Federal Railroad Administration, DOT

(A) IEEE 1483-2000, Standard for the Verification of Vital Functions in Processor-Based Systems Used in Rail Transit Control.

(B) IEEE 1474.1-2003, Standard for user interface requirements in communications based train control (CTC) systems.

(C) IEEE 1474.1-2004, Standard for Communication-Based Train Control (CBTC) Performance and Functional Requirements.

(ii) CENELEC Standards as follows:

(A) EN50129: 2003, Railway Applications: Communications, Signaling, and Processing Systems-Safety Related Electronic Systems for Signaling; and


(iii) ATCS Specification 200 Communications Systems Architecture.

(iv) ATCS Specification 250 Message Formats.


(vii) IEC 61508 (International Electrotechnical Commission), Functional Safety of Electrical/Electronic/Programmable/Electronic Safety (E/E/P/ES) Related Systems, Parts 1-7 as follows:


(G) IEC 61508-7 (2000–04) Part 7: Overview of techniques and measures.

(H) IEC 62278: 2002, Railway Applications: Specification and Demonstration of Reliability, Availability, Maintainability and Safety (RAMS);

(I) IEC 62279: 2002 Railway Applications: Software for Railway Control and Protection Systems;

(4) Use of unpublished standards, including proprietary standards, is authorized to the extent that such standards are shown to achieve the requirements of this part. However, any such standards shall be available for inspection and replication by FRA and for public examination in any public proceeding before the FRA to which they are relevant.

(5) The various standards provided in this paragraph are for illustrative purposes only. Copies of these standards can be obtained in accordance with the following:

(i) U.S. government standards and technical publications may be obtained by contacting the federal National Technical Information Service, 5301 Shawnee Rd, Alexandria, VA 22312.

(ii) U.S. National Standards may be obtained by contacting the American National Standards Institute, 25 West 43rd Street, 4 Floor, New York, NY 10036.

(iii) IEC Standards may be obtained by contacting the International Electrotechnical Commission, 3, rue de Varembe, P.O. Box 131 CH—1211, GENEVA, 20, Switzerland.

(iv) CENLEC Standards may be obtained by contacting any of the national standards bodies that make up the European Committee for Electrotechnical Standardization.

(v) IEEE standards may be obtained by contacting theIEEE Publications Office, 10962 Los Vaqueros Circle, P.O. Box 3014, Los Alamitos, CA 90720-1384.

(vi) AREMA standards may be obtained from the American Railway Engineering and Maintenance-of-Way Association, 10003 Derekwood Lane, Suite 210, Lanham, MD 20706.

APPENDIX D TO PART 236—INDEPENDENT REVIEW OF VERIFICATION AND VALIDATION

(a) This appendix provides minimum requirements for independent third-party assessment of product safety verification and validation pursuant to subpart H or subpart I of this part. The goal of this assessment is to provide an independent evaluation of the product manufacturer’s utilization of safety design practices and the product’s development and testing phases, as required by any mutually agreed upon controlling documents and standards and the applicable railroad’s:

(1) Railroad Safety Program Plan (RSPP) and Product Safety Plan (PSP) for processor based systems developed under subpart H or; 

(2) PTC Product Development Plan (PTCDP) and PTC Safety Plan (PTCSF) for PTC systems developed under subpart I.
APPENDIX E TO PART 236—HUMAN-MACHINE INTERFACE (HMI) DESIGN

(a) This appendix provides human factors design criteria applicable to both subpart H and subpart I of this part. HMI design criteria will minimize negative safety effects by causing designers to consider human factors in the development of HMIs. The product design should sufficiently incorporate human factors engineering that is appropriate to the complexity of the product; the gender, educational, mental, and physical capabilities of the intended operators and

(b) The reviewer may request advice and assistance of the reviewer concerning the actions identified in paragraphs (c) through (g) of this appendix. However, the reviewer shall not participate in any design efforts associated with the product, the products subsystems, or the products components, in order to preserve the reviewer’s independence and maintain the supplier’s proprietary right to the product.

(c) The supplier shall provide the reviewer access to any and all documentation that the reviewer requests and attendance at any design review or walkthrough that the reviewer determines as necessary to complete and accomplish the third party assessment. The reviewer may be accompanied by representatives of FRA as necessary, in FRA’s judgment, for FRA to monitor the assessment.

(d) The reviewer shall evaluate the product with respect to safety and comment on the adequacy of the processes which the supplier applies to the design and development of the product. At a minimum, the reviewer shall compare the supplier processes with acceptable validation and verification methodology and employ any other such tests or comparisons if they have been agreed to previously with FRA. Based on these analyses, the reviewer shall identify and document any significant safety vulnerabilities which are not adequately mitigated by the supplier’s (or user’s) processes. Finally, the reviewer shall evaluate and document the adequacy of the railroad’s:

1. RSPP, the PSP, and any other documents pertinent to a product being developed under subpart H of this part; or
2. PTCDP and PTCSp for systems being developed under subpart I of this part.

(e) The reviewer shall analyze the Hazard Log and any other hazard analysis documents for comprehensiveness and compliance with applicable railroad, vendor, supplier, industry, national, and international standards.

(f) The reviewer shall analyze all Fault Tree Analyses (FTA), Failure Mode and Effects Criticality Analysis (FMECA), and other hazard analyses for completeness, correctness, and compliance with applicable railroad, vendor, supplier, industry, national, and international standards.

(g) The reviewer shall randomly select various safety-critical software, and hardware modules, if directed by FRA, for audit to verify whether the requirements of the applicable railroad, vendor, supplier, industry, national, and international standards were followed. The number of modules audited must be determined as a representative number sufficient to provide confidence that all unaudited modules were developed in compliance with the applicable railroad, vendor, supplier, industry, national, and international standards.

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