entry and ballistic-resistant doors, frames, and vision systems at various security levels, much of which is included in the new ASTM work item discussed previously, ASTM **WK23681**, *Standard Guide for the Selection of Test Methods and Security Ratings for Forced Entry and Ballistics Resistant (FEBR) Doors, Windows, Other Opening Protectives, Walls Ceilings, Roofs, and Other Fixed Barriers Comprising the Secure Parts of Building Exteriors and the Security Envelope of Secure Areas Inside Buildings*.

These two guide specifications include the latest revisions of ASTM **F1450-12a** and ASTM **F1592-12**, both of which incorporate extensive up-to-date additional testing from the previous 2005 revisions, particularly security testing of doors with large glazed vision panels. They also include the latest revisions of ASTM and ANSI standards for tool-resistant bars, prime and finish coatings, fire testing, weather resistance, bullet resistance, and the latest HMMA "Tech Notes" on installation, grouting, continuous welding, and other topics.

ASTM Committee F33, HMMA, and now DEMA are all hard-working standards development organizations (SDOs) that have made a lot of progress in standards development for the benefit of the corrections industry within a short span of time. The fact that HMMA specifications and all ASTM F33 standards are complete, up-to-date, and coordinated offers the industry a tremendous opportunity, not only to incorporate these beneficial documents into project specifications but also to adopt them for inclusion into accreditation standards and building codes.

As mentioned, within the last few years, NAAMM has started a new division, DEMA, which has strong support and involvement from several of the major detention equipment and systems manufacturers and contractors in the industry and has already developed new standards in cooperation with ASTM and HMMA, establishing itself as a complementary SDO for the ongoing progress of the industry. Their published specifications are available via the NAAMM Web site (**www.naamm.org**) under technical publications as follows:

- DEMA-111900-09, *Guide Specification for Basic Detention Equipment Requirements*
- DEMA-111910-09, *Guide Specification for Detention Fixed Windows*
- DEMA-111970-12, *Guide Specification for Security Metal Ceilings*
- DEMA-111990-11, *Guide Specification for Detention Electronic Requirements*

As another quick word on ASTM Committees E54 and F12, there are strong relationships and coordinated efforts among these committees, ASTM Committee F33, and the two NAAMM associations. There are several standards under the jurisdiction of these committees that have significant value and applicability to more than just one committee. For example, there are detention security standards that have been developed in Committee F33 that have been used for part of the basis of testing and guidance material for standards developed and under current development in Committees E54 and F12, particularly as they apply to forced entry and ballistics resistance, topics addressed by ASTM Subcommittee F12.10 on Security Systems and Equipment, ASTM Subcommittee E54.05 on Building and Infrastructure Protection, and ASTM Subcommittee E54.06 on Electronic Security Systems. This video clip shows segments of forced entry testing **CLICK HERE**. (In these cases, tests were conducted on samples after they were shot multiple times under a ballistics testing protocol.) The clip also includes related impact testing and seminar group demonstration and participation testing. Committee F33 assisted with the founding of Committee E54 in 2002 and has been closely involved since that time. Committee F33 members have helped that committee grow into a strong advocate and developer of standards for homeland security

FIG. 6

Liaison report.

Liaison Report to
Hollow Metal Manufacturers' Association (HMMA)
Division of National Association of Architectural Metal Manufacturers (NAAMM)

ASTM F33, Detention and Correctional Facilities
ASTM E54, Homeland Security Applications

Saturday, April 18, 2015

ASTM F33:

F33 met Saturday February 7, 2015, Long Beach, CA, in conjunction with the Winter ACA. The Hollow Metal Task Group (F33.02.01) and the Fixed Barriers Task Group (F33.02.03) met together.

The combined group continued their review of the latest drafts of the new standards, WK9092 – Draft #14, "Standard Test Methods for Physical Assault on Overhead Horizontal Fixed Barriers for Detention and Correctional Facilities", and WK25858 – Draft #3, "Standard Test Methods for Anchor Systems used for Detention Hollow Metal Systems", both of which were sent out in advance of the meeting along with the updated Long Range Plan for Standards Development. WK25858 is scheduled for another round of Subcommittee ballot.

WK9092 has completed final balloting and ASTM review, and has been approved for publication. The standard number is **ASTM F2697-15**, and ASTM is doing a press release on this new standard for Standardization News and other publications.

There was a lot of interest in developing this standard because it would complete the suite of test methods (see below) that addresses the security "envelope" within a secure area inside a detention or correctional facility. The security envelope is considered by F33 as consisting of the doors, windows and borrowed lights along with associated security hardware; glazing for these components; walls and associated penetrations such as ventilation grilles; and now the ceilings or the horizontal fixed security barriers above the ceilings. Now that this standard is complete, the user can now specify compliance with complimentary testing for all components of security envelopes, and thereby, provide reasonable assurance that there are no "weak links in the chain".

- A627 – 03(2011), "Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities"
- F1450 – 12a, "Test Method for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities"
- F1577 – 05 (2012), "Test Methods for Detention Locks for Swinging Doors"
- F1592 – 12, "Test Methods for Detention Hollow Metal Vision Systems"
- F1643 – 05 (2012), "Test Methods for Detention Sliding Door Locking Device Assemblies"
- F1758 – 05 (2012), "Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors"
- F1915 – 05, "Test Methods for Glazing for Detention and Correctional Facilities"

FIG. 6

(Continued)

- F2322 – 03 (2012), "Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities"
- F2542 – 05 (2012), "Test Methods for Physical Assault of Ventilation Grilles for Detention and Correctional Facilities"

And Last but not least:

- F2697 – 15, "Test Methods for Physical Assault on Overhead Horizontal Fixed Barriers for Detention and Correctional Facilities"

Going forward, the priority list for the following future standards was reviewed by the group and work will continue to proceed accordingly:

1. Complete WK 25858, "Standard Test Methods for Anchoring Systems for Hollow Metal Vision Systems and Door Assemblies Used in Detention and Correctional Facilities"

2. New "Standard Test Methods for Non-contact Visitation Stations" which address acoustics as well as security.

3. New "Standard Test Methods for Bar and Wire Mesh"

4. New "Standard Test Methods for Access Panels and Doors"

5. New "Standard Guide for Stainless Steel Detention Doors": The hollow metal task group has agreed that a guide incorporating HMMA-863 and HMMA-866 would be the best approach. The group has previously agreed that there should be no need for additional or supplementary testing for stainless steel detention doors. Also the group has agreed that the guidance provided by HMMA-866 as it relates to finishes and corrosion resistance as they apply to detention and correctional facility applications will be valuable and useful information.

All of these future new standards are expected to be developed as a joint effort by the F33.02 Physical Barriers Subcommittee, HMMA and DEMA.

Gregg Williams, DLR Group, reviewed the new standard, "Standard Guide for the Selection of Security Fasteners" (Work Item No. WK14507 updated to No. WK43304). Several members will be reviewing this latest draft, and sending comments back to Gregg. Gregg had this standard developed very close to readiness for subcommittee ballot, and as of April 2014, this draft has been placed on the ASTM Collaboration website for member comment. According to Gregg, all that is needed to go to ballot is the addition of graphics and illustrations, and these are scheduled to be reviewed during the upcoming F33 meeting in two (2) weeks.

F1577, "Standard Test Methods for Detention Locks", was approved with no changes in 2012. Joe Tate, Southern-Folger, is chairing the next review and will be presenting recommendations for revisions when those are ready.

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(Continued)

FIG. 6

(*Continued*)

ASTM E54:

E54 met January 26 – 28, 2015, New Orleans, LA, in conjunction with the Winter ASTM Committee Week.

Subcommittee E54.05 is continuing to review two standards that are high priority for balloting:

WK3799, "Standard Guide for Identifying Blast Mitigating Design Criteria for the Protection of Building Exteriors Against Blast Loading due to Intentional Attacks", and

WK50338, "Standard Guide for the Selection of Test Methods and Security Ratings for Forced Entry and Ballistics Resistant (FEBR) Doors, Windows, Other Opening Protectives, Walls, Ceilings, Roofs, and Other Fixed Barriers Comprising the Secure Parts of Building Exteriors and the Security Envelope of Secure Areas Inside Buildings". The recently published "Standard Test Method for Timed Evaluation of Forced-Entry-Resistant Structural Systems", **ASTM F3038-14**, developed by Committee F12, has been incorporated into the working draft, Draft #4, 1/20/15, and the subcommittee will begin reviewing this work beginning this meeting.

Next meeting of F12, April 27 & 28, Anaheim CA, Along with the Spring ASTM Committee Week.

HMMA and DEMA:

I reported to both F33 and E54 that the HMMA and DEMA divisions of NAAMM met in Chicago IL, November 8 - 10, 2014. I reported that these divisions have recently completed the latest revision of the, "Guide Specifications for Detention Security Hollow Metal Doors and Frames", **ANSI/NAAMM/HMMA-863-14**, and this standard has been reapproved by ANSI as a 2014 standard.

This is in addition to the already revised and ANSI reapproved "Guide Specifications for Commercial Security Hollow Metal Doors and Frames", **ANSI/NAAMM/HMMA-862-13**, which includes guidance for the specification and testing of forced entry and ballistic resistant doors, frames and vision systems at various security levels, much of which is included in the new ASTM work item discussed previously, WK50338.

These two (2) guide specifications include the latest revisions of the "Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities", ASTM **F1450-12a**, and the "Standard Test Methods for Detention Hollow Metal Vision Systems", ASTM **F1592-12**, both of which incorporate extensive up-to-date additional testing from the previous 2005 revisions, particularly security testing of doors with large glazed vision panels. They also include the latest revisions of ASTM and ANSI standards for tool resistant bar, prime and finish coatings, fire testing, weather resistance, bullet resistance, and the latest HMMA "Tech Notes" on installation, grouting, continuous welding, and other topics.

Current DEMA specifications that are closely related to the work of E54.05 and E54.06 are:

FIG. 6

(Continued)

- DEMA-111900-09,"Guide Specification for Basic Detention Equipment Requirements"
- DEMA-111910-09, "Guide Specification for Detention Fixed Windows"
- DEMA-111970-12, "Guide Specification for Security Metal Ceilings"
- DEMA-111990-11, "Guide Specification for Detention Electronic Requirements"

Other DEMA specification projects that are in process are, security hardware, site-erect security wall panel systems, modular steel detention cells, glass and glazing, and bar and wire mesh barriers to name a few.

The group discussed the fact that these test methods and the prescriptive information incorporated into these specifications as well as those in the HMMA standards are readily adaptable or at least useful for reference, for standards being developed or being considered in E54.05, E54.06 and F12.10. attendees can visit www.naamm.org and go to the HMMA and DEMA sites, then to "literature", to check out these and many other resources.

In summary, as discussed in previous meetings, there is a lot of current work being done and completed by these organizations (HMMA, DEMA, ASTM F33, ASTM F12) that can be useful to the ongoing efforts of E54.

Next Meetings:

Next E54 meeting, June 15 – 17, 2015 Anaheim CA, along with the Summer ASTM Committee Week.

Next F33 meeting, August 13, 2015 along with ACA summer conference & show, Indianapolis, IN

Respectfully Submitted:
Jimmy Stapleton
Habersham Metal Products Co.

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(Continued)

applications—a subject that is near and dear to the hearts of Americans, especially in this day and time. **Fig. 6** is an example of a liaison report that touches on the activities of these committees with the objective of keeping members informed and encouraging participation.

ASTM **WK23681**. The recently published ASTM **F3038-14**, *Standard Test Method for Timed Evaluation of Forced-Entry-Resistant Structural Systems*, developed by Committee F12, has been incorporated into Draft #4, 1/20/15, and the subcommittee has begun reviewing this work.

Although not related directly to security, the capability of exterior security windows and doors to withstand windstorm—and particularly hurricane—damage also is an important consideration. The committee, along with HMMA and the Steel Door Institute, have worked together regarding this threat and have done considerable research and product development for many years, with HMMA having already run a "joint test" program consisting of windstorm testing involving almost 30 member manufacturers from all over the country. This testing addressed commercial door, frame, and window products, but much of the results translate over to security products when combined with additional testing or evaluations (or both).

Just to discuss some specifics, of primary concern are facilities located in the hurricane zones in Florida and along the Gulf Coast. For example, Broward County and Miami-Dade County in Florida require specific testing and a rigorous certification and registration program. They require specific testing application standard (TAS) protocols, TAS 201, TAS 202, and TAS 203, which by either interpretation or prescription include the following:

- ASTM **E330**, *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*
- ASTM **E1886**, *Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials*
- ASTM **E1996**, *Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes*
- ASTM **E283**, *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*
- ASTM **E331**, *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

A manufacturer selects a target design pressure for these tests and, of course, the higher the pressure, the better—but this also increases the risk of failure. Miami-Dade County certificates are public information and verify that the tested products have met all of the requirements of TAS 201, TAS 202, and TAS 203.

One drawback of these certifications is that each Miami-Dade County notice of acceptance (NOA) is very restrictive as to specific elevation and design. A window frame is approved by Miami-Dade County only as it is shown exactly in the NOA document. Any variations in elevation, design, or section would not be covered by the NOA and would most likely require an expensive approval process through the county. NOA documents are public information and can be found by performing a search on Miami-Dade County's Regulatory and Economic Resources Web site (**http://www.miamidade.gov/building/pc-search_app.asp**).

Many manufacturers' products, such as view windows, sidelights, and pair and single door openings, are certified by a testing laboratory such as Underwriters' Laboratories (UL) or Intertek Testing Services, which have a follow-up and inspection service or are under a statewide Florida approval number (or both). Laboratory listings and approvals are not quite as restrictive as those of Miami-Dade County, and many times variations can be approved by the listing body through an engineering evaluation.

The ultimate objective of Committee F33, working alongside these related organizations, is to develop standards that will enhance the quality of construction and operational safety and security of detention and correctional facilities across the nation and internationally. The committee will continue to work to achieve this objective.

Current Work on Specific Standards and Projects

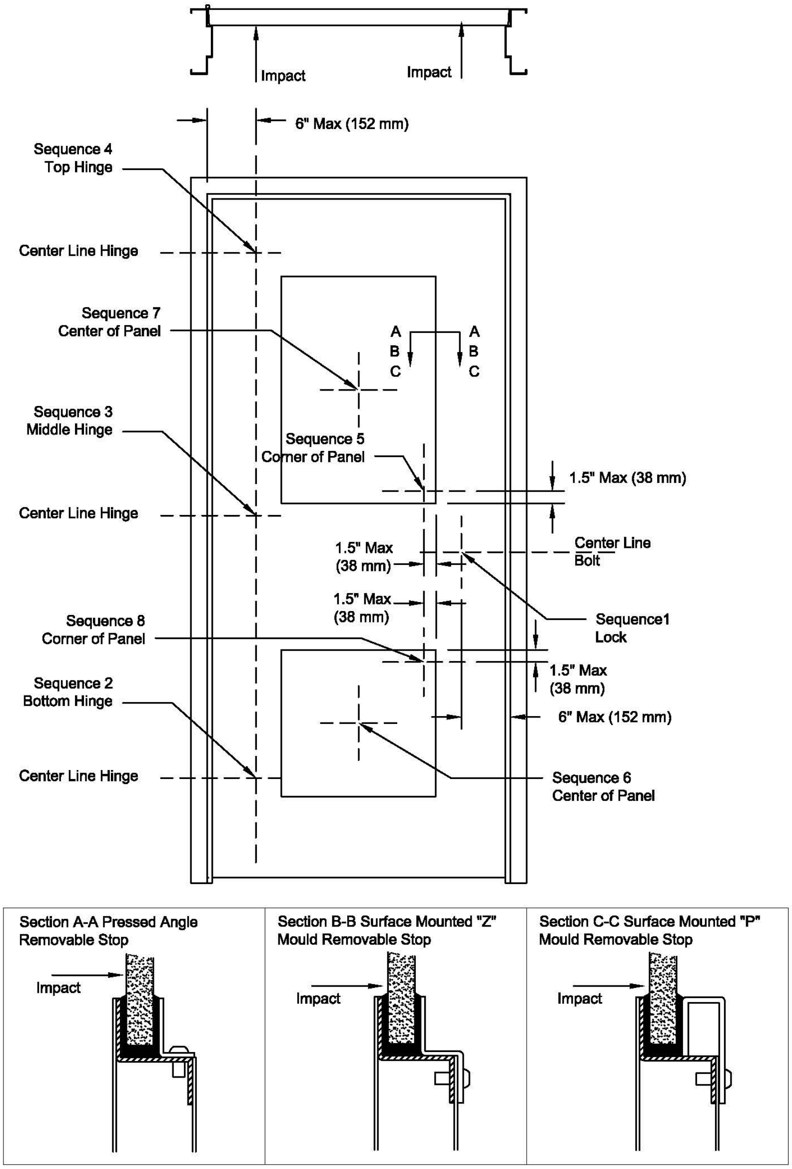
During recent meetings, the hollow metal and barriers group reviewed the latest drafts of ASTM **F1450**, **F159**, **F2322**, **F2697**, and ASTM **WK25858**, *New Test Method for Anchor Systems Used for Detention Hollow Metal Vision Systems and Door Assemblies.*

These drafts include additional and updated testing from the 2005 editions. Both ASTM **F1450** and ASTM **F1592** were approved at the meeting for final review and publication. This was a significant accomplishment for the committee because updated and additional testing is very important to better ensure the security performance of hollow metal designs that were not included in the previous editions dating back to their original publications (1991 and 1995, respectively).

The additional testing in ASTM **F1450** includes additional samples that represent the most current commonplace door profiles used in detention and correctional facilities. One of these samples is a door with double glazing preparations representing examples such as cell and dayroom doors that must provide good visibility with respect to inmate activity (**Fig. 7**). These samples are tested under all procedures required in past versions of the standard and are not given any special treatment because of their large vision openings. This is a case where committee architect members insisted this type of door must not only provide good visibility but must also possess the same security capabilities as doors with much smaller vision openings. Their message to the task group was that the original sample designs were just as relevant as they were when the standard was first published 25 years earlier. This new sample design represents a smaller number of facility openings, but they are very important to the security of a facility and consequently must

FIG. 7

ASTM **F1450** test assembly door elevation No. 2.

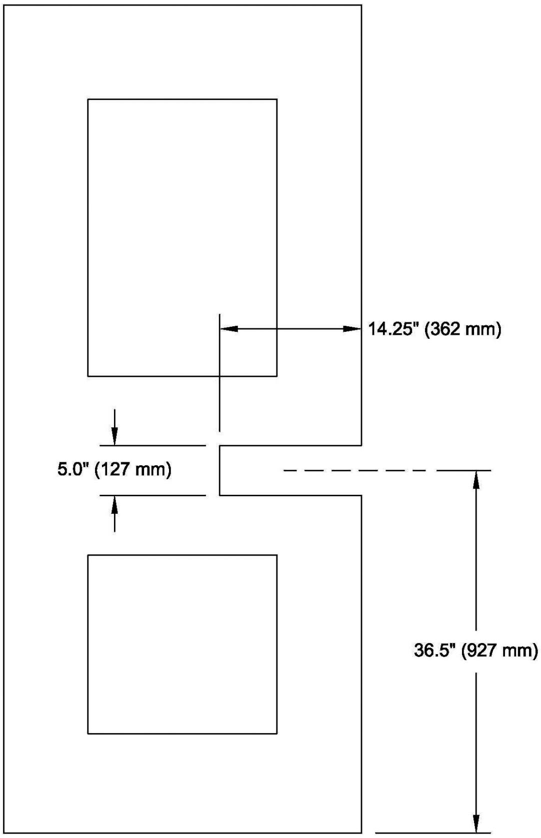


be included in the standard. The manufacturer members agreed, understanding that this was a significant concern of the design community, and they immediately went to work on product development (as necessary) and on benchmark testing in order to meet this need.

Another example within the same standard was the addition of the sample that included not only the larger multiple vision openings but also an "edge cut" food pass/cuff port (**Fig. 8**). Because of the gap in the edge, it was mandated that the architectural community must have the assurance that the door is not going

FIG. 8

ASTM **F1450** test assembly door elevation No. 3.

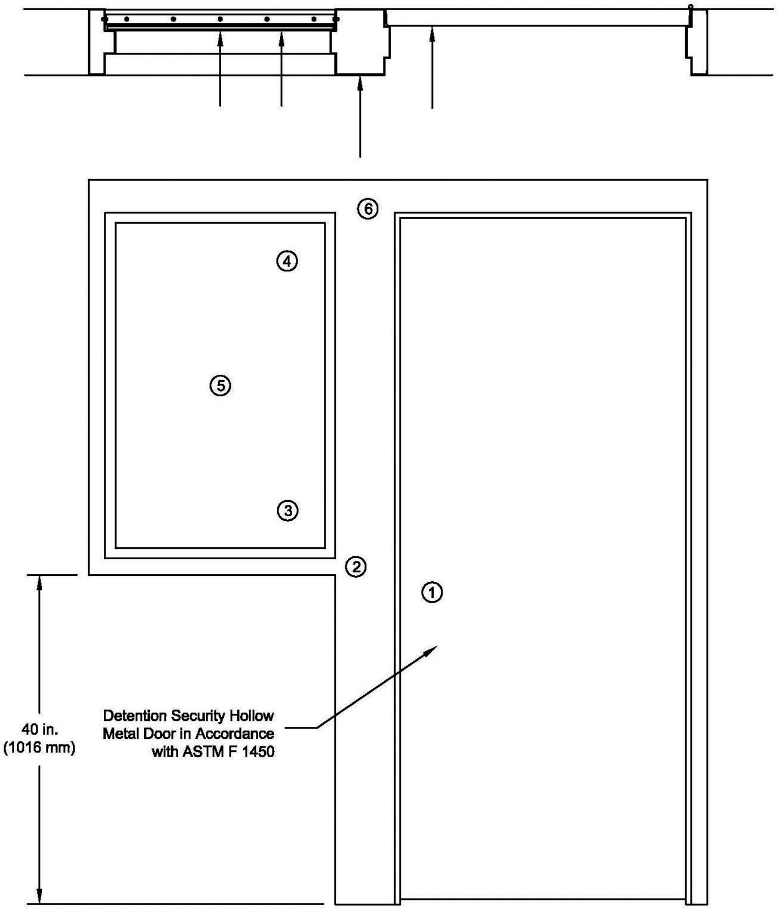


to buckle or deform and spring open during an attack. Therefore, the new standard includes rack testing of a full-scale sample in order to provide that assurance. Manufacturers have had to use innovative design and fabrication techniques to accomplish this goal, again raising the bar for existing products and creating new products in order to meet the needs of ever-changing detention and corrections environments.

Yet another example is the addition of more rigorous testing incorporated into ASTM **F1592**, the performance test method for door sidelights and multilights (**Fig. 9**). The major change was the size of the sidelight vision opening, which is now much larger than the previous revision. Because of this increased opening size, the frame, the glazing retention systems, and the glazing itself are more susceptible to failure, especially under the lengthy multi-location impact test, which lasts more than seven hours in the case of Grade #1 (most secure) (**Fig. 10** Table 2). This grueling test procedure challenged the capabilities of current-day detention hollow metal design and manufacturing but was necessary in order to meet the needs of the industry. These two video clips (ASTM **F1592** Video Clip and ASTM **F1592** Wall Damage Video) not only demonstrate impact testing of this type of sample but also illustrate the severe damage that this testing inflicts on the sample, including

FIG. 9

ASTM **F1592** test assembly side-light elevation showing strike points.



on the test wall and anchor system **CLICK HERE**. This is a demonstration of the importance of proper reinforcement and grouting of masonry and concrete wall constructions along with substantial frame anchoring systems. This particular test was successful, and the wall as well as the sample met the requirements of the standard. The testing for the new standard currently under development in Committee F33, ASTM **WK25858**, is based upon ASTM **F1592** testing, again in order to be sure that anchor systems meet the same performance criteria as the doors and vision system and that there are no "weak links in the chain."

The completion of these two standards has released HMMA, working with DEMA and Committee F33, to complete the ANSI reviews of HMMA-863 as well as HMMA-862, an industry standard that is important to homeland security applications, and it is a key resource for ASTM **E54** in the area of forced-entry and ballistic-resistant products and systems.

ASTM **F2697** recently was approved for the first time and ASTM **F2322** has been reapproved for another cycle. As a point of interest, and as an example of the forward thinking and productive dynamics of the group, the "furniture

FIG. 10

ASTM **F1592** impact test series for side-light frame.

TABLE 2 Impact Series for Frame and Glazing/Panel Impact Test Sidelight Frame, Fig. 3

Sequence [A]	No. of Blows Grade 1	No. of Blows Grade 2	No. of Blows Grade 3	No. of Blows Grade 4	Impact Energy of Each Blow ft · lbf (J)	Location of Blows
						Frame
1	600	400	200	100	200 (271.2)	At mid-height on the door, 6 in. (152 mm) maximum horizontally from the lock edge.
2	600	400	200	100	200 (271.2)	On the frame joint between the side-light sill and the strike mullion
						Glazing/Panel
3	600	400	200	100	200 (271.2)	On the glazing/panel at the corner of the glazing/panel closest to the joint between the side-light sill and the strike mullion, within 6 in. (152 mm) of the frame stop
4	600	400	200	100	200 (271.2)	On the glazing/panel at the corner of the glazing/panel closest to the joint between the strike mullion and the header within 6 in. (152 mm) of the frame stop
5	600	400	200	100	200 (271.2)	On the glazing/panel at the center of the glazing/panel
						Frame
6	600	400	200	100	200 (271.2)	On the frame joint between the strike mullion and the header
Cyclic sequence	200	200	100	50		
Total Impacts	3600	2400	1200	600		
ɔtal approximate Time	6 hr.	4 hr.	2 hr.	1 hr.		

The cyclic sequence of impacts will be as indicated by the grade number, and then move to the next sequence number location. If the testing agent observes a cation in the assembly where failure is beginning to occur, the testing agent is entitled to alter the test sequence to attack the weakened location.

impact" test (an additional test written into ASTM **F2322**) will be expanded during the next revision cycle to include multiple impacts on two pieces of cantilever furniture mounted opposite each other on both sides of the wall. The test furniture, which simulates stools or bunks, would be subjected to both simultaneous and alternating impacts in order to simulate coordinated attempts by inmates in adjacent cells to damage furniture and walls. This is an example of how the input and expression of concerns by architects and corrections professionals coupled with research and innovation by manufacturers and detention equipment contractors have resulted in the design of test methods that address these concerns as well as in the creation of new products and the improvement of existing ones. Concept drawings (**Fig. 11**) have been presented to the committee on equipment to accomplish this technically challenging test protocol. After further development and trial runs of this new testing equipment, ASTM **F2322** will be brought back up for review and revised to include this new testing.

The development of ASTM **F2697** was an excellent example of architects, engineers, testing labs, and manufacturers working together to develop a vertically upward impact test apparatus in order to enable testing to be carried out on security ceiling samples in their horizontal installed position. Over a period of several meetings and discussions, a device was designed that would convert the impact loads generated by the apparatus defined in ASTM **F1450**, ASTM **F1592**,

FIG. 11

ASTM **F2322** potential future cyclic impact test apparatus.

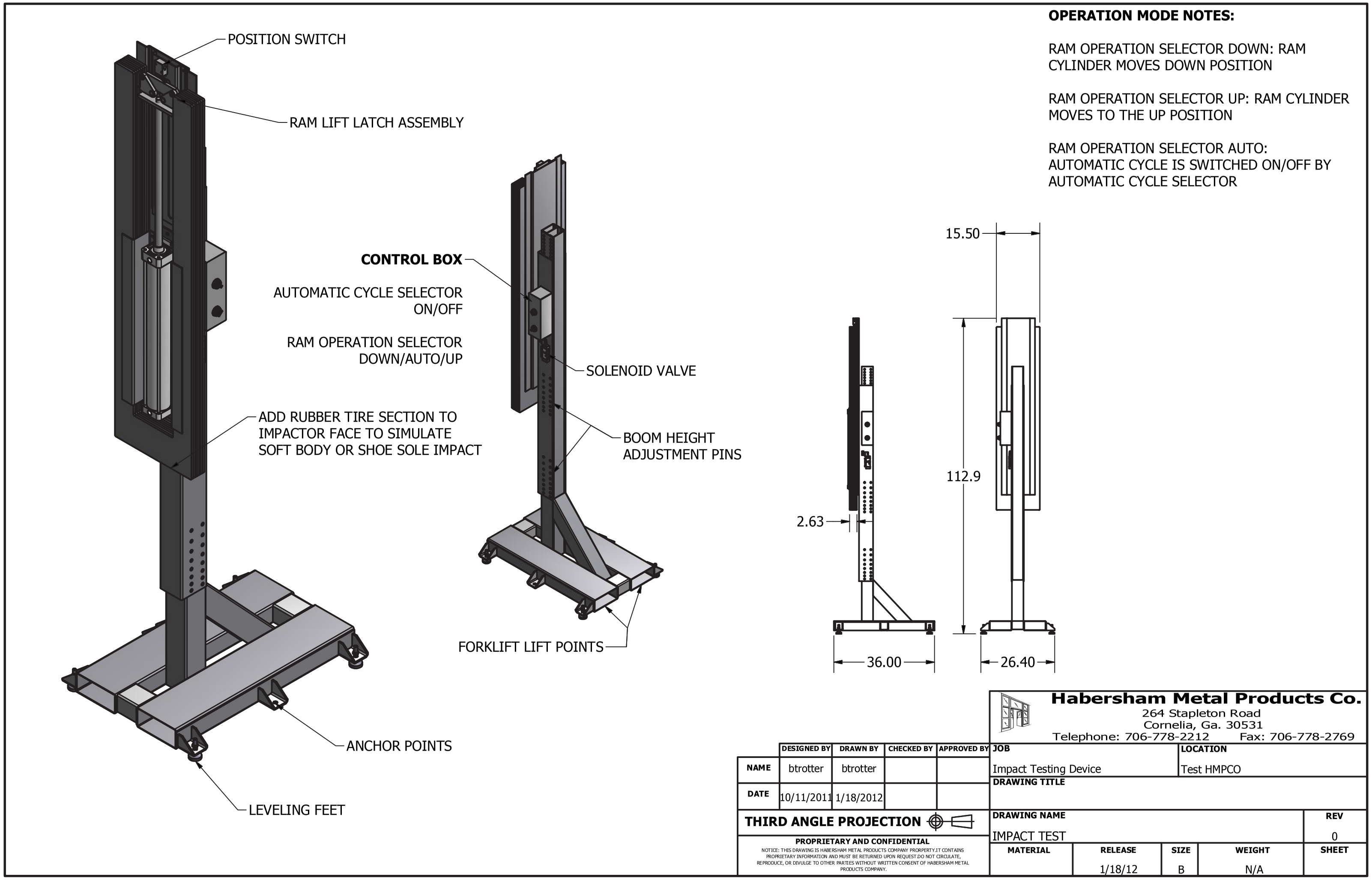
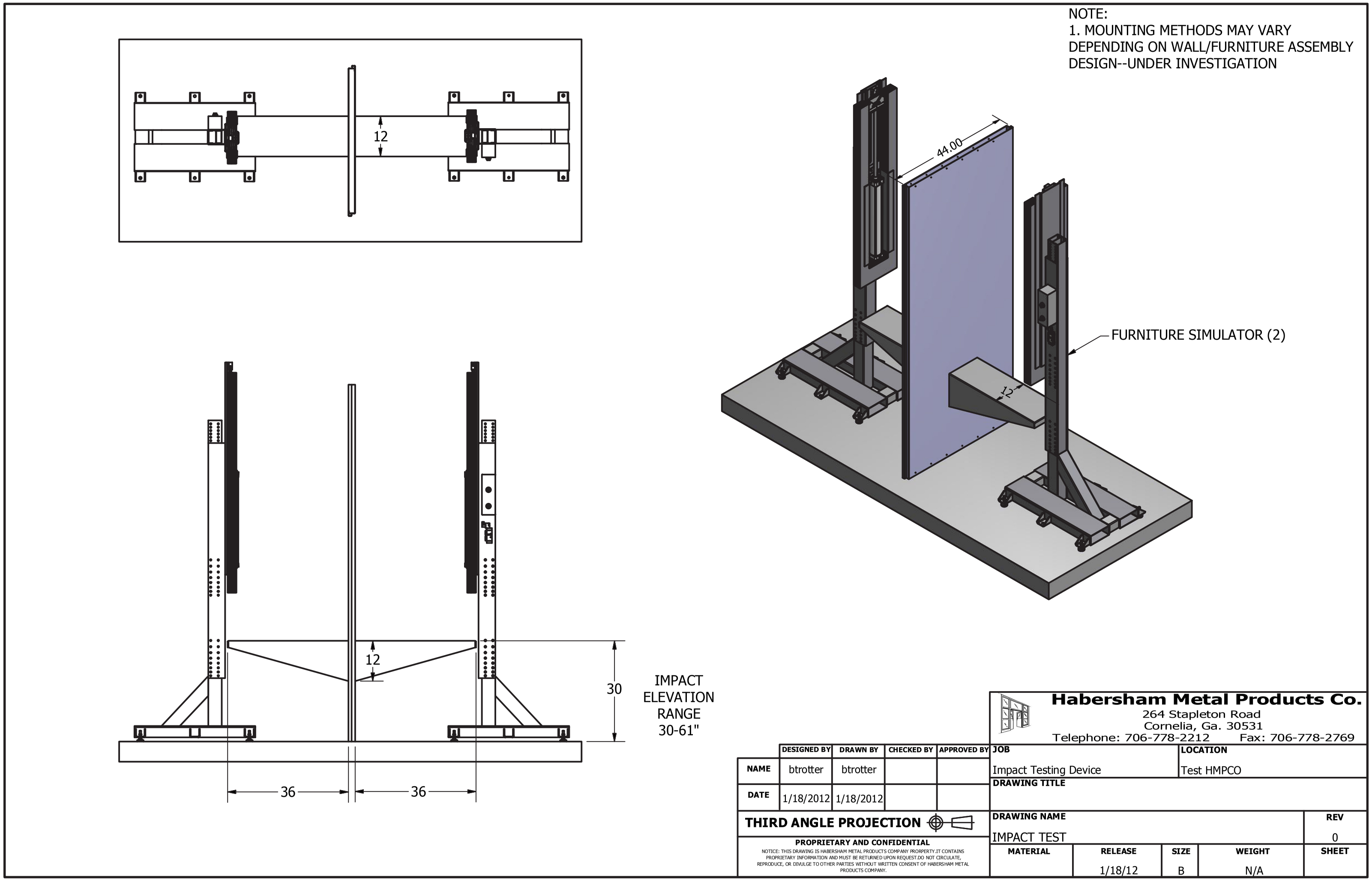


FIG. 11

(Continued)



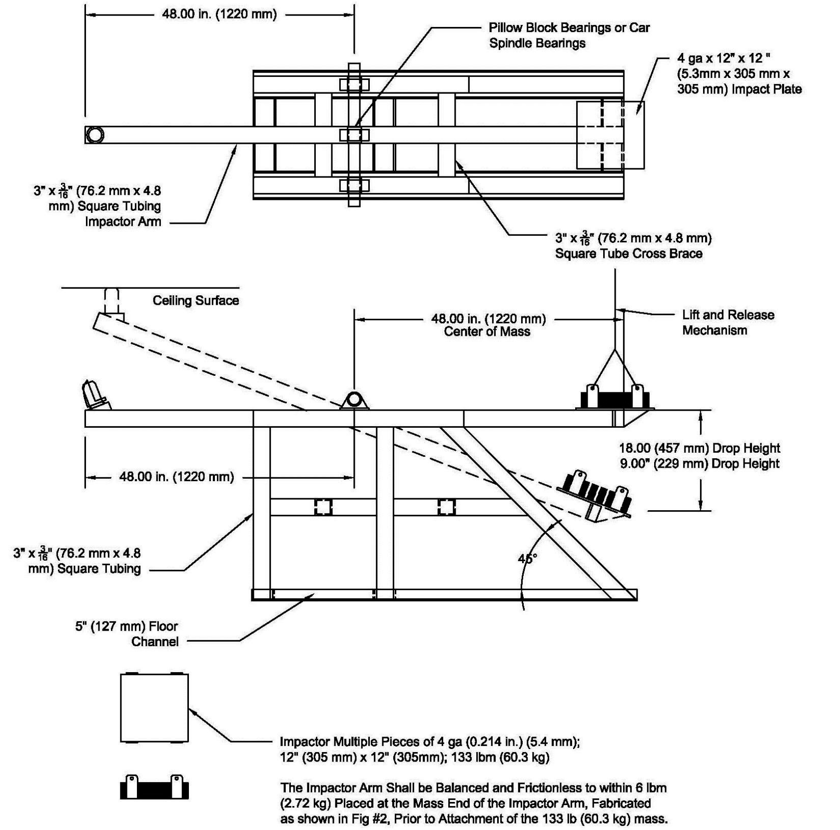
Video

and ASTM **F2322** into vertically upward impacts. The design and schematic drawings of this apparatus are shown in **Fig. 12**. Once this was accomplished, the apparatus was constructed, calibrated, and used for benchmark testing. Observation and measurements by testing laboratory engineers confirmed that the testing closely simulated the predicted upward impact attack that a security ceiling may be subjected to in the field. This was a major step forward in the development of this standard. This video clip shows the ceiling impact test apparatus in action **CLICK HERE**.

Input over the next few meetings and from initial subcommittee ballots improved and fine-tuned the samples, the apparatus, the fixtures, and the procedures in order to be sure that testing of all of the most common products, their configurations, and their mounting systems could be accomplished. In response to concerns expressed by the architect members, the addition of static load tests and simulated prying tests at the anchor points and at seams—for those ceiling designs that incorporated seams—filled out the remainder of the test methods. These tests addressed the concern that inmates lying on top bunks in cells and pressing upward against the ceiling with their legs and feet can exert a tremendous amount of static force when attempting to dislodge or deform the ceiling. The prying attack was simulated using a wedge tool attached to the hydraulic ram used for the upward static load test. Schematic drawings are shown in **Fig. 13a** and **b**, and

FIG. 12

ASTM **F2697** portable impact test apparatus.



the forces applied are shown in **Fig. 14**. Again, the completion of this standard is a major accomplishment by the committee and will be a great asset to the design community in accomplishing the goal of a rigorously tested and proven "security envelope."

Present and Future Work

Regarding future work, the following standards and projects are scheduled to enter the development or revision process. These are prioritized, and progress is tracked in Committee F33's Long Range Plan for Standards Development (**Fig. 15**).

- The new standard, ASTM **WK43304**, *New Guide for Selection of Security Fasteners* for Detention and Correctional Facilities (currently listed as a work item).
- Review of ASTM **F1577-05** (2012).
- The new standard, *Standard Guide for Stainless Steel Door Assemblies for Detention and Correctional Facilities*. The hollow metal task group has agreed that a guide incorporating HMMA-863 and HMMA-866, *Guide Specifications for Stainless Steel Hollow Metal Doors and Frames*, would be the best approach. The group agreed that the guidance provided by HMMA-866 as it relates to finishes and corrosion resistance as they apply to detention and correctional facility applications will be valuable and useful information.
- New standard, *Standard Test Methods for Access Panels and Doors.*
- New standard, *Standard Test Methods for Bar and Wire Mesh.*
- New standard, ASTM **WK25858**.
- New *Standard Test Methods for Non-Contact Visitation Stations Used in Detention and Correctional Facilities.*
- New *Standard Test Methods for Cantilevered Steel Bunks Used in Detention and Correctional Facilities.*
- Revision of ASTM **F1465-03**, *Standard Guide for Selection of Security Control Systems*.
- New *Standard Guide for the Selection of Digital Video Recording (DVR) and Digital Video Networking (DVN) Systems*
- New *Standard Guide for Video Visitation Systems*
- New Task Group, ASTM F33.06.10 on Electrified Fences used to Secure the Perimeters of Detention and Correctional Facilities.

Members and their network of colleagues are continually bringing up new areas of security, and these are constantly being studied. There is definitely a lot of work in store for ASTM F33 and more will be on the horizon.

Fire Resistance of Emerging Wall and Floor Systems

Another important topic that has arisen as of this writing is the fire resistance of new and innovative security wall systems for use in detention and correctional facilities. The rapid development of modular steel and wall panel systems since

FIG. 13

ASTM **F2697** fixed overhead barrier static load test apparatus.

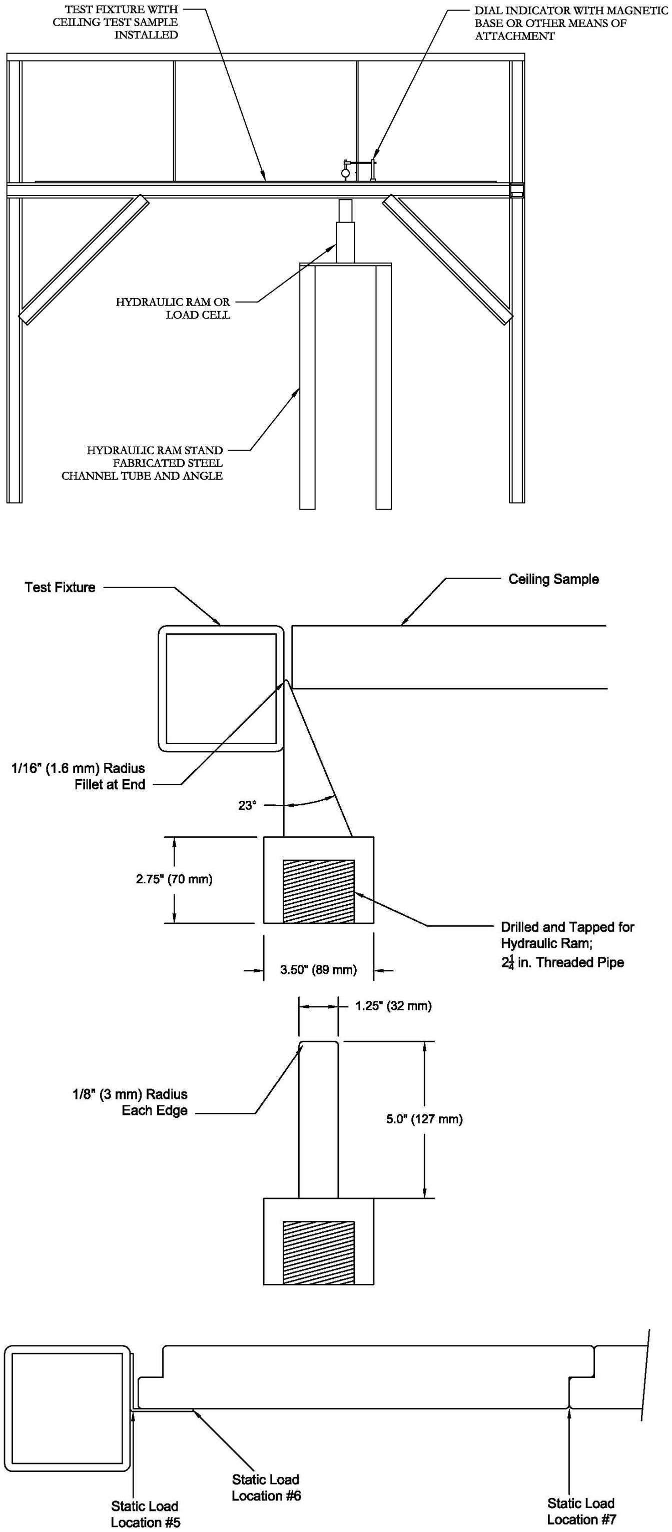


FIG. 14

ASTM **F2697** security grades and load requirements.

Table 1: Security Grades and Load Requirements for Ceiling Panels

Grade Number [A]	Recommended Ceiling Panel Face Sheet Thickness [B] in. (mm) gauge	Number of Impacts at Each Target Location (total/time)	Static Load lbf (N)
1	0.093 (2.3) 12 Hollow Metal Panel	600 (2400/4 hrs.)	3000 (13 345)
2	0.067 (2.3) 14 Hollow Metal Panel	400 (1600/2 hrs. 40 min.)	2000 (8896)
3	0.093 (1.7) 12 Single Sheet Pan	200 (800/1 hr. 20 min.)	1000 (4448)
4	0.067 (1.7) 14 Single Sheet Pan	100 (400/40 min.)	750 (3336)

Target Locations for Ceiling Impact Test and Ceiling Static Load Test

Location Number	Target Location [C]
1	Static Load & Impact: Against the ceiling, within 6 in. (152 mm) of a corner selected by the lab test director (Figure 6).
2	Static Load & Impact: Against the ceiling along one length of the ceiling wall attachment within 1 in. (25.4 mm) of the attachment of the wall and the ceiling panel selected by the lab test director. (Figure 6).
3	Static Load & Impact: Against the ceiling at a distance of 30 in. (762 mm) from the attachment between the ceiling and the test fixture (wall attachment) selected by the lab test director. (Figure 6).
4	Static Load & Impact: Against the ceiling directly against a seam at or near center span of the seam selected by lab test director. (Figure 6).
5	Static load only: In the seam between the test fixture and ceiling wall anchor at a location selected by the lab test director using the “Pry Test Adapter” (Figure 7).
6	Static load only: Gap at a present horizontal seam (Figure 7).
7	Static load only: In the seam in the middle of ceiling selected by test director 24 in. away from edge (Figure 7).

[A] Grades 1 and 2 shall be identified as a containment ceiling. Grades 3 and 4 shall be identified as a concealment ceiling.
[B] Alternate materials and methods of construction that promote product innovation including non-metallic and/or square panel ceilings, which meet the aforementioned performance criteria shall be permitted.
[C] Impact locations and static load locations may be selected by the lab test director such that no two test locations are within 12 in. (305 mm) of each other.

the early 1990s has called attention to the fire-resistance capabilities of these systems as compared to the traditional reinforced concrete masonry unit and precast concrete construction methods that are typical of facility constructions of the past. There are excellent site-erect and complete modular systems that—complete with doors, detention windows, and other products—meet all of Committee F33’s security standards. The key advantages are: (1) These designs open up the opportunity to maximize usable floor space while minimizing the overall footprint of the facility, which is a major consideration—especially in urban locations; and (2) the modular or pre-engineered approach gives rise to major reductions in the construction schedule.

However, with regard to fire-resistance capabilities, testing and compliance of these new systems under the stringent fire test standards are still very much under development. The basic test standards for fire-resistant wall systems are ASTM **E119**, *Standard Test Methods for Fire Tests of Building Construction and Materials*, and the UL equivalent, UL 263, *Standard for Fire Tests of Building Construction and Materials*. All wall systems are listed under the classifications that are governed by these standards, and they are rated by their fire test duration and the maximum temperature rise requirements during the entire test duration. The test also includes the thermal shock and impact test by water fire hose stream at

FIG. 15

F33 long-range plan for standards development.

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015 **#1**

Standard	**Project Chair**	**Target Completion Date First Draft**	**Target Completion Date Sub-Com. Ballot**	**Target Completion Date Main Comm. & Society Ballot**
F33.02 – Physical Barriers Review of F1450-05 for Technical Changes and Additional Testing Criteria: Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	Complete	Complete	Complete **F1450-12a**
Review of F1592-05 for Technical Changes and Additional Testing Criteria: Standard Test Methods for Detention Hollow Metal Vision Systems (2012 edition sent to publication November 2012)	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	Complete	Complete	Complete **F1592-12**
Five (5) year review of F2322-03, Standard Test Methods for Physical Assault on Vertical Fixed Barriers for Detention and Correctional Facilities Renewed with no changes to keep active. Work on additional testing continuing.	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	Complete	Complete	Complete **F2322-03 (2012)**
Standard Test Methods for Horizontal Fixed Barriers Used in Detention and Correctional Facilities Work Item Number: WK9092 (Priority 1)	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	Complete	Complete	Complete **F2697-15**
Standard Test Methods for Anchoring Systems for Hollow Metal Vision Systems and Door Assemblies Used in Detention and Correctional Facilities WK 25858 (Priority 2)	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	Complete	Complete	08/15
Standard Test Methods for Non-Contact Visitation Stations Used in Detention and Correctional Facilities (Priority 3)	Joe Tate (Mike Retford, Joyce Malloy) Tel: (210) 533-1231 Email: jtate@southernfolger.com	08/15	01/16	08/16
Standard Test Methods for Bar and Wire Mesh Vision Systems Used in Detention and Correctional Facilities (Priority 4)	T. Peterson Tel: (714) 288-1770 Email: tpeterson@petersondetention.com	08/15	01/16	08/16

FIG. 15

(Continued)

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015 **#2**

Standard	Project Chair	Target Completion Date First Draft	Target Completion Date Sub-Com. Ballot	Target Completion Date Main Comm. & Society Ballot
Standard Test Methods for Access Doors and Panels used in Detention and Correctional Facilities (Priority 5)	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	08/15	01/16	08/16
Standard Guide for the Specification of Stainless Hollow Metal Steel Doors and Windows for Detention and Correctional Facilities (Priority 6)	J. Stapleton Tel: (706) 778-2212 Ext. 202 Fax: (706) 778-2769 Email: jas@habershammetal.com	08/15	01/16	08/16
Standard Test Method for Light Fixtures	Joe Chavez PDI Tel: (714) 288-1770x29 Email: jchavez@pdidet.com	01/15	08/15	01/16
Standard Specification for Pivoted Detention Windows	J. Gallagher Tel: (514) 457-6650 Fax: (514) 457-4302 Email: johnjosephgallagher@comcast.net	Complete	TBD	TBD
Standard Test Method for Structural Performance of Ventilators in an Operable Steel Detention Top Pivoted Awning Window	J. Gallagher Tel: (514) 457-6650 Fax: (514) 457-4302 Email: johnjosephgallagher@comcast.net	TBD	TBD	TBD
Standard Cycling Test for Operational Components of Detention Windows	J. Gallagher Tel: (514) 457-6650 Fax: (514) 457-4302 Email: johnjosephgallagher@comcast.net	Complete	TBD	TBD

(Continued)

FIG. 15

(Continued)

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015 **#3**

Standard	**Project Chair**	**Target Completion Date First Draft**	**Target Completion Date Sub-Com. Ballot**	**Target Completion Date Main Comm. & Society Ballot**
Standard Guide for Selection of Security Fasteners for Detention & Correctional Facilities Work Item Number: WK43304	Gregg Williams Tel: (602) 386-7265 Email: gwilliams@dlrgroup.com	Complete	08/15	01/16
Standard Specification for Sally Port Gate Operators	M. Nardini Tel: (800) 328-4283 Fax (518) 692-9930 Email: mnardini@tymetal.com	TBD	TBD	TBD
F 1916-98 Standard Specification for Selecting Chain Link Barrier Systems with Coated Chain Link Fence Fabric and Round Posts for Detention Applications. Five (5) Year Review	M. Nardini Tel: (800) 328-4283 Fax (518) 692-9930 Email: mnardini@tymetal.com	Complete	Complete	TBD
Partial Rewrite of (F1916-98) Standard Specifications for Selecting Chain Link Barrier Systems with Coated Chain Link Fence Fabric and Round Posts for Detention Applications	M. Nardini Tel: (800) 328-4283 Fax (518) 692-9930 Email: mnardini@tymetal.com	Complete	Complete	TBD
Standard Specification for Selecting Welded Wire Mesh Fence Systems for Detention Applications	M. Nardini Tel: (800) 328-4283 Fax (518) 692-9930 Email: mnardini@tymetal.com	TBD	TBD	TBD
Standard Test Methods for Glazing Used in Detention and Correctional Facilities, F1915-05. Addition of Nomenclature Section (New appendix, technical revision ongoing)	R. Trundt Tel: (706) 859-7713 Fax: (770) 516-6729 Email: rtrundt@A0L.com	Complete	08/14	01/15
A627-03, Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities Five (5) year Review. Ballot for re-approval with no changes.	C. Draca Tel: (514) 457-6650 Fax: (514) 457-4302 Email: cdraca@cmsecurity.com	Complete	Complete	Complete **A627-03 (2011)**

FIG. 15

(*Continued*)

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015 **#4**

Standard	**Project Chair**	**Target Completion Date First Draft**	**Target Completion Date Sub-Com. Ballot**	**Target Completion Date Main Comm. & Society Ballot**
F33.04 Detention Hardware Standard Test Method for Detention Locks for Swinging Doors: Review for technical revisions and testing clarifications.	Joe Tate Tel: (210) 533-1231 Email: jtate@southernfolger.com	TBD	TBD	TBD **F1577-05 (2012)**
Standard Test Methods for Detention Sliding Door Locking Device Assembly	Joe Tate Tel: (210) 533-1231 Email: jtate@southernfolger.com			**F1643-05 (2012)**
Standard Test Method for Detention Hinges used on Detention Grade Swinging Doors	Joe Tate Tel: (210) 533-1231 Email: jtate@southernfolger.com			**F1758-05 (2012)**
Standard Test Methods for Physical Assault on Ventilation Grilles for Detention and Correctional Facilities.	Joe Chavez Argyle Security Tel: (909) 714-8015 Email: jchavez@arglesecurity.com			**F2542-05 (2012)**

(*Continued*)

FIG. 15

(Continued)

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015

#5

Standard	**Project Chair**	**Target Completion Date First Draft**	**Target Completion Date Sub-Com. Ballot**	**Target Completion Date Main Comm. & Society Ballot**
F33.05 Furnishing & Equipment Standard Test Method for Determining Changes in Fire-Test-Response Characteristic of Cushioning Materials after Water Leaching,	C. Ogburn Tel: (724) 537-9000 Fax: (724) 537-9003 Email: cogburn@chestnutridgefoam.com	Complete	Complete	Complete **F1534-10**
Standard Guide for Selection of Fire Test Methods for the Assessment of Upholstered Furnishings in Detention and Correctional Facilities	M. Hirschler Tel: (415) 388-8278 Fax: (415) 388-5546 Email: gbhint@aol.com	Complete	Complete	Complete **F1870-11**
Standard Test Method for Determination of Fire-Test Response Characteristics of Components of Composites of Mattresses or Furniture for Use In Detention and Correctional Facilities after Exposure To Vandalism by Employing a Bench Scale Oxygen Consumption Calorimeter	C. Ogburn Tel: (724) 537-9000 Fax: (724) 537-9003 Email: cogburn@chestnutridgefoam.com	Complete	Complete	Complete **F1550-10**
Standard Test Methods for Cantilevered Steel Bunks used in Detention and Correctional Facilities	C. Ogburn Tel: (724) 537-9000 Fax: (724) 537-9003 Email: cogburn@chestnutridgefoam.com	Complete	Complete	08/15
Specification for Screening Purposes for Assessment of Flammability of Mattresses in Detention and Correctional Facilities	M. Hirschler Tel: (415) 388-8278 Fax: (415) 388-5546 Email: gbhint@aol.com	Complete	TBD	TBD

FIG. 15

(*Continued*)

ASTM F33
Long Range Plan for Standards Development
Revised – August 2015

#6

Standard	**Project Chair**	**Target Completion Date First Draft**	**Target Completion Date Sub-Com. Ballot**	**Target Completion Date Main Comm. & Society Ballot**
F33.06 Operational Controls: Standard Guide for Selection of Security Control Systems 1465-03 Revision	Jennie Mann jenrenmann@gmail.com	01/15	08/15	01/16
Standard Guide for the Selection of Digital Video Recording (DVR) and Network Video Recording (NVR) Systems	Jennie Mann jenrenmann@gmail.com	01/15	08/15	01/16
Standard Guide for Video Visitation Systems	Joe Chavez, PDI Tel: (714) 288-1770x29 Email: jchavez@pdidet.com	01/15	08/15	01/16
F33.06.10, Task Group on Electrified Fences	Mike Retford, HOK Tel: (415) 356-8558 Email: mike.retford@hok.com	TBD	TBD	TBD

the final stage of the test to determine if the wall design is robust enough to stay intact and not collapse during firefighting activities. Also, wall designs are tested and rated during the duration of the fire test as non-load-bearing (such as partition walls) or load-bearing (which are tested and rated while supporting either a percentage of their design load capacity or a designated load).

Another factor that must be considered is the new ceiling/floor steel panel designs that are tested to the security standard ASTM **F2697** and are tested and rated in accordance with the fire-resistance standards ASTM **E119**/UL 263 for horizontal fire-resistant barriers under the same protocol as the vertical wall tests and under either non-load-bearing or load-bearing conditions.

Finally, according to NFPA 5000 and NFPA 101, the vitally important connections among wall to floor, wall to wall, and head of wall (ceiling/structural floor overhead) must meet the fire-resistance standards ASTM **E1966**, *Standard Test Method for Fire-Resistive Joint Systems*, or the UL equivalent, ANSI/UL 2079, *Standard for Tests for Fire Resistance of Building Joint Systems*; otherwise, the completed construction combining walls and corresponding floors or ceilings would not be fire-resistant. The reason being that if a fire starts on one side of a fire-resistant wall and combustibles are stacked up against or on shelves or on the other side of the wall, and there are not fire-resistant joints at the floor and ceiling, upper floor, or roof, heat transfer through the non-fire-resistant joint could cause these materials to catch fire, thereby allowing the fire to spread from one occupancy space to the next. These connections must be listed in the certifying laboratory's building materials' directories under the classifications for "Fire-Resistive Joint Systems"; in the case of UL, that product classification is XHBN, and for Intertek, that classification is "fire stop systems." These design concepts are a lot to consider in overall facility design, but the benefits from diligent research into the systems that manufacturers and installers have to offer are definitely worth the effort.

Testing Laboratory Accreditation and Product Certification

It is very important that, in today's world, a testing laboratory be judged as competent. There is ongoing discussion within the committee on this topic and, as of this writing, guidelines are currently under development. A technically valid view is that laboratories—at least those that certify testing equipment—should be accredited to ISO/International Electrotechnical Commission (IEC) Standard 17025-2005 by an external accreditation body that is a full signatory member of an internationally recognized multilateral recognition arrangement (MRA). A testing lab (TL) obtains its accreditation specific only to the tests that it can perform competently, as judged through actual audits performed by the accreditation body (AB). The competence of the AB in turn is established by the peer review audits it passes. Passing such audits is a mandatory part of being a full signatory member of an MRA administered by International Laboratory Accreditation Cooperation (ILAC, **www.ilac.org**).

All the excellent work done by ASTM F33 and by ASTM in general would not be fruitful unless the tests were performed with honesty and competence. Over the past 50 years, in the United States and many other countries, a well-established product certification system has been in place. After initially passing the tests, manufacturers enter into binding contracts with independent third parties, product certification agencies (PCAs) that are independent of them or any other manufacturer. The competence of a PCA is established through its accreditation to ISO/IEC Standard 17065-2012 by an external AB that is a full signatory member of an internationally recognized MRA, administered by the International Accreditation Forum. The accredited PCA makes sure that its certification labels are applied only on the products that, through an accredited inspection/surveillance scheme, have been verified to have the same design, construction, and manufacture as those that passed the initial qualifying tests resulting in the initial certification. The competence and integrity of the inspection body (IB) is verified by accreditation to ISO/IEC 17020-2012 by an external AB that is a full signatory member of an internationally recognized MRA (ILAC-MRA).

Having this knowledge, an architect or a maintenance professional can verify if a detention security product was acceptable by checking the certification label provided by an accredited PCA, who provides this only on the basis of verification by an accredited IB and on the basis of testing by an accredited TL. This reduces the burden on design and maintenance professionals. It also eliminates the need for retesting due to minor technical revisions of test standards. Retesting decisions are reached by the PCA in consultation with the manufacturer, reducing again the burden on design professionals.

Such a process also makes the manufacturers' certified products eligible for worldwide sales because the certification, related inspections, and tests are accepted worldwide.

ASTM, as an internationally respected standards development body, has taken the lead in distribution of ISO/IEC Standard 17025, ISO/IEC Standard 17020, and ISO/IEC Standard 17065.

Conclusion

The industry has experienced stability and confidence in product and system performance through the use of tried and true ASTM standards. These standards have been widely used in project specifications, and good track records for their use and for these products and systems have been established. All of these standards are continually maintained and expanded to meet growing needs. At the same time, subcommittees are working to keep up with mandatory standards reviews. Methodology and equipment are constantly being developed for new test methods. The future is filled with opportunities for continuous improvement and innovation in the world of detention and correctional facility designs for better security, and ASTM is leading the way. Much like the companies and professional practices in the industry, ASTM F33 recognizes that its greatest asset is the participation of industry professionals, and this participation and input is always welcome and appreciated.

On a personal note, in 1968, I had a professor for one of my calculus courses at Georgia Tech—in fact my seventh and last course, "Differential Equations." This was a difficult course, but this professor made it interesting and not so painful. The professor was a recent immigrant from Eastern Europe and had a heavy regional accent. During one class, he digressed somewhat as professors do in order to hold class attention; he pointed his finger at us and said, "One day…you will be professionals!" Looking at our class of 19- and 20-year-old college students, you can imagine that this was a pretty bold statement given the dress, the hair, and so on.

He paced back and forth and continued, "And as professionals…you must give back! You must give back to your profession! You must do voluntary research, and you must write in your trade journals! You must give back to your profession and to your country! You have a wonderful country here!" (Amen!) This was a statement that was unfortunately not very popular in those days in light of Vietnam and other troubles, but he was an enthusiastic and vocal supporter of our country nonetheless—an appreciation probably based upon his past life in Eastern Europe. That professor made quite an impact on me and on many other students, and I have always tried to live up to his challenge.

But finally and most importantly, when I first joined ASTM in 1980, I immediately encountered men and women who themselves were living out this same creed. In Committee F33 and its iterations prior to full committee status, later along with Committee F12 and Committee E54, I have had the privilege of working alongside members, assisted by excellent staff, who put forth their best and volunteered to do a lot of work and spend a lot of hours solely for the betterment of their professions and their industries, and I have always deeply appreciated the opportunity to work with them.

This is a word of sincere appreciation, and this book is a tribute, to all of those men and women who truly and continually give back to their professions and to their country.

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Abstract

The early work of the committee on detention and correctional facilities, ASTM F33, during the 1970s and early 1980s, was focused primarily on two main areas. One was the maintenance of the two published standards for tool resistant bar and plate, ASTM **A627** and **A629**, both of which were under the task group's jurisdiction (A01.02.03). The other was the development of specifications for detention doors, frames, hardware, and glazing.

At that time, there was much discussion in committee meetings regarding the details of the specifications and the methods that should be used to perform simulated service testing. The group finally agreed to focus on the test methods. After that decision, there was rapid progress toward development of the first simulated service test method for full-scale door, frame, hardware, and glazing assemblies, fully operational and installed in test walls as they would be in actual detention and correctional facilities.

The first of these test methods, ASTM **F1450**, "*Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities*," was published in 1991. By that time, the task group had grown in participation and had progressed through being re-organized into a subcommittee under A01, A01.16, and then in 1989 into a full committee, the "Committee on Detention and Correctional Facilities," F33.

Since the startup of F33, other standards were developed and publications followed in rapid succession. F33 has published and maintained 15 standards that address everything from test methods of opening assemblies to selection guides for security controls to fire testing of cushioning material for bunks. Also, there are 16 more topics for potential standards development listed on the committee Long Range Plan, six of which are already in draft format and prioritized for balloting.

The objective of the committee as stated in the foreword of the compilation entitled, "*ASTM Standards Detention and Correctional Facilities, 2nd Edition*," published in 2006, is the promotion of knowledge and the development of standards for materials, products, assemblies, and systems used in the construction or renovation and operation of detention and correctional facilities for adults and juveniles. This book will explore many of the details of the test methods and guide standards, along with guidance for their use, as well as commentary on the plans for future standards development projects, and thereby, will provide valuable assistance to industry practitioners and progress toward the advancement of this stated committee objective.

Keywords

security, homeland security, forced entry, bullet resistance, detention security, detention facilities, correctional facilities, fire resistance

Author Biography

James (Jimmy) A. Stapleton, Jr., is a bachelor of mechanical engineering graduate from the Georgia Institute of Technology and is a Georgia registered professional mechanical engineer. He serves as chairman and CEO of Habersham Metal Products Company, Inc., a manufacturer of detention and commercial security doors, frames, vision systems, and related products. Habersham has been an industry leader in the detention and correctional products and systems field since the mid-1970s and is currently one of the leaders in the manufacture of forced-entry, ballistics, and blast-resistant doors, frames, vision systems, roof hatches, and related products, having developed that product line since the early 1990s.

Stapleton has been involved in ASTM since 1980, when he became a member of the task group on detention products and systems under A01 and helped to develop that task group into a subcommittee under A01, which grew into a full main committee, F33, in 1989. He currently serves as chairman of F33 task groups on security hollow metal and fixed barriers; chairman of F33.02 subcommittee on Physical Barriers; chairman of the F33 Technical Subcommittees Track; and is a past chairman of F33. Stapleton has written several articles over the years on the specification and testing of various detention and corrections products and systems as well as the latest developments in F33 related to the corrections industry. He was awarded the Award of Merit by F33 in 2011.

Stapleton is a member of F12.10 on Systems Products and Services, a subcommittee under F12 on Security Systems and Equipment, and E54 on Homeland Security Applications. He is currently a member-at-large on the E54 Executive Subcommittee, and serves as chairman of the Task Group on Building Exteriors under the E54.05 subcommittee on Building and Infrastructure Protection.