



DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Part 229

[Docket No. FRA-2025-0126]

RIN 2130-AD50

Expanding Certain Locomotive Wheel Set Diameter Variations

AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: This rule amends FRA’s locomotive safety regulations to expand the maximum permitted variation in diameter for locomotive wheel sets using alternating current technology, in response to a Class I railroad’s May 2019 petition for rulemaking and innovations in traction motor control.

DATES: This rule is effective [INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

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SUPPLEMENTARY INFORMATION:

I. Background

Consistent with Executive Order (E.O.) 14192, *Unleashing Prosperity Through Deregulation* (90 FR 9065, Feb. 6, 2025), and E.O. 14219, *Ensuring Lawful Governance and Implementing the President’s “Department of Government Efficiency” Deregulatory Initiative* (90 FR 10583, Feb. 25, 2025), FRA is reviewing its regulatory requirements in

49 CFR parts 200 through 299 and repealing requirements that are outdated and redundant.

On July 1, 2025, FRA published a notice of proposed rulemaking (NPRM) that proposed to amend 49 CFR 229.73(b) to expand the maximum permitted variation in diameter for locomotive wheel sets using alternating current (AC) technology. 90 FR 28658 (July 1, 2025). During the comment period, which closed on September 2, 2025, FRA received comments from the following five entities: the American Short Line and Regional Railroad Association (ASLRRA);¹ the Brotherhood of Locomotive Engineers and Trainmen, a Division of the Rail Conference of the International Brotherhood of Teamsters (BLET);² the International Association of Machinists and Aerospace Workers (IAM Union);³ the International Association of Sheet Metal, Air, Rail, and Transportation Workers – Transportation Division (SMART-TD);⁴ and the Transportation Trades Department, AFL-CIO (TTD).⁵

In summary, ASLRRA supports the proposed regulatory change, whereas BLET, IAM Union, SMART-TD, and TTD oppose the rulemaking. FRA discusses the comments it received further in the *Section-by-Section Analysis* of this final rule.

II. Section-by-Section Analysis

Section 229.73 Wheel sets

As proposed in the NPRM, in this final rule, FRA is amending paragraph (b) of this section to expand the maximum permitted variation in diameter for locomotive wheel sets using AC technology. In May 2019, Union Pacific Railroad (UP) submitted a

¹ <https://www.regulations.gov/comment/FRA-2025-0126-0007>.

² <https://www.regulations.gov/comment/FRA-2025-0126-0005>.

³ <https://www.regulations.gov/comment/FRA-2025-0126-0003>.

⁴ <https://www.regulations.gov/comment/FRA-2025-0126-0004>.

⁵ <https://www.regulations.gov/comment/FRA-2025-0126-0006>.

petition for rulemaking under 49 CFR part 209 on the basis that “[n]ew technology with individual axle control developed and placed in service after 1980 provides the basis for change which will result in better customer service through a reduction of locomotive out of service time and increased wheel life without impacting safety.”⁶

Existing paragraph (b) of § 229.73 specifies that the maximum variation in the diameter between any two wheel sets on different trucks on a locomotive that has three-powered-axle trucks may not exceed 1 1/4 inches. This final rule separates the existing requirement in current paragraph (b) into new paragraphs (b)(1) and (2), generally continuing the current 1 1/4-inch maximum variation for wheel sets on, for example, older locomotives equipped with direct current (DC) traction motors. This final rule adds a new paragraph (b)(3), generally allowing a 1 1/2-inch maximum variation for wheel sets on newer locomotives equipped with AC traction motors that utilize individual truck or single axle control technology. New paragraph (b)(3) eliminates the wheel set variation requirement of this section for wheel sets on non-powered axles on locomotives equipped with AC traction motors that utilize individual truck or single axle control technology because FRA does not expect wheel variation to have a significant impact on truck dynamics in that case. FRA modified the final rule text from the NPRM to simplify the language and address a potential regulatory gap in the proposed framework.

Specifically, FRA decided not to include the proposed reference to DC traction motors in paragraph (b) in this final rule. The revised language is intended to help clarify that the existing requirement (*i.e.*, the default 1 1/4-inch maximum variation)—now in paragraphs (b)(1) and (2)—continues to apply to wheel sets in general, unless the wheel sets meet the criteria in new paragraph (b)(3).

⁶ UP’s petition for rulemaking is available in Docket No. FRA-2025-0126 at <https://www.regulations.gov/document/FRA-2025-0126-0002>.

In its comments, ASLRRA offers support for this regulatory change and states that it “agrees with FRA that this proposal would better accommodate new technology while maintaining current levels of safety.” In addition, ASLRRA notes that short line railroads expect the change to “save a tremendous amount of time and additional wheel cuts on 24-wheel sets in the industry’s new fleets of AC traction systems.”

In its comments, BLET opposes this rulemaking and UP’s 2019 petition for rulemaking. BLET expresses concerns about the potential risks associated with excessive wheel size variation. For example, BLET states that uneven weight distribution on the trucks can cause an uneven load and increase the risk of derailment simply due to the difference in wheel diameters, and that can lead to more wheel slip as there may be fewer contact points with the rail. BLET states they have seen documentation from manufacturers recommending less than one inch of variation in wheel diameters, in contrast to UP’s proposed 1 1/2 inches. BLET expresses interest in the safety studies UP, other Class I railroads, or FRA, conducted to support an increase in wheel diameter variation beyond what the manufacturer recommended. BLET indicates its members believe the current practice at multiple railroads is for AC locomotives to have a smaller variation in wheel diameter than DC locomotives.

In its respective comments, the IAM Union and TTD assert that FRA’s existing limit of 1 1/4 inches reflects sound engineering practice and remains necessary for safe operation, and raising the limit to 1 1/2 inches or eliminating it for non-powered axles introduces additional mechanical risk, contravenes manufacturer specifications, and lacks evidentiary justification.

FRA notes that Appendices A and B to UP’s petition for rulemaking include a white paper and presentation by General Electric (GE), the original equipment manufacturer (OEM). The document in Appendix A to UP’s petition is titled, “Expanding the limits of CFR 49 Part 229.73 Wheel Sets for GE AC Traction Single

Axle Locomotives (AC4400CW, ES44AC, ET44AC models),” and it supports the expanded wheel diameter variation in this final rule, based on a detailed technical analysis.⁷ GE presented various simulations of extreme curving examples and concluded that the derailment coefficients (L/V),⁸ after increasing the wheel diameter difference from 3/4 of an inch to 1 1/2 inches, were still within FRA’s Vehicle/Track Interaction Safety Limits for GE AC locomotives with individual axle control.⁹ It is not clear what documentation from other manufacturers BLET, the IAM Union, and TTD are referencing in their comments, and it is possible that documentation refers to the existing standards regarding DC-powered locomotives, which are still applicable and are not rescinded in this rulemaking.

IAM Union asserts that increasing the permissible wheel size variation to 1 1/2 inches disregards operational hazards, involving truck dynamics, bearing and gearbox stress, wheel wear, and adhesion and control systems, as further described in its comments.¹⁰ FRA disagrees that the amendment to 49 CFR 229.73(b) will amplify side-to-side imbalance, as IAM Union and TTD contend because the amendment does not modify the standard for wheel diameters on the same axle. Furthermore, FRA does not understand IAM Union’s argument about bearing and gearbox stress because the diameter of the wheel has no bearing on lateral tolerances. IAM Union presents no data that the regulatory amendment will create more wear, rather than less wear and unnecessary wheel truing, as presented in GE’s white paper. The only indication in GE’s white paper that the expanded wheel diameter variation could cause instability is if the

⁷ GE, FRA Part 229.73 Waiver, For GE North American Locomotives, White Paper, available at <https://www.regulations.gov/document/FRA-2025-0126-0002>.

⁸ The L/V ratio is the numerical ratio of lateral (L) load applied at a point on the rail to the vertical (V) load applied at that same point.

⁹ FRA’s Vehicle/Track Interaction Safety Limits are listed in 49 CFR 213.333.

¹⁰ Similarly, TTD states a quarter-inch expansion beyond the existing limit amplifies side-to-side imbalance, reducing suspension effectiveness and increasing derailment risk.

smallest wheelset is the lead wheelset, and the general practice is never to place the smallest wheelset in the lead position.

In its comments, SMART-TD urges FRA to withdraw the proposal and reinstate the Railroad Safety Advisory Committee (RSAC) to provide a rigorous safety analysis on this subject. FRA appreciates SMART-TD's support in general for RSAC and agrees that RSAC may be the appropriate forum for the agency's various stakeholders to exchange information about certain issues relating to the safety of rail operations in the future.

In its comments, SMART-TD highlights that FRA acknowledged in the NPRM that excessive wheel size variation poses risks to wheel slip, truck dynamics, and ultimately derailment potential. SMART-TD contends that those risks do not disappear simply because newer locomotives are equipped with AC traction motors, stating that allowing greater tolerance in wheel set variation will increase lateral forces, create more vibration, and cause greater truck instability. According to SMART-TD, this instability translates directly into a rougher ride in the locomotive cab, amplifying shocks and lateral motion that its members endure for long hours on duty.

FRA disagrees with SMART-TD's comment because it fails to consider the safety benefit of axle control technology on wheel slip and truck dynamics. Section 229.73(b)(3) in this final rule permits increased wheel variation for only wheel sets "on locomotives equipped with alternating current traction motors that utilize individual truck or single axle control technology." As explained in GE's white paper, the axle control technology mitigates any safety risks caused by the small increase in wheel size variation permitted in this final rule. GE asserts that its traction "locomotives with individual axle control utilize a wheel slip control system which includes one speed sensor per traction motor. Each traction motor is powered by an exclusive inverter which applies a frequency

and voltage appropriate for the wheel diameter and vehicle speed.”¹¹ GE explains further that the “inverter for each axle regulates tractive effort regardless of the other axles so variation in axle to axle wheel diameters do not result in tractive effort or current imbalance risk nor a shift in the thermal duty toward any traction motors due to its axle’s wheel diameter.”¹²

FRA’s Motive Power and Equipment (MP&E) Compliance Manual reiterates that § 229.73, *Wheel sets*, applies only to three-powered-axle trucks.¹³ FRA’s MP&E Compliance Manual also acknowledges that the wheel slip control system brings into play either manual sanding by the engineer or automatic sanding triggered as the response to arrest the wheel slip, and in either case, sanding may substantially increase the ratio of lateral to vertical forces creating a derailment possibility. However, GE maintains that “variation in axle to axle wheel diameters do not impair the wheel slip control system nor influence the automatic sanding in a manner which would increase the use of this sand.” FRA believes this also would not influence the ratio of lateral to vertical forces. FRA continues to rely on GE’s analysis and is adopting the rule text as proposed.

SMART-TD’s comment also asserts that increases to lateral forces, vibration, and truck instability will result in a rougher ride, but does not provide any details showing how, or to what extent, these changes will occur, or explain how any such changes would impact safety or result in noncompliance with current safety regulations. FRA expects that any increase in lateral forces, vibration, or truck instability will be consistent with current levels of railroad safety and is adopting the rule text as proposed.

¹¹ GE White Paper at 18.

¹² *Id.* at 20.

¹³ FEDERAL RAILROAD ADMINISTRATION, Motive Power and Equipment Compliance Manual (July 2012), available at <https://railroads.dot.gov/sites/fra.dot.gov/files/2020-05/MPEComplianceManual2013.pdf>.

In its comments, TTD echoes the comments from BLET, the IAM Union, and SMART-TD, including opposing the rulemaking and requesting that FRA withdraw the NPRM. In TTD's view, to increase variation in wheel set diameter is arbitrary and not based on practical applications in railroading. TTD argues that FRA has not provided test data, peer-reviewed studies, or operational safety analyses demonstrating that the proposed increase to a 1 1/2-inch wheel diameter variation poses no additional risk.

Generally, excessive wheel size variation is a safety concern due to the potential impact on wheel slip and truck dynamics. For older locomotives equipped with DC traction motors, excessive wheel size variation causes current imbalance and triggers wheel slip corrections, including unnecessary sanding, removing tractive effort, and removing power. These corrections can have adverse effects on the equipment and efficiency of operations but are necessary to prevent more serious safety hazards like damage to the rail (*e.g.*, rail burn) that can lead to rail failure. Newer locomotives equipped with AC traction motors utilize single axle control technology to apply voltage and control current more precisely to each wheel set based on operating conditions. As such, the AC traction motors function as an independent wheel slip correction system that does not use wheel size variation as a trigger for correction.

Despite the improvements to prevent wheel slip, wheel sets on locomotives equipped with AC traction motors still need to minimize wheel size variation to help maintain proper truck dynamics. Excessive wheel size variation can decrease the effectiveness of weight distribution from corresponding trucks, and the trucks' inability to help absorb the impact of a shifting load could lead to a derailment.

III. Regulatory Impact and Notices

A. Executive Order 12866 (Regulatory Planning and Review) and DOT

Regulatory Policies and Procedures

FRA has considered the impact of this final rule under E.O. 12866 (58 FR 51735, Oct. 4, 1993), *Regulatory Planning and Review*, and DOT Regulatory Policies and Procedures.¹⁴ The Office of Information and Regulatory Affairs within the Office of Management and Budget (OMB) determined that this final rule is not a significant regulatory action under section 3(f) of E.O. 12866.

FRA has considered the potential costs and benefits of this final rule. This final rule amends FRA’s locomotive safety regulations to expand the maximum permitted variation in diameter for wheel sets using alternating current technology. FRA expects that this final rule will result in cost savings to the industry as it will increase a maximum threshold for certain locomotives under 49 CFR 229.73(b) due to innovations in traction motor control. This will, in turn, result in a reduction of locomotive out-of-service time and increased wheel life without impacting safety. The increased allowable variation will help reduce the regulatory burden on the railroad industry while maintaining proper truck dynamics. FRA does not anticipate any costs associated with this final rule.

B. Executive Order 14192 (Unleashing Prosperity Through Deregulation)

E.O. 14192, *Unleashing Prosperity Through Deregulation*, requires that for “each new [E.O. 14192 regulatory action] issued, at least ten prior regulations be identified for elimination.”¹⁵ Implementation guidance for E.O. 14192 issued by OMB (Memorandum

¹⁴ 49 CFR part 5; *see also* DOT Order 2100.6B, Policies and Procedures for Rulemakings, available at <https://www.transportation.gov/regulations/dot-order-21006b-policies-and-procedures-rulemakings>; DOT Order 2100.7, Ensuring Reliance Upon Sound Economic Analysis in Department of Transportation Policies, Programs, and Activities, available at <https://www.transportation.gov/mission/ensuring-reliance-upon-sound-economic-analysis-department-transportation-policies-programs>.

¹⁵ Executive Office of the President, *Executive Order 14192 of January 31, 2025, Unleashing Prosperity Through Deregulation*, 90 FR 9065–9067 (Feb. 6, 2025).

M-25-20, March 26, 2025) defines two different types of E.O. 14192 actions: an E.O. 14192 deregulatory action, and an E.O. 14192 regulatory action.¹⁶

An E.O. 14192 deregulatory action is defined as “an action that has been finalized and has total costs less than zero.” This final rule is expected to have total costs less than zero, and therefore, it is considered an E.O. 14192 deregulatory action upon issuance of this final rule.

C. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601, *et seq.*), as amended by the Small Business Regulatory Fairness Act of 1996,¹⁷ requires a Federal agency to prepare and make available to the public a regulatory flexibility analysis that describes the effect of the rule on small entities (*i.e.*, small businesses, small organizations, and small governmental jurisdictions). Accordingly, DOT policy requires an analysis of the impact of all regulations on small entities and mandates that agencies strive to lessen any adverse effects on these businesses. The term “small entities” comprises small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and government jurisdictions with populations of less than 50,000 (5 U.S.C. 601(6)).

In the NPRM, FRA certified that this rule would not have a significant economic impact on a substantial number of small entities. No comments were received on this certification.

This final rule will not preclude small entities from continuing practices that comply with part 229; it merely offers flexibilities that will result in cost savings, if a small entity or other regulated entity chooses to utilize those flexibilities. By extending

¹⁶ Executive Office of the President, Office of Management and Budget, Guidance Implementing Section 3 of Executive Order 14192, Titled “Unleashing Prosperity Through Deregulation,” Memorandum M-25-20 (Mar. 26, 2025).

¹⁷ Pub. L. No. 104-121, 110 Stat. 857 (Mar. 29, 1996).

this regulatory relief, many regulated entities, including small entities, will experience benefits. FRA does not expect these impacts to be significant. Consequently, FRA holds to its previous certification that this final rule will not have a significant economic impact on a substantial number of small entities.

D. Paperwork Reduction Act

This final rule offers regulatory flexibilities, and it does not impose any new information collection requirements or modify any existing information collection requirements. Therefore, an information collection submission to OMB is not required under the Paperwork Reduction Act of 1995, 44 U.S.C. 3501, *et seq.*

E. Environmental Assessment

FRA has analyzed this rule for the purposes of the National Environmental Policy Act of 1969 (NEPA). In accordance with 42 U.S.C. 4336 and DOT NEPA Order 5610.1D, FRA has determined that this rule is categorically excluded pursuant to 23 CFR 771.116(c)(15). This rulemaking is not anticipated to result in any environmental impacts, and there are no unusual or extraordinary circumstances present in connection with this rulemaking.

F. Federalism Implications

This final rule will not have a substantial effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. Thus, in accordance with E.O. 13132, *Federalism* (64 FR 43255, Aug. 10, 1999), preparation of a Federalism Assessment is not warranted.

G. Unfunded Mandates Reform Act of 1995

This final rule will not result in the expenditure, in the aggregate, of \$100,000,000 or more, adjusted for inflation, in any one year by State, local, or Indian Tribal governments, or the private sector. Thus, consistent with section 202 of the Unfunded

Mandates Reform Act of 1995 (Pub. L. No. 104–4, 2 U.S.C. 1532), FRA is not required to prepare a written statement detailing the effect of such an expenditure.

H. Energy Impact

E.O. 13211, *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use* (66 FR 28355, May 22, 2001), requires Federal agencies to prepare a Statement of Energy Effects for any “significant energy action.”¹⁸ FRA has evaluated this final rule in accordance with E.O. 13211 and determined that this final rule is not a “significant energy action” within the meaning of E.O. 13211.

I. Executive Order 13175 (Tribal Consultation)

FRA has evaluated this final rule in accordance with the principles and criteria contained in E.O. 13175, *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249, Nov. 6, 2000). The final rule will not have a substantial direct effect on one or more Indian tribes, will not impose substantial direct compliance costs on Indian Tribal Governments, and will not preempt tribal laws. Therefore, the funding and consultation requirements of E.O. 13175 do not apply, and a tribal summary impact statement is not required.

J. International Trade Impact Assessment

The Trade Agreement Act of 1979 prohibits Federal agencies from engaging in any standards or related activities that create unnecessary obstacles to the foreign commerce of the United States. Legitimate domestic objectives, such as safety, are not considered unnecessary obstacles. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. This final rule is purely domestic in nature and is not expected to affect trade opportunities for U.S. firms doing business overseas or for foreign firms doing business in the United States.

¹⁸ 66 FR 28355 (May 22, 2001).

List of Subjects in 49 CFR Part 229

Penalties, Railroad safety, Reporting and recordkeeping requirements.

The Final Rule

For the reasons discussed in the preamble, FRA amends part 229 of chapter II, subtitle B of title 49, Code of Federal Regulations as follows:

PART 229—RAILROAD LOCOMOTIVE SAFETY STANDARDS

1. The authority citation for part 229 continues to read as follows:

Authority: 49 U.S.C. 20103, 20107, 20133, 20137-38, 20143, 20168, 20701-03, 21301-02, 21304; 28 U.S.C. 2461 note; and 49 CFR 1.89.

2. Amend § 229.73 by revising paragraph (b) to read as follows:

§ 229.73 Wheel sets.

* * * * *

(b) The maximum variation in the diameter between any two wheel sets (the average diameter of the two wheels on an axle) shall not exceed the following:

(1) Within the same three-powered-axle truck, 3/4 inch, except that when shims are used at the journal box springs to compensate for wheel diameter variation, the maximum variation may not exceed 1 1/4 inches.

(2) On different trucks on a locomotive that has three-powered-axle trucks, 1 1/4 inches.

(3) For powered axles on locomotives equipped with alternating current traction motors that utilize individual truck or single axle control technology, 1 1/2 inches, with or without shims. For non-powered axles in the middle of two powered axles, this paragraph (b) does not apply.

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Issued in Washington, D.C., under authority delegated in 49 CFR 1.89.

David A. Fink,
Administrator.

