

# A Break from Tradition: The “New” 14 C.F.R. Part 23 and Consensus Standards

Jack A. Griffin<sup>1</sup> and Timothy T. Takahashi<sup>2</sup>  
*Arizona State University, Tempe, AZ 85287*

**This paper is a commentary on the state of the recently revised airworthiness standards for small, “general aviation” aircraft. When the FAA amended 14 C.F.R. § 23 in 2016, they introduced a substantial break in tradition regarding American Federal Aviation Law. This paper recounts the history of administrative law from Roman times forward, particularly in terms of how American Aviation Law came into existence in the first place. This paper discusses possible legal vulnerabilities of the 2016 14 C.F.R. § 23 revision. It concludes with a moral and ethical commentary on the long term effects of these revisions.**

## I. Introduction

**A**VIATION LAW, like so much of our legal framework builds upon our tradition of Roman law, Napoleonic Codes, and British “Common Law.” We must never forget the historical legacy that brought us to our current state.

In this paper, we document the history behind the certification requirements of small aircraft in the United States. We then introduce recent changes made specifically 14 C.F.R. § 23. [1] We highlight the break in tradition that occurred in US aviation law (and law as a whole) resultant of this substantial change in compliance requirements. To do this, we first recount the history that led to the 2016 14 C.F.R. § 23 revision. Secondly, we argue the legality of the changes. Then, we comment on the morality and possible long term effects of the revisions.

## II. The Role of Administrative Law in the Modern Regulatory State

The American political system is based on the concept of a separation of powers between the executive, the legislature, and the judiciary. In the 47<sup>th</sup> Federalist Paper, James Madison argued that “the accumulation of all powers, legislative, executive, and judiciary, in the same hands, whether of one, a few, or many, and whether hereditary, self-appointed, or elective, may justly be pronounced the very definition of tyranny.” [2] Moreover, he agreed with Montesquieu that there “can be no liberty where the legislative and executive powers are united in the same person, or body of magistrates.” [2] Thus, to enshrine liberty the political system must ensure a dynamic tension – where the executive, legislature and judiciary have limited control over the acts of one another. If the whole power of a department were to be exercised by the “same hands” who control another department, such an act would subvert the fundamental principles of a free constitution.

Hamilton, in the 70<sup>th</sup> Federalist paper, equally noted that powers of the executive would quickly overwhelm any one soul. While “Energy in the Executive is a leading character in the definition of good government, ... every man the least conversant in Roman story, knows how often that republic was obliged to take refuge in the absolute power of a single man, under the formidable title of Dictator, as well against the intrigues of ambitious individuals who aspired to the tyranny.” [3] He realized that the essential characteristics of the Executive were unity, duration, and competency. [3] Unity, paradoxically, “may be destroyed in two ways: either by vesting the power in two or more magistrates of equal dignity and authority; or by vesting it ostensibly in one man, subject, in whole or in part, to the control and co-operation of others, in the capacity of counsellors to him.” [3] Thus, while the executive must delegate power to subordinate consuls, the President (as the Chief Executive) must remain in control of the whole administrative state all the while maintaining the separation of powers.

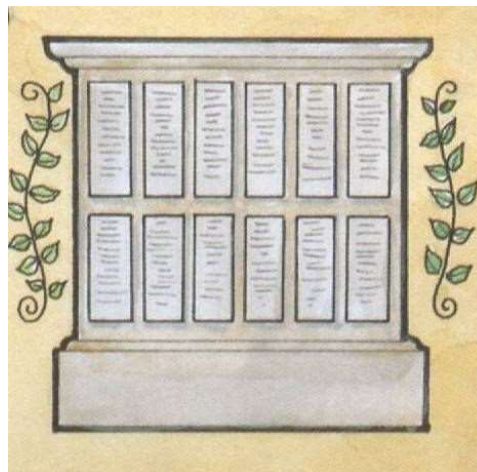
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<sup>1</sup> M.S. Candidate, Aerospace Engineering, School for Engineering of Matter, Transport & Energy, P.O. Box 876106, Tempe, AZ, 85281, Student Member AIAA

<sup>2</sup> Professor of Practice, Aerospace Engineering, Arizona State University, P.O. Box 876106, Tempe, AZ. Associate Fellow AIAA.

Thus, we see the true meaning of the descriptor “government agency.” The “agency” acts as an “agent” to the President who serves as the Chief Executive. Thus, regarding aviation, the President, himself, does not directly regulate engineers, pilots, and mechanics, even though the laws promulgated and enforced by the Federal Aviation Administration are done so in his name. This is because agency directors have devolved powers traceable directly to the president.

This modern regulatory state is a byproduct of the Roosevelt administration. Chief Justice Charles Evans Hughes (1862-1948) wrote that the “distinctive development of our era ... [is] ... that the activities of the people are largely controlled by government bureaus in State and Nation.” [4] In 1935, Felix Frankfurter (1882-1965), later to be an associate justice of the U.S. Supreme Court (1939-1962), wrote that “we are in the midst of a process ... adjusting the play of these powers (i.e., governmental agency regulation) to the traditional system of Anglo-American law and courts.” [4] Yet the modern regulatory state has its foundations in the ancient world; one of the fundamental ideas of law still practiced today stems from the Law of the Twelve Tables [5] in which, in order to prevent arbitrary treatment, the laws that govern the land would be written and made available to **all** those who are subject to them; see FIGURE 1.



**FIGURE 1 Law of the Twelve Tables**

An agency like the FAA, partakes in Rulemaking, Adjudication, and Investigation. [6] In some sense, it acts as a “fourth branch” of government. As Madison wrote in the 48<sup>th</sup> Federalist Paper: “the powers properly belonging to one of the departments ought not to be directly and completely administered by either of the other departments.” [7] He continues finding it evident “that none of them ought to possess, directly or indirectly, an overruling influence over the others, in the administration of their respective powers.” [7]

In line with Madison, writing in the 47<sup>th</sup> Federalist Paper, the need for agency “transparency” is essential to prevent tyranny arising from excessive consolidation of power (either private or publicly visible). [2] The Federal Records Act of 1935 (Pub. L. 74-220, July 26, 1935) addressed a valid critique of the Roosevelt administration; the fact that “even individuals working at the highest levels of government found it difficult or impossible to keep track of” burgeoning agency regulations. [8] It became abundantly clear to the “regulated public, this new body of ‘executive legislation’ was inaccessible and virtually hidden.” [9] This was demonstrated in the humiliating and influential 1935 case *Panama Refining Co. v. Ryan* [10] where the Supreme Court forced the creation of the Federal Register to ensure that the Federal Government publicly posted **all** Executive office derived changes to Federal Law. [11]

As a byproduct of the Federal Records Act of 1935, the U.S. Federal Government began printing the Federal Register, a daily gazette including 1) Presidential proclamations and Executive orders; 2) other documents the President determined to have general applicability and legal effect; 3) all documents required to be published by Act of Congress; and 4) documents authorized to be published by regulations. [9] This act was quickly followed by an amendment (Pub. L. 75-158, 1937) which authorized the publication of the Code of Federal Regulations – a compendium of all active Federal Agency rules and regulations spread across fifty subject areas (called Titles); Title 14 comprises regulations relevant to Aviation, Aeronautics and Space. [12] Thus, beginning in 1938, the complete regulatory burden for aircraft design, certification, operation, repair and maintenance has been available to the general public as well as to the expert. Today, the C.F.R. is available on-line at no charge at [www.ecfr.gov](http://www.ecfr.gov). [13]

Presently, the activities of all federal agencies are controlled by the Administrative Procedures Act (APA). [14] The APA has “four basic goals: greater transparency in government agencies; public participation in administrative rule making; uniformity of adjudicative processes between different agencies; and the availability of judicial review of administrative rulings”. [15] This act created a coherent policy in how government agencies where to act. Thus, Aviation Law in form, function and adjudication is not unlike other agency law (i.e. Environmental, Pharmaceutical or Telecommunications). In line with Madison in the 47<sup>th</sup> Federalist Paper, the need for agency “transparency” is essential to prevent tyranny arising from excessive consolidation of power (either private or publicly visible).

The traditional concept of “agency” holds that “one who has a bare power of authority from another to do an act must execute it himself and cannot delegate his authority to another; for this being a trust or confidence reposed in him personally, it cannot be assigned to a stranger.” [16] Thus, we see enshrined in agency law the personification of “The Administrator.” For example, under 14 C.F.R. § 183.1 the law states that individuals and organizations may function as representatives of The Administrator to examine, inspect and/or test persons and aircraft expressly “for the purpose of issuing airman, operating, and aircraft certificates” [17] These carefully vetted representatives are given this privilege for limited periods of time. [18] [19] This is all consistent with traditional concepts of Agency. Kent’s Commentaries, a legal treatise from 1827, holds that “an agent ordinarily, and with express authority, has **no power to employ a sub-agent** to do the business, without the knowledge or consent of his principal.” [20]

One of the key elements the APA introduced was the concept of Notice-and-Comment. [14] [21] In order to amend the regulations found in the C.F.R., agencies must make public notice of proposed rule changes and provide time for interested parties to be able to reply with comments, suggestions, and concerns. The additional concept of judicial review allows for interested parties to challenge proposed rulemaking to prevent agencies from overstepping their bounds. Judicial review has been used to successfully invalidate agency rules made for “arbitrary and capricious” reasons (example restoring the grizzly bear to the Endangered Species List after they were summarily dropped, [22]) [23]; see FIGURE 2.

The need for transparency, to prevent agency capture by external interests goes beyond Notice-and-Comment. In 1976, Congress passed the Government in the Sunshine Act (Pub. L. 94-409), which stated that when an agency holds a meeting it must be reported on to the public at large, but with few exceptions (i.e., designated “classified” for reason of national defense or foreign policy, involving trade secrets or discussions involving suspected criminal action). [24] This law requires all agency meetings to be publicly announced (at least one week before the meeting, of the time, place, and subject matter of the meeting, whether it is to be open or closed to the public, and the name and phone number of the official designated by the agency to respond to requests for information about the meeting) all to enable public scrutiny of any contemplated agency action or regulatory change.

We will see, over the rest of the paper, how the actions of the FAA fit into traditional framework of an executive branch agency. We will also see how recent actions mandated by the legislature, undertaken by the FAA undo the safeguards deemed essential by Madison.

### III. Historical Context of American Aviation Law

To understand where we are today, we must recount the beginning of Federal Aviation Law in the United States. The Federal tradition began with the passing of the Air Commerce Act of 1926. [25] This Act, placing the burden of regulation under the Department of Commerce required aircraft “to undergo routine inspections and receive an airworthiness rating.”[15] As the years passed much of the initial prescriptive requirements that can be found in the modern 14 C.F.R. started to take form.

Unfortunately, as previously mentioned, much of the legislation made by the Secretary of Commerce at the time was not easily available for study; executive branch agencies, if they were to post regulations, tended to publish law in a variety of locations and forms. [26] In our research, we found a few documents relating to aircraft design and operations dating from this time. These pamphlets, published by the Department of Commerce – Aeronautics Branch foreshadow modern regulations on a multitude of topics including 1) licensing, 2) inspection and 3) operation of aircraft; 4) licensing of pilots; 5) licensing of mechanics and 6) air traffic rules; see FIGURE 3 (overleaf). [27] A second pamphlet concerns itself with Airworthiness Requirements for the design of Aircraft; see FIGURE 4 (overleaf). [28]

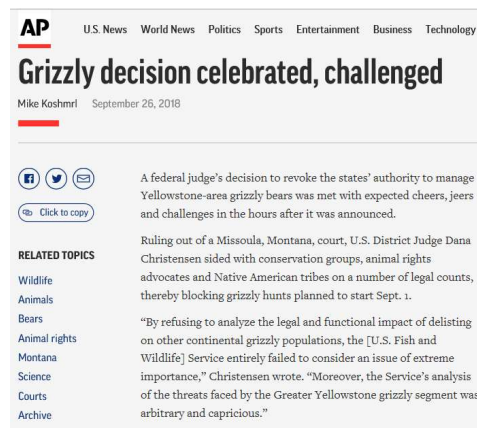


FIGURE 2 - Arbitrary & Capricious Agency Rulemaking Judged Illegal

Airworthiness Requirements from 1933, predating the modern C.F.R., are, although dated, modern in the sense that they describe rules in a prescriptive way through engineering standards. Over 35 pages, they discuss the need for engineering to work with government to formalize a “type certificate” for any series produced design. The approved design must conform to fairly precise technical standards, for example for structural design they stipulate specific formulas to estimate loads.

“A stress analysis covering an investigation of the strength of the primary members of the wings, fuselage, landing gear, control surfaces, engine mount and/or nacelles, and control systems, and of fittings connecting parts of the primary structure for the conditions and load factors ... shall be submitted. The analysis of secondary members carrying heavy loads and the investigation of main members subjected to eccentric loads is required. The stress analysis shall state ... the material used for each member or group of members, whether or not it is heat treated, and what physical properties are guaranteed not assumed, by the manufacturer. The stress analysis shall also include a table indicating the margins of safety of all members.” [28]

It is important to note how mature this regulation is.

If we turn next to the initial edition of the C.F.R., Title 14 C.F.R. 4 from 1938, we find 64 pages of regulations covering the design of an airworthy aircraft. [29] We can see the regulation in essentially similar form, but containing considerably more detail as established safety-factors are now called out in various tables; see FIGURE 6, overleaf.

**04.2 Structural loading conditions.**

**04.20 General structural requirements.**

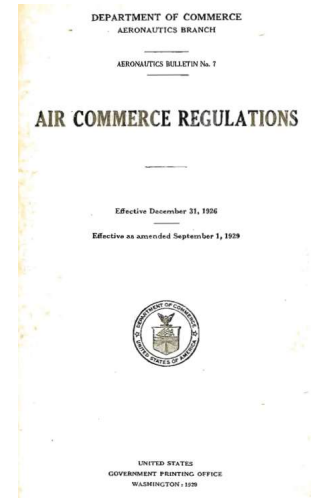
**04.200 Strength.** The primary structure shall be capable of supporting the ultimate loads determined by the loading conditions and ultimate factors of safety hereinafter specified, the loads being properly distributed and applied..

**04.27 Multiplying factors of safety.**

**04.270 General.** In addition to the minimum factors of safety specified for each loading condition, the multiplying factors specified in Table 04-7 and the following paragraphs shall be incorporated in the structure. The total factor of safety required for any structural component or part equals the minimum factor of safety specified for the loading condition in question multiplied by the factors of safety hereinafter specified, except that certain multiplying factors may be included in others, as indicated in Table 04-7.

**04.271 Fittings.** All fittings in the primary structure shall incorporate the multiplying factor of safety specified in Table 04-7. For this purpose fittings are defined as parts used to connect one primary member to another and shall include the bearing of those parts on the members thus connected. Continuous joints in metal plating and welded joints between primary structural members are not classified as fittings.

**04.272 Castings.** All castings used in the primary structure shall incorporate a multiplying factor of safety not less than that specified in Table 04-7.” [29]



**FIGURE 3 - Air Commerce Regulations (Bulletin 7) from 1929**



**FIGURE 4 - Airworthiness Regulations (Bulletin 7A) from 1933**

**TITLE 14—CIVIL AVIATION**  
**CHAPTER I—BUREAU OF AIR COMMERCE**  
**DEPARTMENT OF COMMERCE**

Part	Part
00 Aircraft registration certificate	50 Flying school rating
01 Aircraft certificates	52 Aircraft repair station rating
02 Aircraft identification mark	60 Air traffic rules
03 Aircraft title transfer	62 Rules and order rules (Interstate)
04 Aircraft airworthiness	65 Air mail
11 Aircraft engine airworthiness	71 Aircraft accident investigations
12 Aircraft equipment airworthiness	75 Hearings upon certificates (General, renewal, denied, suspended or revoked)
14 Aircraft operator airworthiness	80 Penalties
15 Aircraft alteration of aircraft	85 Licenses
20 Pilot rating	90 Inspection, suspension and withdrawal of penalties
21 Airline pilot rating	95 Penalties
22 Ground instructor rating	98 Inspection, suspension and withdrawal of penalties
23 Mechanic rating	99 Authority to act for the Secretary
24 Aircraft repair station rating	99 Penalties
25 Aircraft mechanic operator rating	99 Penalties
27 Airline dispatcher rating	99 Penalties
40 Scheduled service certificate (inter-state and intra-territorial)	99 Penalties

**CROSS REFERENCES**  
Aircraft and aviation services: See Table of Contents, of CFR Part 6.  
Aircraft navigation: See Transportation, of CFR Parts 100, 102.  
Air mail: See Post Office Department, of CFR Part 1.  
Air traffic: See Public Lands, of CFR Part 21.  
Application of customs laws, airports of entry: See Customs Duties, 19 CFR, 115, 116, 117.  
Application of laws: See Army: War Department, 16 CFR Part 25.  
Application of laws: See Navy: Navy Department, 16 CFR Part 25.  
Application of laws: See Post Office Department, 39 CFR Chapter 1.  
Application of laws: See War Department: War Department, 16 CFR Part 25.  
Application of laws: See War Department: War Department, 16 CFR Part 25.  
Application of laws: See War Department: War Department, 16 CFR Part 25.

**SUPPLEMENTAL PUBLICATIONS**  
Aircraft equipment airworthiness, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 11)  
Air traffic rules, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 12)  
Aircraft certificates, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 13)  
Aircraft identification mark, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 14)  
Aircraft title transfer, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 15)  
Aircraft airworthiness, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 16)  
Aircraft engine airworthiness, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 17)  
Aircraft equipment airworthiness, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 18)  
Aircraft operator airworthiness, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 19)  
Aircraft alteration of aircraft, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 20)  
Pilot rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 21)  
Airline pilot rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 22)  
Ground instructor rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 23)  
Mechanic rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 24)  
Aircraft repair station rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 25)  
Aircraft mechanic operator rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 26)  
Airline dispatcher rating, Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 27)  
Scheduled service certificate (inter-state and intra-territorial), Bureau of Air Commerce, Department of Commerce, July 1, 1929. (ACM 28)

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1931

**FIGURE 5 - 1938 C.F.R. for Aviation**

**TABLE 04-7.—Additional (Multiplying) Factors of Safety**

(See § 04.27)

Item	Component	Reference Part 04	Additional Yield Factor of Safety, $J_y$	Additional Ultimate Factor of Safety, $J_u$	May be Covered by Item No.
1.	Fittings (except control system fittings)	.271	None	1.20	2, 4, 5, 6, 7, 8, 9
2.	Castings	.272	None	2.00	7, 8
3.	Parallel double wires in wing lift truss	.273	None	1.05	4
4.	Wires at small angles	.274	None	See Ref.	
5.	Double drag truss wires	.275	None	See Ref.	
6.	Torque tubes used as hinges	.276	None	1.5	
7.	Control surface hinges <sup>(1)</sup>	.277	None	6.67	
8.	Control system joints <sup>(1)</sup>	.277	None	3.33	
9.	Wire sizes	.278	None	See Ref.	

<sup>(1)</sup> For bearing stresses only.

**FIGURE 6 – Supplemental Factors of Safety from 14 C.F.R. 4 (1938). [29]**

Unlike later regulations, this edition of the C.F.R. calls out the ultimate load factors on a part by part basis. In common with modern regulations, the ultimate design load is typically 1.5 times the limit load, the maximum load expected to be seen during flight.

While aviation regulations remain codified in Title 14 since 1938, the sections have been re-numbered and re-categorized on numerous occasions as the power to regulate aviation changed hands between different Federal Agencies. As we saw, initial regulations were promulgated under the Department of Commerce. In 1938, the Civil Aeronautics Act transferred federal responsibilities for non-military aviation from the Bureau of Air Commerce to a new, independent agency, the Civil Aeronautics Authority. [30] Following the Federal Aviation Act of 1958, this role transitioned to the Federal Aviation Administration. [31] Not too long after that, the FAA was put under the Department of Transportation. [32] From there forwards, the administrative role surrounding aircraft certification settled down.

In 1952, the broader 14 C.F.R. § 4 divided into three categories. 14 C.F.R. § 3 became the repository for Airplane Airworthiness standards for smaller Normal, Utility and Acrobatic aircraft [33] and 14 C.F.R. § 4b became the repository for Airplane Airworthiness standards for larger Transport Category aircraft. [34] The 1952 C.F.R. § 4a became a placeholder for airworthiness standards for modifications of older aircraft designs. [35] The 1952 C.F.R. § 3 comprises 70 pages of regulations; that 1938 standard for primary structure now reads:

**“§ 3.172 Factor of safety.** The factor of safety shall be 1.5 unless otherwise specified.

§ 3.174-6 Material correction factors, fitting factors, and other factors; their effect on test loads -(a) Use of factors to establish design and test loads. This part specifies certain factors which must be taken into account in establishing design and test loads for structural components. ... In all cases of ultimate load testing the factor of safety of 1.50 should be included in the test load. (c) Material correction factors. (d) Fitting factor. The additional multiplying factor of safety of 1.15 specified in § 3.306 need not be included in test loads in which the actual stress conditions are simulated in the fitting and the surrounding structure. Also, these factors are considered to be included in and covered by the other special factors specified in § 3.302. (e) Casting factors. Casting factors should be included in all tests in the substantiation of castings. (f) Hinge and bearing factors. Hinge and bearing factors specified shall be included in tests unless the appropriate portions of the parts are substantiated otherwise.”

In other words, we see a more detailed and further expanded version covering the advances in technology and engineering practice seen between 1938 and 1952.

The more modern general aviation design regulation code, 14 C.F.R. § 23 [36] originated in 1965 being the descendant of 14 C.F.R. 3 (1952) [33] which grew out of the earlier 14 C.F.R. 4 (1938) [29]. It underwent the normal changes that we would expect as technology progresses, but nothing completely upending the framework. The penultimate “classic” edition of 14 C.F.R. § 23 (from 2016) was 191 pages long [37] and had the following versions of the structural design safety factor regulation shown above:

**§ 23.303 Factor of safety.** Unless otherwise provided, a factor of safety of 1.5 must be used.

**§ 23.619 Special factors.** The factor of safety prescribed in §23.303 must be multiplied by the highest pertinent special factors of safety prescribed in §§23.621 through 23.625 for each part of the structure whose strength is (a) Uncertain; (b) Likely to deteriorate in service before normal replacement; or (c) Subject to appreciable variability because of uncertainties in manufacturing processes or inspection methods.

**§ 23.621 Casting factors.** ... Critical castings. For each casting whose failure would preclude continued safe flight and landing of the airplane or result in serious injury to occupants, the following apply: (1) Each critical casting must either (i) Have a casting factor of not less than 1.25 and receive 100 percent inspection by visual, radiographic, and either magnetic particle, penetrant or other approved equivalent non-destructive inspection method; or (ii) Have a casting factor of not less than 2.0 and receive 100 percent visual inspection and 100 percent approved non-destructive inspection.

**§ 23.623 Bearing factors.** (a) Each part that has clearance (free fit), and that is subject to pounding or vibration, must have a bearing factor large enough to provide for the effects of normal relative motion. ....

**§ 23.625 Fitting factors.** For each fitting (a part or terminal used to join one structural member to another), the following apply: (a) For each fitting whose strength is not proven by limit and ultimate load tests in which actual stress conditions are simulated in the fitting and surrounding structures, a fitting factor of at least 1.15 must be applied to each part of (1) The fitting; (2) The means of attachment; and (3) The bearing on the joined members. (b) No fitting factor need be used for joint designs based on comprehensive test data (such as continuous joints in metal plating, welded joints, and scarf joints in wood). (c) For each integral fitting, the part must be treated as a fitting up to the point at which the section properties become typical of the member. (d) For each seat, berth, safety belt, and harness, its attachment to the structure must be shown, by analysis, tests, or both, to be able to withstand the inertia forces prescribed in §23.561 multiplied by a fitting factor of 1.33..” [37]

In other words, in between 1965 and 2016 we see further changes reflecting specific factors of safety to be used in critical structural design.

A 2009 Obama-era study on 14 C.F.R § 23 [38] produced a number of recommendations which spurred Congress and the FAA to take action to reorganize Part 23.

To alleviate the perceived problems within the FAA and to more precisely to “streamline programs, create efficiencies, reduce waste, and improve aviation safety and capacity, to provide stable funding for the national aviation system, and for other purposes” Congress passed and President Obama signed the Federal Aviation Modernization and Reform Act of 2012 [39]. Among the many overhauls, this Act required the FAA to consult with the aviation industry regarding aircraft certification processes.

On the heels of the 2012 Act, Congress passed and President Obama signed the Small Airplane Revitalization Act of 2013 [40]. This Act aimed to “advance the safety and continued development of small airplanes by reorganizing the certification requirements for such airplanes under Part 23 to streamline the approval of safety advancements”. [40] It did this by ordering the ‘Part 23 Reorganization Aviation Rulemaking Committee’ established in 2011 [40] to review Part 23 and Civil Air Regulations, Part 3 (CAR 3) airplanes, and then consider means for improvement. [41] The results of the committee’s findings were then implemented after going through the proper channels and public commentary. The overhaul was then published in 2016 and came into effect in 2017. [42]

Herein after the post-2016 14 C.F.R. Part 23 will be referred to as the “new” Part 23. [43]

The new Part 23 had a few new provisions; for example, adding requirements on stability and in-flight icing, but the bulk of the changes were to replace the “prescriptive requirements with performance-based standards coupled with consensus-based compliance methods”. [42] In reality this change removed most of the requirements from the C.F.R.,

now placing the burden of proof for certification on “consensus standards.” This can be seen in the page count where the old Part 23 [37] consisted of about 190 pages compared to the new Part 23 which has 20 in total [43]; a reduction in regulatory content by nearly an order of magnitude. It is important to note that the changes were specifically ordered by Congress in the Small Airplane Revitalization Act of 2013 [40].

The concept of consensus standard is paramount to arguments presented as such the exact verbiage used in [40] is included below:

“(1) CONSENSUS STANDARDS. —

(A) IN GENERAL. —The term “consensus standards” means standards developed by an organization described in subparagraph (B) that may include provisions requiring that owners of relevant intellectual property have agreed to make that intellectual property available on a non-discriminatory, royalty-free, or reasonable royalty basis to all interested persons.

(B) ORGANIZATIONS DESCRIBED. — An organization described in this subparagraph is a domestic or international organization that—

(i) plans, develops, establishes, or coordinates, through a process based on consensus and using agreed-upon procedures, voluntary standards; and

(ii) operates in a transparent manner, considers a balanced set of interests with respect to such standards, and provides for due process and an appeals process with respect to such standards.”

The purpose of these consensus standards as it pertains to Part 23 is to provide a *Means of Compliance* with Part 23. In the past there was only one way to be in compliance with the C.F.R. without requesting special exemptions, and that would be to meet the prescriptive requirements detailed in the C.F.R. directly. But given the new length of Part 23, the details must be found elsewhere. An example of how the *Proof of Compliance* would need to be shown can be seen in 14 C.F.R. § 23 from 2016 [37] below:

**“§ 23.21 Proof of compliance.**

(a) Each requirement of this subpart must be met at each appropriate combination of weight and center of gravity within the range of loading conditions for which certification is requested. This must be shown—

(1) By tests upon an airplane of the type for which certification is requested, or by calculations based on, and equal in accuracy to, the results of testing; and

(2) By systematic investigation of each probable combination of weight and center of gravity, if compliance cannot be reasonably inferred from combinations investigated.

(b) The following general tolerances are allowed during flight testing. However, greater tolerances may be allowed in particular tests:”

The new 14 C.F.R. § 23 now has a more fluid method for demonstrating *Proof of Compliance*. Compliance can be shown through a variety of methods. [44] It can be shown by following some *Consensus Standard* and by some *Method of Compliance*, think ground test or flight test. The exact way compliance is shown is dependent on company in process and is subject to being accepted by the ‘Administrator,’ the Designated Engineering Representative. [44] The exact phrasing is seen below: [43]

**§ 23.2010 Accepted means of compliance.**

(a) An applicant must comply with this part using a means of compliance, which may include consensus standards, accepted by the Administrator.

(b) An applicant requesting acceptance of a means of compliance must provide the means of compliance to the FAA in a form and manner acceptable to the Administrator.

An example of some of the accepted consensus standards can be seen in FIGURE 7, overleaf. These function as means by which an aircraft designer may show compliance. But “Applicants, individuals, or organizations also have the option to propose their own means of compliance” [45] and “Amendment 23–62 will remain a means of compliance with this final rule” [45]. So, if you are not happy with the consensus standards you may still try an alternative method of compliance and the old prescriptive Part 23, frozen in 2016, is still a valid method of compliance.

**Part 23 Accepted Means of Compliance Based on ASTM Consensus Standards**  
Effective March 11, 2022

ASTM Designation Number	ASTM Document Title	Changes Required for FAA Acceptance <sup>1,2</sup>	Additional Information <sup>3</sup>
		MHz, decreasing 20 dB per frequency decade to a minimum of 3 mA at 400 MHz.”	
F3239 – 19	Standard Specification for Aircraft Electric Propulsion Systems	FAA does not universally accept F3239 – 19 due to inexperience with the standard.	Applicants are encouraged to consider proposing F3239 – 19 for development of their method of compliance for electric propulsion systems on a project-by-project basis. Any method of compliance proposed must establish a level of safety equivalent to certified reciprocating and turbine propulsion systems and receive acceptance by FAA in accordance with §23.2010.
F3254 – 19	Standard Specification for Aircraft Interaction of Systems and Structures	<b>Figures 2, 3 and 4</b> <b>Replace:</b> “Remote” <b>With:</b> “10 <sup>-5</sup> ”  <b>Replace:</b> “Extremely Improbable” <b>With:</b> “10 <sup>-8</sup> ” for Level 1, 2 and 3 airplanes and with “10 <sup>-9</sup> ” for Level 4 airplanes”	Other proposed probabilities will be considered by the FAA on a case by case basis.
F3309/F3309M – 21	Standard Practice for Simplified Safety Assessment of Systems and Equipment in Small Aircraft	None	
F3316/F3316M – 19	Standard Specification for Electrical Systems for Aircraft with Electric or Hybrid-Electric Propulsion	FAA does not universally accept F3316/F3316M – 19 due to inexperience with the standard.  <b>Remove:</b> Table 1	Applicants are encouraged to consider proposing F3316/F3316M – 19 for development of their method of compliance for electrical systems installed on airplanes with electric or hybrid-electric propulsion systems on a project-by-project

**FIGURE 7 - Example of Consensus Standards [46]**

Let us examine the current verbiage surrounding structural design factor of safety:

**§ 23.2230 Limit and ultimate loads.** The applicant must determine (a) The limit loads, which are equal to the structural design loads unless otherwise specified elsewhere in this part; and (b) The ultimate loads, which are equal to the limit loads multiplied by a 1.5 factor of safety unless otherwise specified elsewhere in this part.

**§ 23.2265 Special factors of safety.**

(a) The applicant must determine a special factor of safety for each critical design value for each part, article, or assembly for which that critical design value is uncertain, and for each part, article, or assembly that is

- (1) Likely to deteriorate in service before normal replacement; or
- (2) Subject to appreciable variability because of uncertainties in manufacturing processes or inspection methods.

(b) The applicant must determine a special factor of safety using quality controls and specifications that account for each

- (1) Type of application;
- (2) Inspection method;
- (3) Structural test requirement;
- (4) Sampling percentage; and
- (5) Process and material control.

(c) The applicant must multiply the highest pertinent special factor of safety in the design for each part of the structure by each limit and ultimate load, or ultimate load only, if there is no corresponding limit load, such as occurs with emergency condition loading.” [43]

Thus, the new C.F.R. specifies themes for engineers and assessors to consider but lacks much specificity in terms of how one could demonstrate compliance or lack of compliance with such a standard. Thankfully, the 1.5 basic factor of safety between limit and ultimate loads, in place since 1938, remains unchanged in formal law.



## IV. Legal Assessment

Next, we cover the legality of the changes. We intend to answer the question regarding the legality of the FAA delegating its rulemaking ability to private industries via the method of “consensus standards.” Then, we will see if the FAA is able to go around Notice-and-Comment by using Advisory Circular or consensus standards to in effect change the rules.

We start with an overview of what authority the FAA has.

As set forth in 49 U.S. Code § 101 the purpose of the U.S. Department of Transportation is summarized here. The department aimed to encourage development of fast, safe, efficient transportation to complete the national objectives of general welfare, economic growth and stability, and security of the United States. It is to do this by “encourag[ing] cooperation of Federal, State, and local governments, carriers, labor” [47] and ensure effective administration while stimulating technological adamant.

The FAA, which is under the DOT, must follow the above purpose specifically focusing on aviation. Under 49 U.S.C § 44701 [48] the FAA is tasked in part with the following.

(a) Promoting Safety.—The Administrator of the Federal Aviation Administration shall promote safe flight of civil aircraft in air commerce by prescribing—

(1) minimum standards required in the interest of safety for appliances and for the design, material, construction, quality of work, and performance of aircraft, aircraft engines, and propellers;

(2) regulations and minimum standards in the interest of safety for—

(A) inspecting, servicing, and overhauling aircraft, aircraft engines, propellers, and appliances;

(B) equipment and facilities for, and the timing and manner of, the inspecting, servicing, and overhauling; and

(C) a qualified private person, instead of an officer or employee of the Administration, to examine and report on the inspecting, servicing, and overhauling;

(3) regulations required in the interest of safety for the reserve supply of aircraft, aircraft engines, propellers, appliances, and aircraft fuel and oil, including the reserve supply of fuel and oil carried in flight;

(4) regulations in the interest of safety for the maximum hours or periods of service of airmen and other employees of air carriers; and

(5) regulations and minimum standards for other practices, methods, and procedure the Administrator finds necessary for safety in air commerce and national security.

Thus, the FAA has the power to control what is considered airworthy. But can it delegate its power to others? Cases such as *A.L.A. Schechter Poultry Corp. v. US* demonstrated limitations in which Congress can delegate its powers to the executive branch. [49] From that case, it is clear that the important matter is not if Congress can delegate its power, but whether Congress put forth procedures and guidelines to follow and whether it put forth reasonable limitations and scope? That case dealt with powers delegated directly to the executive branch but from its precedent it is clear from the Small Airplane Revitalization Act of 2013 that Congress precisely delegated the rules just for the very limited area of making sure that airworthiness compliance uses “consensus standards.” As Congress specifically and narrowly ordered it, it makes reasonable sense that the FAA can do as they are told and allow consensus standards.

Additionally, we would argue that even if Congress did not specifically order consensus standards, the FAA would still have the power to enact them. This would come from their enabling law 49 U.S.C. § 106 [50] which states:

(6) Contracts.—

The Administrator is authorized to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary to carry out the functions of the Administrator and the Administration. The Administrator may enter into such contracts, leases, cooperative agreements, and other transactions with any Federal agency (as such term is defined in section 551(1) of title 5) or any instrumentality of the United States, any State, territory, or possession, or political subdivision thereof, any other governmental entity, or any person, firm, association,

corporation, or educational institution, on such terms and conditions as the Administrator may consider appropriate.

Thus, if the Administrator deemed it appropriate, they could enter an agreement with firms, associations, corporations, or educational institutions to develop consensus standards. Although rulemaking was not specifically called out, it can be inferred as “functions of the Administrator and the Administration.” In *Chevron v. NRDC* [51] the Supreme Court deferred to an agency’s statutory interpretation (i.e., command from Congress) if the court concluded that the agency’s interpretation of its directive is “reasonable” or “permissible.” As such, an interpretation where the FAA can delegate its rulemaking ability via consensus standards would likely be found permissible even without the direct order of that was the Small Airplane Revitalization Act of 2013.

We next ask if the FAA can delegate work to a subcontractor, shouldn’t the contractor be bound to “sunshine in government” and other Notice-and-Comment rulemaking procedures?

We see that today, under the post 2016 paradigm, the FAA can functionally change regulations without the usual form of Notice-and-Comment. Although this process detailed no doubt goes against the intentions of the NPRM, the authors find it difficult to find a way this breaks the law as it is a consequence of the FAA’s authority on determining acceptable methods of compliance. And this is the sticky point – it isn’t the “outsourcing” of the “consensus standard” that is the trouble – as the FAA has basically deferred the process of established materials strength since its inception. Consider **14 C.F.R. 04.0320 – Type Certificate Drawings** requires the airplane manufacturer to specify “all materials used in the primary structure ..., including the guaranteed physical properties in the case of materials the strength properties of which are developed through manufacturing processes, and specifications of all bolts, nuts, rivets, and similar standard parts essential to the strength of the structure.” [52] In the latest paradigm, wholesale deferral of validation and verification processes to a vague and fluid “consensus standard” make the whole type certification process vulnerable to the sort of “tyranny” envisioned by Madison in the 47<sup>th</sup> Federalist. [2]

Currently the adoption of consensus standards require notification when they are accepted but do not need comments from the community. So, if the FAA wants to adopt a new rule, they merely need to find a likeminded organization and accept a consensus standard from them or just produce an Advisory Circular. Equally, the FAA can now deny a means of compliance that does not meet their new rule. The Advisory Circular No: 23.2010-1 FAA [44] sets forth guidance on the process in which the FAA finds means of compliance.

We believe that “Consensus Standards” function as a form of “non-legislative-rule-making.” It is legally permissible, when the notice-and-comment promulgated law is vague, for an agency to issue precise interpretive rules (i.e., as through an Advisory Circular) bypassing notice-and-comment. Under *American Mining Congress v. Mine Safety & Health Administration*, Judge Williams devised a four part test to decide if an “interpretive rule” overstepped its bounds and short-circuited the need for notice-and-comment. He asked 1) whether in the absence of the interpretive rule there isn’t adequate basis for agency enforcement, 2) whether the agency published the rule in the C.F.R., 3) whether the agency explicitly invoked its general legislative authority and 4) whether the rule effectively amends a prior properly-promulgated rule that went through notice-and-comment. Regarding recent FAA policy, we find the evidence inconclusive. Yes, the new C.F.R. rules are vague to the point of unenforceability absent the directive document (this supports the idea that the new C.F.R. is defective), and that the advisory circulars containing “consensus standards” (or references to consensus standards hidden behind paywalls) are not in C.F.R. (also supports the idea that the new C.F.R. is defective). Alternatively, the fact that the FAA promulgated the new paradigm under directive from Congress (hence was within its general legislative authority) supports the idea that the new C.F.R. is legal. The fact that the pre 2016 14 C.F.R. 23 is specifically called out as being an acceptable means of compliance is not dispositive either way. Taken together, we think that the FAA may (or may not) survive challenges to the legality of the new Part 23.

Nonetheless, the way that “consensus” standards have entered the certification process has all of the hallmarks of an illegal “non-legislative-rule:” 1) the consensus standards are adopted without public input; 2) the agency treats the rule as binding on members of the public; and 3) members of the public who rely on the rules may be adversely affected when the non-legislative-rule suddenly changes. Aircraft designers, beware!

## V. Moral Assessment

Now for the most important part of the argument, are these changes really beneficial to the industry and/or the public? In *Revision of Airworthiness Standards for Normal, Utility, Acrobatic, and Commuter Category Airplanes* [45] the FAA makes their arguments on why this is a beneficial change. We do not argue what the FAA should have done as their hands were essentially tied as Congress gave them explicit orders in the Small Airplane Revitalization Act of 2013. But we question the merit of the changes. What kind of precedent do they set, are the benefits all that they claim, and is this a step forward?

The first reason the FAA believes that this change is beneficial is that it “provides greater flexibility to applicants seeking certification of their airplane designs.” [45] They argue this point with the fact that there is now the ability to follow consensus standards and importantly that this is not the only means of showing compliance. [45] However, we do not agree with this assessment entirely as there was nothing stopping applicants from requesting exemptions beforehand. As said in the very same revision “organizations also have the option to propose their own means of compliance as they do today.” [45] As such the flexibility was already there. In the older paradigm, did industry consider the option for requesting exemptions as so expensive or time consuming to the applicant making it de facto impossible? History shows a long list of successful “Special Conditions” and “Exemption” dockets demonstrating the older exemption process worked. So, if the exemptions are nothing new the increased flexibility advertised would need to come from the consensus standards. At the time of writing only ASTM has consensus standards published on the FAA Small Airplanes Regulations, Policies & Guidance website. [46] With only one organization creating consensus standards it would be hard to describe the current state as having greater flexibility.

Under the new rules these standard creating organizations can do the work creating the alternative methods of compliance under consensus standards, allowing the applicant to simply shop about between the Advisory Circular’s, consensus standards, the old C.F.R., or do something different entirely. But what does this cost? In exchange for this new freedom the consistency between aircraft certification is lost. It is nothing new that the rules an aircraft flies under depends on the year it was certified but now a whole new layer is added on top. Not only will the C.F.R. change from time to time, but the “consensus standards” and Advisory Circulars being used as Means of Compliance will also change. A distinct danger could be seen on how engineering standards may be applied differently to disparate customers; resulting in a lack of “equal protection” under the law.

The next argument made by the FAA is that the new rules “facilitates faster adoption of safety enhancing technology in type-certificated products.” As the average time required to go from start to a type-certificated aircraft is not publicized, we would need to take the FAA at its word, but there are reasons to doubt the claim. First the FAA said about the old system that “products frequently requires the FAA’s use of equivalent level of safety (ELOS) findings, special conditions, and exemptions. These take time, resulting in uncertainty and high project costs.” [45] But how exactly would these exemptions and special conditions require more work than the aforementioned “propose their own means” of the new aircraft. If an applicant does propose their own means, then it is functionally the same work as ‘special conditions’ but under a new name. As that does not reduce workload the hope is clearly that the applicants will opt to use consensus standards in place of proposing their own means. As the hope is the consensus standards will be done by industry groups such as RTCA, SAE, ASTM, and the EUROCAE but they still require the FAA to do the work to validate the equivalent level of safety. Yes, an argument could be made that they would only need to evaluate these standards once before being used on a number of planes, but it opens the door for anyone to submit consensus standards thus the FAA may not necessarily get less workload as multiple organizations can propose their own standards. It can be seen as merely shifting the workload to different parts of the FAA. However, the change does do the advertised benefit of shifting work off an applicant to industry groups which would reduce the time required for certification. However, the loosening of rules may encourage more applicants to “propose their own means” in effect increasing the workload. The FAA also claims this new process will cost the FAA less money, the same arguments for time made above could be used here. So, it is unclear if the benefit claimed is necessarily true.

The biggest misstep in the new 14 C.F.R. § 23 is that the consensus standards typically are hidden behind a paywall. Although they are ‘reasonably’ priced, [53] they are an additional expense that the applicant must bear. Importantly they are ‘reasonably’ priced for a business, but individuals, academics, and startups will likely find the costs prohibitive. Although each individual consensus standard is affordable an applicant would be foolish not to buy them all less one provides significantly easier means of compliance, hence the expense would build up quickly. Some may

scoff at the idea of complaining about what amounts to a miniscule amount of cost in a well-known expensive industry, but it is still important to bring note of this as a large point of this rework was to make the process easier for the applicant.

The real trouble behind the new paradigm is that it upends the fundamental principle in Western Civilization of allowing all citizens the knowledge of the laws and regulations governing them. We admit that not everyone is building planes, but it is a dangerous precedent to set. Some might say that these consensus standards are not legally binding, but does that really matter when it would be near impossible to certify a plane without them. To show compliance without them the applicant would need to use all the sections from the old Part 23, which is not the goal of this change or a permanent solution as the old Part 23 will become increasingly out of date until it is no longer accepted, or they would need to propose their own methods for all sections which is fanciful.

Consider an example, maybe in housing regulation, where the de-facto regulations are hidden behind paywalls, so if you wanted to make a modification to your house you would need to buy the rules from a private entity. Then consider if that is consistent with the long standing tradition of justice in the US.

Lastly the FAA claims that “This rule reduces new certification processing by streamlining new certification processing” we strongly disagree. The reasons for this assessment are that the process is confusing, vague, and relies heavily on the administrator’s opinion. First recall § 23.2010 (b) where an applicant “must provide the means of compliance to the FAA in a form and manner acceptable to the Administrator.” [43] But what does that entail, well following the AC regarding § 23.2010 the applicant needs to follow FAA Order 8110.112A [54] and propose it to the Project Aircraft Certification Office (PACO). The flowchart of the process can be seen in FIGURE 8. This is confusing but not insurmountable, but it is important to know that the process includes even more detail if a new or alternative means of compliance is proposed, other than already accepted consensus standards. But this is the process surrounding the actual engineering work with the testing and simulation work dependent on the consensus standard. The consensus standards understandably differ from each other so every aircraft will have different methods of actually proving systems. The issue of vagueness will likely be resolved with time as more aircraft proceed with the process.

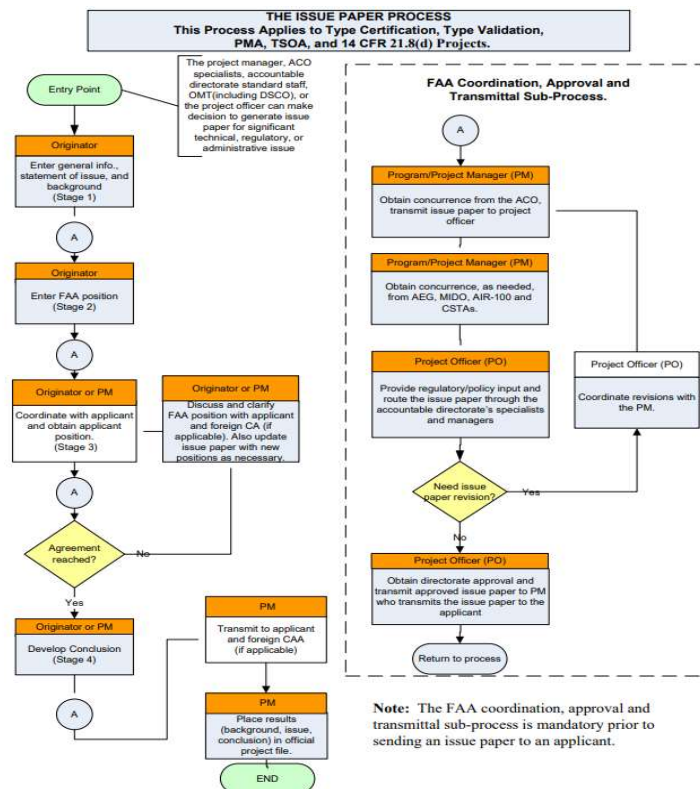


FIGURE 8 - Issue Paper Process Flowchart [54]

Much of the burden is placed on the Administrator which now needs to understand the requirements of not only the old Part 23, but all the new consensus standards and alternative means of compliance proposed. The likelihood that any two Administrators could consistently apply the new larger set of rules is greatly decreased. As the Administrator is the arbiter of what is an acceptable Means of Compliance, hence the rules, we see an instance where tyrannical powers rested in a sole individual that Madison and Hamilton warned about.

## VI. Conclusion

In conclusion, the changes made to 14 C.F.R. § 23 are a marked shift in the way the regulations are prescribed. They diverge from the traditional prescriptive method and are designed to allow the industry to decide on its own methods for certification with tacit approval from the FAA. Since the FAA made the changes under order from Congress, the FAA has the authority to make such changes. The new 14 C.F.R. § 23 introduces a roundabout method for the FAA to force rule changes without Notice-and-Comment. Whether this new method is actually faster and more efficient is debatable. The applicant is likely to see faster processing, but for the FAA, the agency workload may change but it won't necessarily become lighter. Next, the new 14 C.F.R. § 23 suffers from a confusing process that relies too much on the discretion of the Administrator. Lastly there is a dangerous precedent set by making the consensus standards which are hidden behind a paywall a de-facto regulation.

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