JPB-PCEPPM-LTR-000170-R1

November 1, 2023

Mr. Karl Alexy
Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590
thomas.herrmann@dot.gov

Subject: Caltrain EMU Base Waiver Extension (Docket Number FRA-2018-0067)

Dear Mr. Alexy,

Please accept this revised letter and attached document as Caltrain's official submission of the Base Waiver Extension Request for the Electric Multiple Unit (EMU) railcars (reference Docket Number FRA-2018-0067 for the original waiver request). The attached report is an updated revision of the original waiver request report for the EMUs specific to the Passenger Area Emergency Brake Valve (49 CFR 229.47(b) and 238.305(c)(5)), the Clearance above Top of Rail (49 CFR 229.71) and the Safety Appliances (49 CFR 231.14(b)-(d), (f), (g), 238.229 and 238.230(d)). The report revision includes updates to reflect the as-built conditions of the EMU and also incorporates supplemental information that was included as follow-up to the original waiver request.

Please note that since the original waiver request was submitted, the Caltrain EMU order has been expanded from 16, six-car trainsets to 23, seven-car trainsets. The seventh car, or "G-car", is identical to the "E-car". In addition, the intermediate level doors have been replaced with door plugs since those doors (i.e., high-level boarding) will not be utilized for initial operation at Caltrain. Other than that, no changes have been made to the EMU design. An updated General Arrangement drawing is included in the revised report.

Caltrain staff members are available at FRA's convenience for further discussion of this request, if required.

Sincerely,

John Hogan
Chief Operating Officer, Rail

Attachments:

1. Caltrain KISS EMU Base Waiver Request Report R1

CC: FRAWaivers@dot.gov
Sean Mehrvarzi, FRA, Motive Power and Equipment Division
Gary Fairbanks, FRA, Motive Power and Equipment Division
Check Kam, FRA, Motive Power and Equipment Division
Pranaya Shrestha, Chief Officer, Caltrain Modernization Program
Greg Cameron, Caltrain, EMU Procurement Project Manager
Document Control

Caltrain KISS EMU
Base Waiver Request Report

Prepared by: LTK Engineering Services
Revision: Initial Release
Date: July 2, 2018

EXECUTIVE SUMMARY

Caltrain is pleased to submit this waiver request report for review by the FRA. This report describes aspects of the Stadler KISS Electric Multiple Unit (EMU) train that may not meet the specific requirements of 49 CFR Parts 200 through 299, and where necessary petitions the Administrator for issuance of acceptance based on alternate or equivalent compliance. This assessment does not include Alternative Vehicle Technology (AVT) related elements as those are addressed in docket FRA-2009-0124.

The elements covered by this report are:

- Passenger area emergency brake valve
- Track brake clearance
- Safety appliances

TABLE OF CONTENTS

1 Introduction

Caltrain operates commuter rail passenger service throughout the Peninsula corridor from San Francisco to Gilroy under the auspices of the Peninsula Corridor Joint Powers Board (JPB). The northern terminal is at 4th and King Streets in San Francisco where there are local connections to Muni bus and streetcar services.

Caltrain currently utilizes platforms at 8 inches above top-of-rail (ATOR) and uses mini-high platforms at 22 inches ATOR to board ADA passengers.

Caltrain operates 92 trains per day, with 5 trains per direction in peak hours. Caltrain has seen a steady growth in ridership over the past decade. In FY2015, Caltrain carried a record 18.5 million passengers and in 2016, average weekday ridership reached over 62,400 passengers. Current service is offered via 5-car diesel-hauled train sets. To meet growing demand, Caltrain recently increased the length of roughly half the fleet to 6-car train sets. Ultimately, more trains per peak hour must be operated, which requires major changes to infrastructure and rolling stock.

Caltrain Electrification of the alignment between San Francisco and Tamien will enable the introduction of multi-level EMU vehicles to meet Caltrain's continually expanding service. Significant operational benefits to be realized from the EMU vehicles include higher acceleration and braking capabilities resulting in shorter travel times, higher reliability, a more environmentally-sensitive operation, and simplified operating and maintenance procedures. The Caltrain corridor is also the link to San Francisco within in the California High-Speed Rail (CHSRA) statewide network.

The EMU procurement began with a Request for Proposal in August of 2015. The contract was awarded to Stadler Rail Group of Switzerland in August of 2016. The contract requires delivery of 16, six-car trainsets with delivery of the first train scheduled for fall of 2019. The project is currently in the final design phase and car shell construction has begun.

Each six-car trainset is identical and consists of 2 cab cars and 4 coach cars (a datasheet is provided in Appendix A and general arrangement drawings are provided in Appendix B). Each is a multi-level car built upon the Stadler “KISS” platform and contains three types of levels: a lower level, two intermediate levels and an upper level. The lower and upper levels are considered “main levels”. In addition, each car contains both intermediate level doors and lower level doors. Initially, Caltrain will utilize only the lower level doors to serve their existing 8-inch platforms. Once CHSRA service begins in the corridor, there will be a station or two that will have high level platforms and will be served by the Caltrain EMUs via the intermediate level doors. Other Caltrain stations will remain low level and will be served by the lower level doors. Both intermediate and low level doors will be utilized by Caltrain EMUs once CHSRA service begins.

2 Purpose

The purpose of this document is to describe aspects of the Caltrain KISS EMU design that may not meet the specific requirements of relevant portions of 49 CFR Parts 200 through 299, and

where necessary, petition to the Administrator for issuance of clarification or acceptance based on alternate or equivalent compliance as required.

Each item includes a discussion of the CFR requirement, a description of the Caltrain KISS EMU configuration, and a detailed discussion of the acceptance justification. If a CFR Part or subpart is not listed, Caltrain believes that the EMU complies with the applicable requirements of that Part or subpart.

It should be noted that the Caltrain KISS EMU utilizes an Alternative Vehicle Technology (AVT) crashworthiness design and that Caltrain has been granted an AVT waiver by the FRA (reference docket FRA-2009-0124), therefore that subject, which is covered by 49 CFR Part 238, is not covered by this document.

3 Caltrain KISS EMU Relevant Details

As mentioned, each six-car trainset is identical and consists of 2 cab cars and 4 coach cars. Each cab car has an automatic coupler at its front end. All cars in the six-car trainset are connected using semi-permanent couplers and each trainset is intended to be operated as a single unit (i.e. the cars will not routinely be separated). There are 12 motor trucks and 12 trailer trucks per train. Each trailer truck is equipped with a magnetic track brake. For ambulatory passengers and crew members, the lower level doors are accessed from the existing 8-inch platforms using a retractable step that is external to the car.

4 FRA Base Waiver Requests

4.1 Emergency Brake Valve (229.47 (b) and 238.305 (c)(5))

4.1.1 Regulation

49 CFR 229.47 (b) Emergency Brake Valve
DMU, MU, and control cab locomotives operated in road service shall be equipped with an emergency brake valve that is accessible to another crew member in the passenger compartment or vestibule. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each valve or shall be shown on an adjacent badge plate.

49 CFR 238. 305 (c)(5) Interior Calendar Day Inspection of Passenger Cars
(c) As part of the interior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the car defective whenever discovered in service, except as provided in paragraphs (c)(8) through (c)(12) and paragraph (d) of this section.

(5) The words "Emergency Brake Valve" are legibly stenciled or marked near each brake pipe valve or shown on an adjacent badge plate.

4.1.2 Caltrain KISS EMU Configuration

The Caltrain KISS EMU utilizes pull handles to provide a means for crew members and passengers to initiate an emergency brake condition. When a pull handle is activated (or "pulled"), propulsion

is cut and an irretrievable emergency brake is initiated. The handle can only be reset using a crew key.

There is one emergency brake pull handle per doorway area, 4 total per car, and each is appropriately stenciled with the nomenclature "Emergency Brake". See Appendix C.

4.1.3 Justification

Though the Caltrain KISS emergency brake pull handles are not technically "valves" as specified in the regulatory language, they perform the same function as a valve. The vehicle is equipped with a modern electro-pneumatic brake system that does not rely on a conventional trainlined brake pipe to initiate an emergency brake command to the train. Therefore, an 'Emergency Brake Valve' is not applicable to this design. Instead, emergency brake commands are transmitted using electronic signals using fail-safe design principles. The emergency brake handles perform an equivalent function as the required Emergency Brake Valve.

4.1.4 Request

Caltrain petitions the FRA to agree that the use of the passenger emergency brake handle (4 per car) and associated decals meet the requirements of 49 CFR 229.47 (b) and 49 CFR 305 (c)(5).

4.2 Clearance above Top of Rail (229.71)

4.2.1 Regulation

49 CFR 229.71
No part or appliance of a locomotive except the wheels, flexible nonmetallic sand pipe extension tips, and trip cock arms may be less than 2-½ inches above the top of rail.

4.2.2 Caltrain KISS EMU Configuration

Magnetic Track Brakes are mounted on each non-powered (i.e. trailer) truck of the Caltrain KISS EMU. Track brakes are commonly used on light rail and high speed rail vehicles to provide supplemental deceleration force independent of wheel rail adhesion limitations. The track brake is deployed when activated by pneumatic operating cylinders and energized using low voltage current from the vehicle battery. When energized, the track brake becomes an electromagnet that is pulled down to contact the rail. The combination of the magnetic attraction and the coefficient of friction between the track brake and the rail results in a deceleration force that is transferred from the rail to the track brake and into the truck side frame. The magnetic track brake has two positions, stowed and deployed. In its normal stowed position, the track brake is positioned 3.9 inches above-top-of-rail (ATOR). Under maximum permissible wear conditions, the track brake assembly will remain 2-½ above-top-of-rail. In the deployed position, the track brake is in contact with the top of rail thus violating the FRA-required clearance.

The magnetic track brake is further described and depicted in Appendix D.

4.2.3 Justification

The track brake system is designed to supplement the Caltrain KISS EMU dynamic and friction brake systems. Proper operation of the track brake requires the brake to come into contact with the railhead when activated.

4.2.4 Request

Caltrain petitions the FRA to accept the use of magnetic track brakes which do not meet the minimum clearances specified 49 CFR 229.71. The use of the magnetic track brake enhances the braking capabilities of the vehicle and only violates the FRA required clearance in the area where the track brake comes into contact with the rail.

4.3 Safety Appliances (231.14 (b) – (d), (f), (g), 238.229, 238.230 (d))

4.3.1 Regulation

49 CFR 231.14
(b) Sill steps
(c) Side handholds
(d) End handholds
(f) Side-door steps
(g) Uncoupling levers.

49 CFR 238.229
(a) Except as provided in this part, all passenger equipment continues to be subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in Federal regulations at part 231 of this chapter.

49 CFR 238.230 (d)
(d) Passenger cars of special construction. A railroad or a railroad's recognized representative may submit a request for special approval of alternative compliance pursuant to §238.21 relating to the safety appliance arrangements on any passenger car considered a car of special construction under §231.18 of this chapter. Any such petition shall be in the form of an industry-wide standard and at a minimum shall:

(1) Identify the type(s) of car to which the standard would be applicable;
(2) As nearly as possible, based upon the design of the equipment, ensure that the standard provides for the same complement of handholds, sill steps, ladders, hand or parking brakes, running boards, and other safety appliances as are required for a piece of equipment of the nearest approximate type already identified in part 231 of this chapter;
(3) Comply with all statutory requirements relating to safety appliances contained at 49 U.S.C. 20301 and 20302;
(4) Specifically address the number, dimension, location, and manner of application of each safety appliance contained in the standard;
(5) Provide specific analysis regarding why and how the standard was developed and specifically discuss the need or benefit of the safety appliance arrangement contained in the standard;

(6) Include drawings, sketches, or other visual aids that provide detailed information relating to the design, location, placement, and attachment of the safety appliances; and
(7) Demonstrate the ergonomic suitability of the proposed arrangements in normal use.

4.3.2 Caltrain KISS EMU Configuration

The Caltrain KISS EMU does not have sill steps, side handholds, end handholds, or uncoupling levers. The Caltrain KISS EMU safety appliance arrangement is identical in concept to other Stadler equipment operating safely in the US under approved FRA waivers.

The Caltrain KISS EMU does have side-door steps at the lower level side doors, but not in the conventional sense as described in 49 CFR 231.14. These are described below.

4.3.3 Justification

Sill Steps/Side Handholds

Sill steps and side handholds are intended to allow railroad employees to ride the outside of the vehicle during switching moves to manually couple/uncouple cars and make up manual hose connections. Not only will Caltrain operating rules prohibit personnel to mount the exterior of the Stadler KISS EMU, but Caltrain will not use the EMU to make any equipment moves within yards, storage tracks or other areas where personnel would be required to utilize any exterior steps. The Stadler KISS EMU is equipped with an automatic coupler which allows coupling, uncoupling, and pneumatic and electrical connection make-up between trains to be accomplished without requiring employees to leave the car interior. A drawing of the automatic coupler is provided in Appendix E.

End Handholds/Uncoupling Levers

End handholds and uncoupling levers are intended to provide a secure hand grip for a railroad worker while performing manual coupling or uncoupling of conventional rail vehicles where it is necessary for the mechanical end connections to be connected or disconnected manually from the ground by a railway employee. As described above, the Caltrain EMUs are equipped with fully automatic couplers. This fully automatic design allows all mechanical, pneumatic and electrical end connections to be accomplished without manual intervention and without requiring personnel to leave the vehicle.

Side Door Steps/Side Door Handholds

The Caltrain EMU vehicle is configured with both high level and low level side entry doors. When the EMU is first placed in service, only the low level doors will be utilized and are accessed from Caltrain's existing 8-inch high platforms. The high level doors will be used at a later date once high level platforms are installed and level boarding is implemented. Each low level side door is equipped with a retractable step to allow passengers to transition from the 8-inch platform to the 22-inch lower level floor height. The step is located at approximately 16 inches ATOR. In addition, extended vertical handholds are located inside the doorways to facilitate the boarding/alighting process. Drawings and renderings of the side door step and the vertical handholds are included in Appendix F.

4.3.4 Request

Caltrain petitions the FRA to accept the KISS EMU vehicle without sill steps, side handholds, end handholds, or uncoupling levers and to request the Secretary of Transportation to grant safety appliance exemption for technological improvements under 49 U.S.C § 20306 (a).

5 Conclusion

Caltrain believes that the KISS EMU design offers an equivalent level of safety and requests relief as described above for the following elements:

- Passenger area emergency brake valve
- Track brake clearance
- Safety appliances

Appendix A. Caltrain KISS EMU Datasheet

STADLER

KISS DOUBLE-DECKER ELECTRIC MULTIPLE UNIT EMU

for Peninsula Corridor Joint Powers Board (CALTRAIN), California, USA

As one of the key parts of the Peninsula Corridor Electrification Project (PCEP) the Caltrain Board of Directors has awarded the contract for the design and manufacture of high-performance double-decker electric train sets to Stadler US, Inc. The new Stadler KISS double-decker EMU with its high performance and passenger capacity helps to alleviate the rapidly growing ridership by allowing faster and more frequent service. The adaptation of electric EMUs also significantly decreases greenhouse gases and noise emissions. With the fast, comfortable and environmental friendly KISS EMU, Caltrain is connecting San Francisco to the Silicon Valley. As highways have become more and more congested, a modernized Caltrain will be the preferred commute option between San Jose and San Francisco while addressing the mobility needs of the Bay Area in an environmentally and economically sustainable manner. The 6-car trains are extendable to 7-car or 8-car units, – providing the same swift performance with significantly increased transport capacity. Built today for tomorrow, – KISS is well ahead of its time.

www.stadlerrail.com

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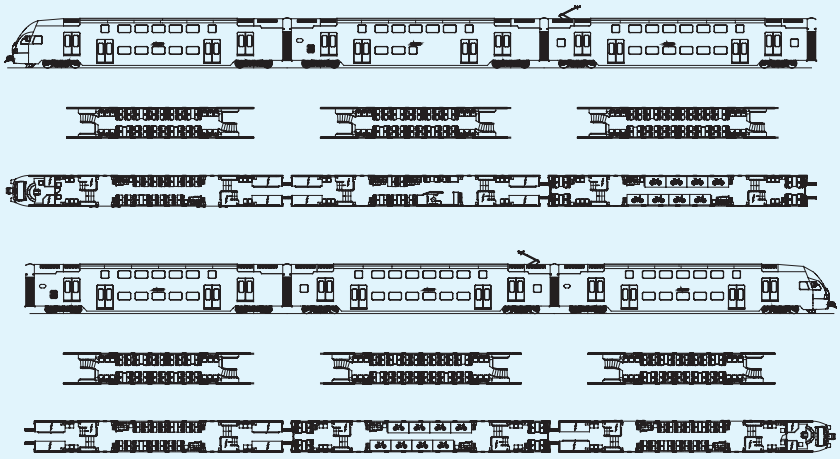


Technical features

Technology

- Vehicle body made of extruded aluminum sections guarantees durable, corrosion-resistant and lightweight vehicles
- Specific Stadler design air-suspended trucks allow smooth running at exceptionally low vibration and noise levels
- High performance traction system not only permits very swift acceleration but also an almost complete recuperation of braking energy to the catenary

Comfort

- The generous and bright interior offers dedicated space for wheelchairs in each car, an ADA (American with Disabilities Act) accessible toilet and ADA lifts to cross between the low and intermediate levels of the train
- For the large number of commuters who bring their bikes, two large bicycle areas are provided in each train
- The state of the art Passenger Information System and CCTV ensures the passengers have up-to-date transit information and can feel secure while in the train

Personnel

- With a strong focus on ergonomics, operability and field of vision the driver cab provides a positive and pleasant work space for the driver

Reliability / Availability / Maintainability / Safety

- Meets FRA Alternate Compliance requirements for operating in mixed traffic, which results in a very high level of passive safety by using crash energy management technology

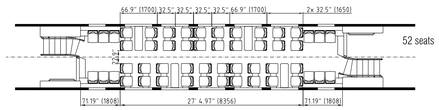
Vehicle data*

	6-car** EMU
Customer	Peninsula Corridor Joint Powers Board (Caltrain)
Region	California, USA
Track gauge	1435 mm (4' 8 ½")
Designation	KISS
Supply voltage	25 KV 60Hz AC
Axle arrangement	2'Bo' + Bo'Bo' + 2'2' + Bo'Bo' + 2'2' + Bo'2
Axle load limit (AW3)	52100 lbs (23.6t)
Number of vehicles/cars	16 vehicles / 96 cars
Commissioning (planned)	2019–2020
Seating capacity	tbd
Tip-up seats	tbd
Seating capacity total	tbd
Standing spaces 4 pers./m² (AW2)	tbd
Number of bike spaces	tbd
Access heights	22" for access from existing platforms 50 ½" for future high level HSR platforms
Access width	51 ¼" (1300 mm)
Length over coupling	515' 3" (157100 mm)
Vehicle width	9' 10" (3000 mm)
Vehicle height	15' 10 ½" (4840 mm)
Max. power at wheel	6000 kW
Starting tractive effort (up to 23 mph)	540 kN
Starting acceleration, gross	2,24 mphps (1.0 m/s²)
Max. Braking performance rating	8000 KW
Maximum speed	110 mph (177 km/h)

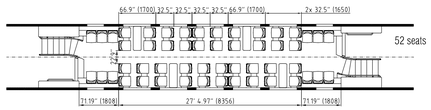
*Data is subject to change pending Caltrain's design approval
**6-car units extendable to 7 or 8-car trainsets

Appendix B. Caltrain KISS EMU General Arrangement Drawings

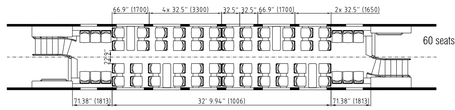
Car "B"
84 seats, 18 folding seats, 2 wheelchairs



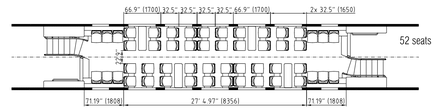
Car "C"
69 seats, 16 folding seats, 2 wheelchairs

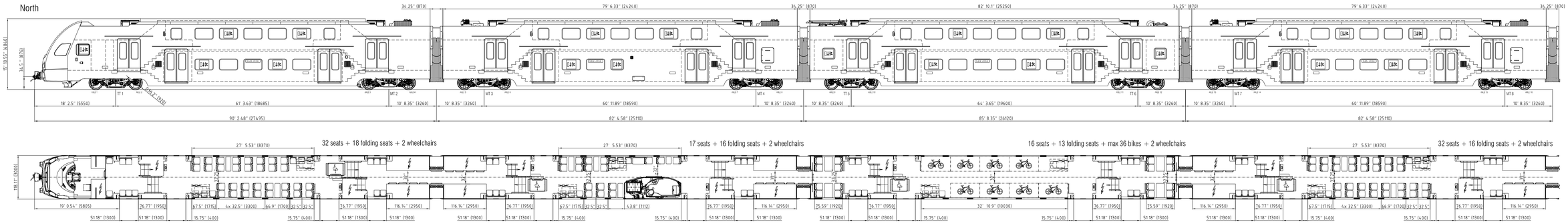


Car "D"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs

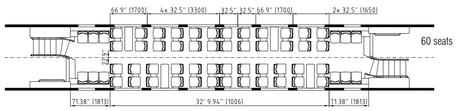


Car "E"
84 seats, 16 folding seats, 2 wheelchairs

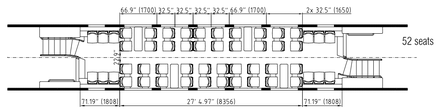




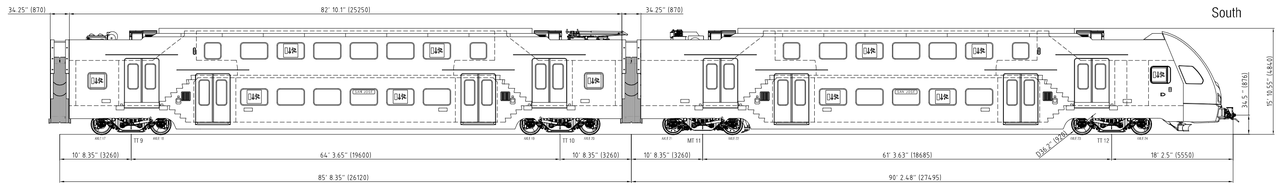
Car "F"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs

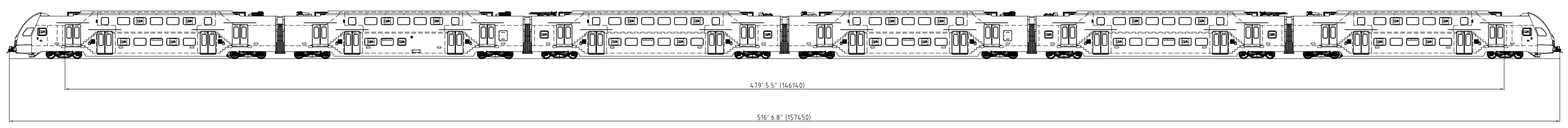


Car "A"
84 seats, 18 folding seats, 2 wheelchairs



	Car B	Car C	Car D	Car E	Car F	Car A	Total	Ratio
Fixed Seats	84	69	76	84	76	84	473	6.57
Folding Seats	18	16	13	16	13	18	94	
Total Seats	102	85	89	100	89	102	567	
Folding Seats - all passenger side doors operational	8	6	3	6	3	8	34	
Total Seats - all passenger side doors operational	92	75	79	90	79	92	507	
Countable Folding Seats - for the core number	16	13	12	14	12	16	83	
Total countable Seats (core number)	100	82	88	98	88	100	556	
Standees 4 P / m² - without Stairwells / Wheelchairs	138	143	150	141	150	138	**860**	
Standees 6 P / m² - without Stairwells / Wheelchairs	207	214	225	212	225	207	**1290**	
Max Capacity 4 P / m² - without Stairwells / Wheelchairs	240	228	239	241	239	240	**1427**	
Max Capacity 6 P / m² - without stairwells / Wheelchairs	309	299	314	312	314	309	**1857**	
Wheelchairs	2	2	2	2	2	2	12	
Max Bikes (4 per stand)			36		36		72	





Update g: updated side view / For the zoomed view: indication of emergency rescue and exit windows, windows clear dimensions
Update h: updated small emergency window (cars C / D / F) and driver's seat (cars A / B), replacement of the folding seats with a bike rack (cars D / F), updated trainset capacity and ratio / For the zoomed view: indication of the car coordinate system, definition of the car ends and updated windows clear dimensions
Update i: corrected lower deck layout (cars D / F), updated intermediate deck flip-up seat position, trainset capacity and ratio / For the zoomed view: indication of emergency rescue and exit windows in the side view of car end 1 (car B)
Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North – South, wheelchair lift displaced to car end 1 in the cars C and D, 1 supplementary page with separated zoomed view of the car F

TT: Trailer Truck
MT: Motor Truck

This drawing is dimensioned with metric values: imperial dimensions are converted and rounded

Issue k: 16.03.2018

	Date	Name
Bearb.	17.06.2016	borluc
Gepr.	17.06.2016	kaetho

KISS Caltrain 6-car trainset
32.5" seat pitch - optimized for maximum seating

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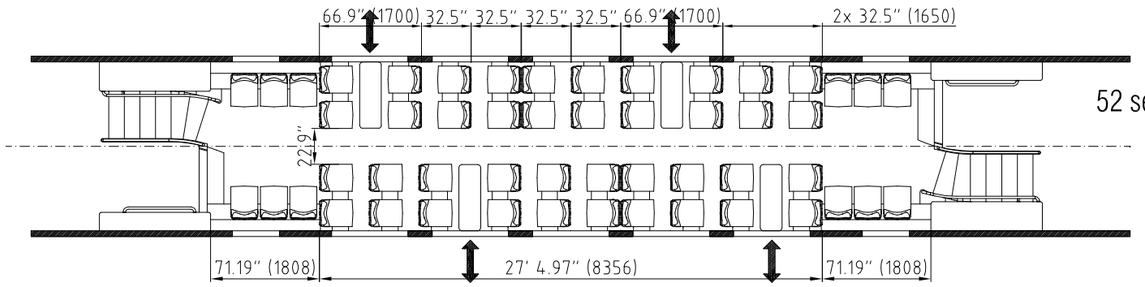
Issue: k

Urspr. | Ers. für: | Ers. durch:

Car "B"

84 seats, 18 folding seats, 2 wheelchairs



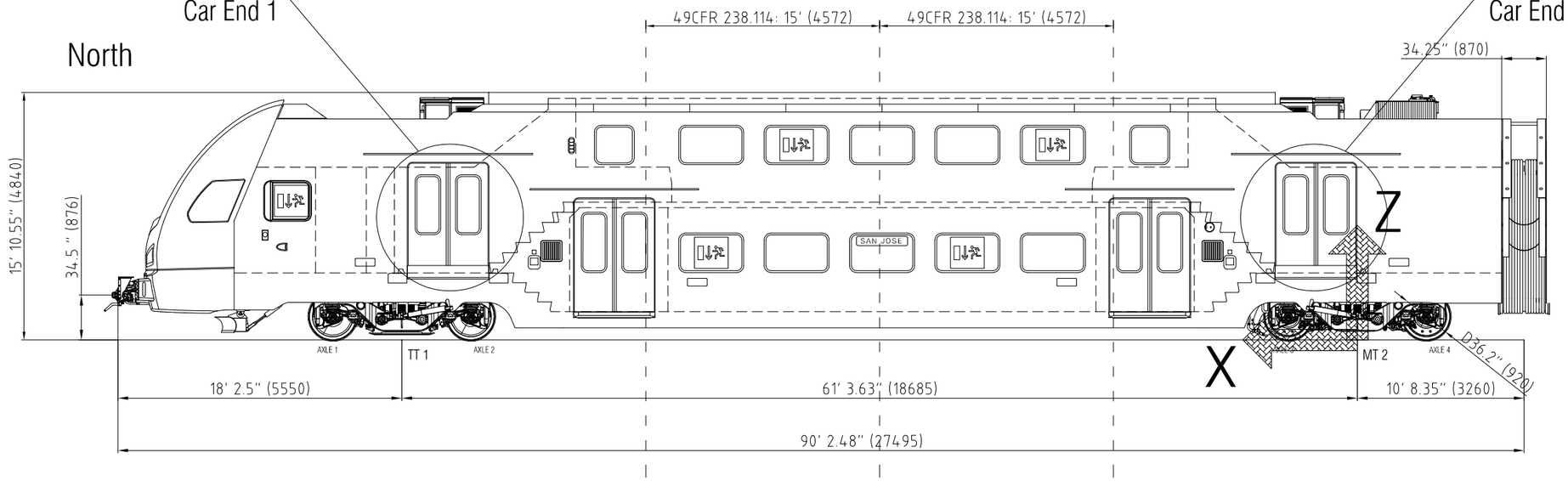
Use of door for emergency window exit and rescue access window in intermediate level without a window is in clarification with the FRA

Car End 1

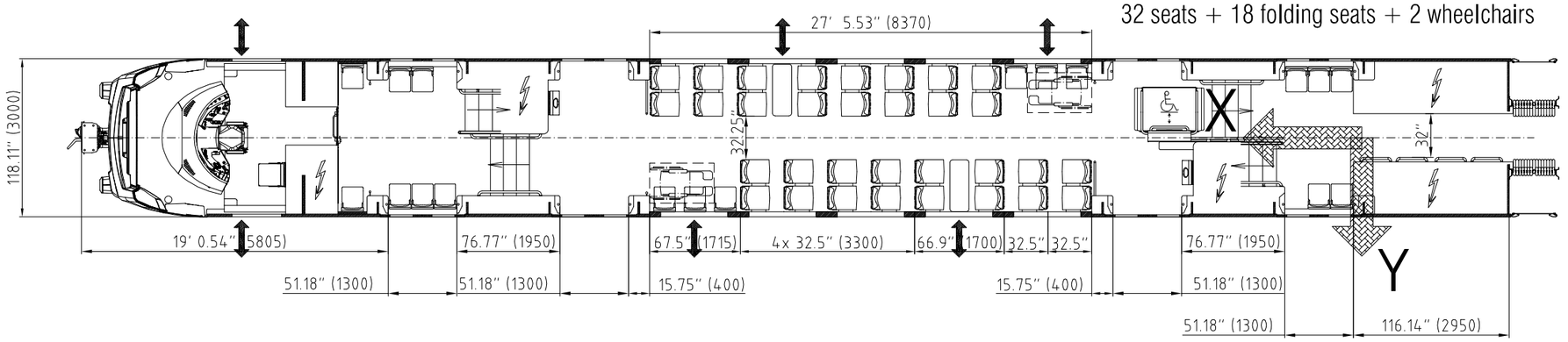
North

Use of door for emergency window exit and rescue access window in intermediate level without a window is in clarification with the FRA

Car End 2



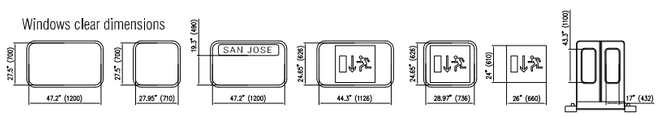
32 seats + 18 folding seats + 2 wheelchairs



or 49 CFR 238.113 Emergency window exit

49 CFR 238.114 Rescue access window including
49 CFR 238.113 Emergency window exit

Windows clear dimensions



This drawing is dimensioned with metric values: imperial dimensions are converted and rounded

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Issue k: 16.03.2018

	Datum	Name
Bearb.	23.08.2017	borluc
Gepr.	23.08.2017	sd

KISS Caltrain 6-car trainset - Car A / B

STADLER

130276 k

L-4380

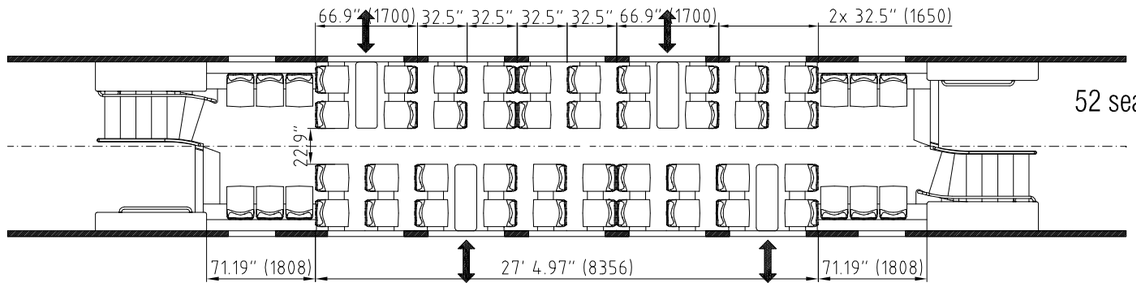
Page: 2/6

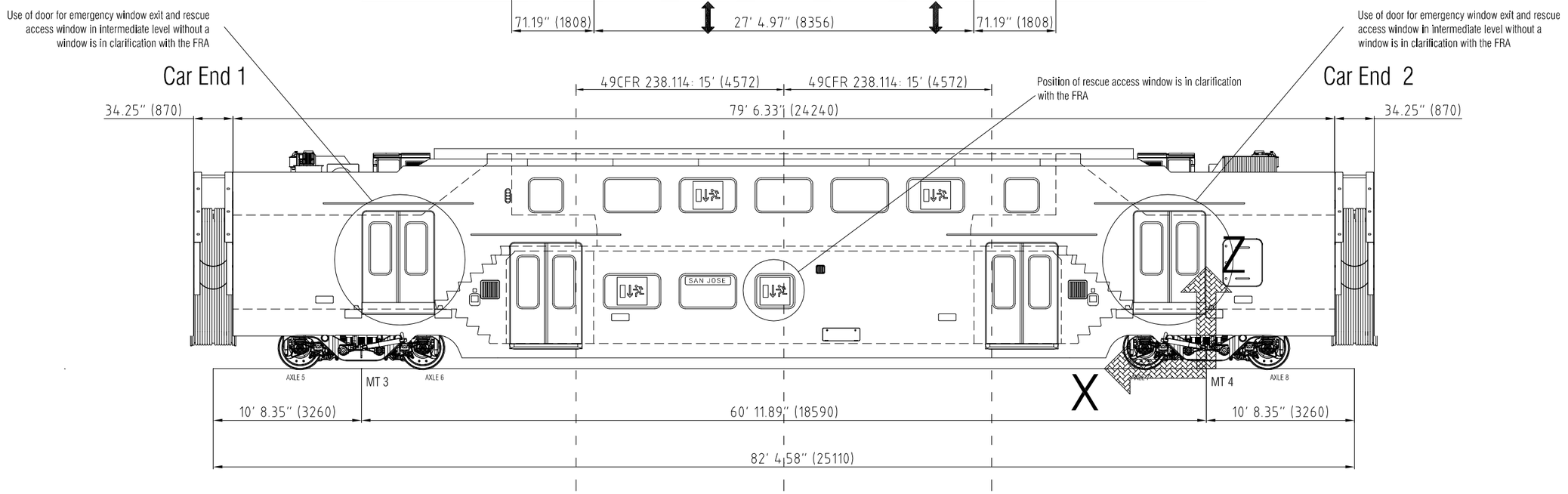
Urspr. | Ers. für: | Ers. durch:

Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D. 1 supplementary page with separated zoomed view of the car F

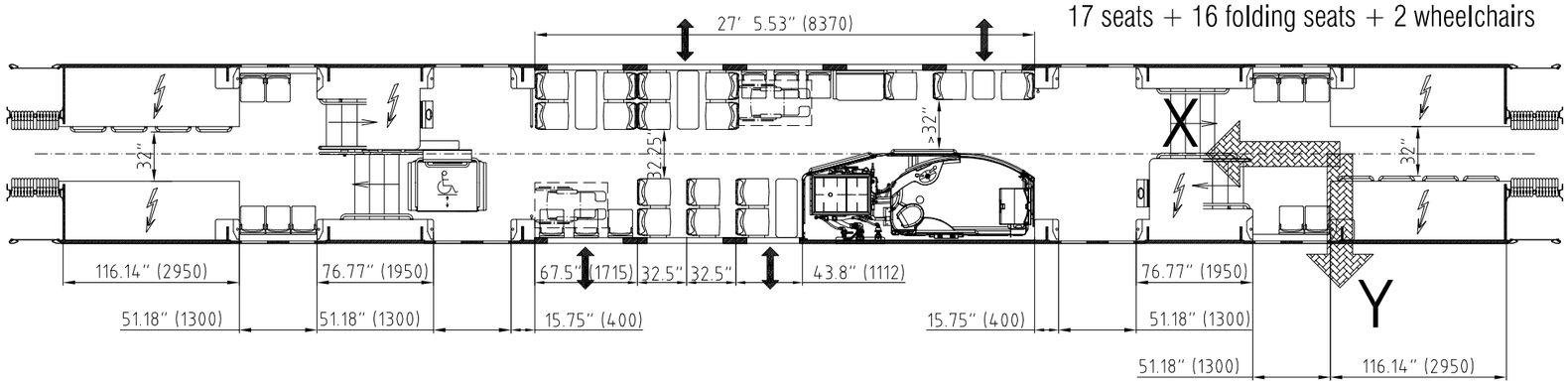
Car "C"

69 seats, 16 folding seats, 2 wheelchairs





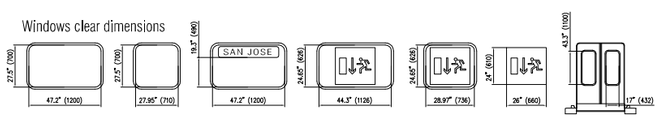
17 seats + 16 folding seats + 2 wheelchairs



or 49 CFR 238.113 Emergency window exit

49 CFR 238.114 Rescue access window including
49 CFR 238.113 Emergency window exit

Windows clear dimensions



This drawing is dimensioned with metric values: imperial dimensions are converted and rounded

CONFIDENTIAL

Issue k: 16.03.2018

	Datum	Name
Bearb.	23.08.2017	borluc
Gepr.	23.08.2017	sd

KISS Caltrain 6-car trainset - Car C

STADLER

130276 k

L-4380

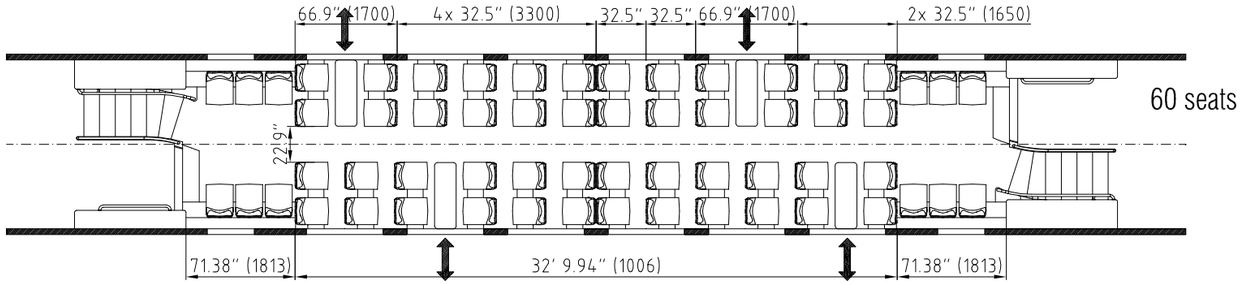
Page: 3/6

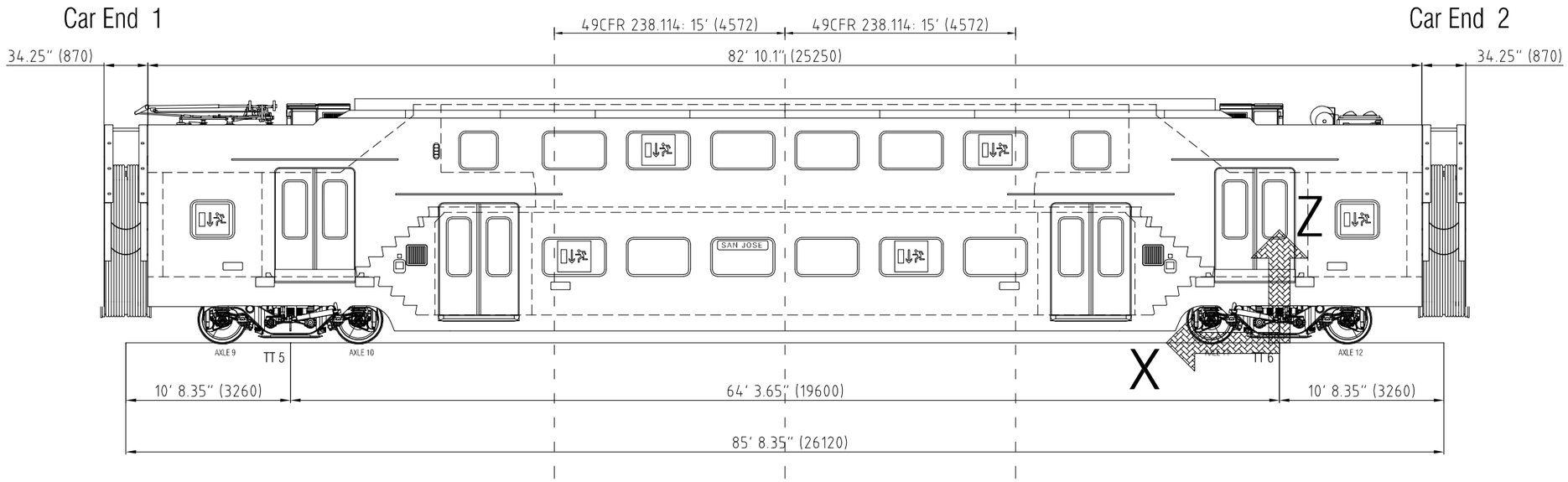
Ursprung | Ers. für: | Ers. durch:

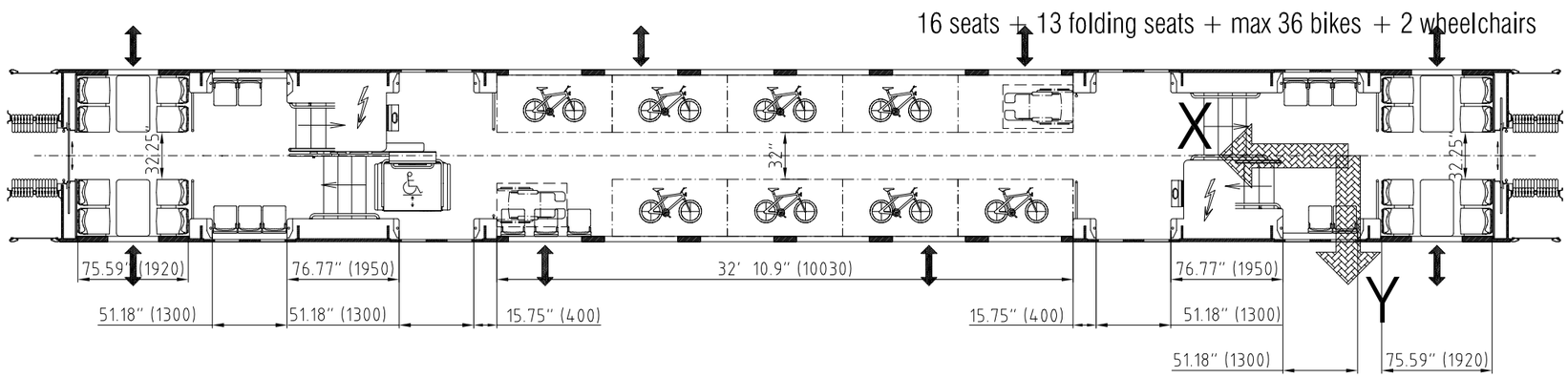
Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D. 1 supplementary page with separated zoomed view of the car F

Car "D"

76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs



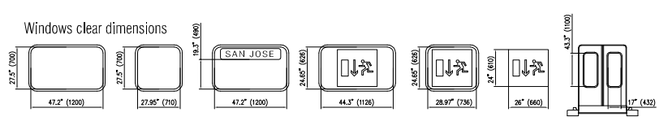




or 49 CFR 238.113 Emergency window exit

49 CFR 238.114 Rescue access window including
49 CFR 238.113 Emergency window exit

Windows clear dimensions



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Issue k: 16.03.2018

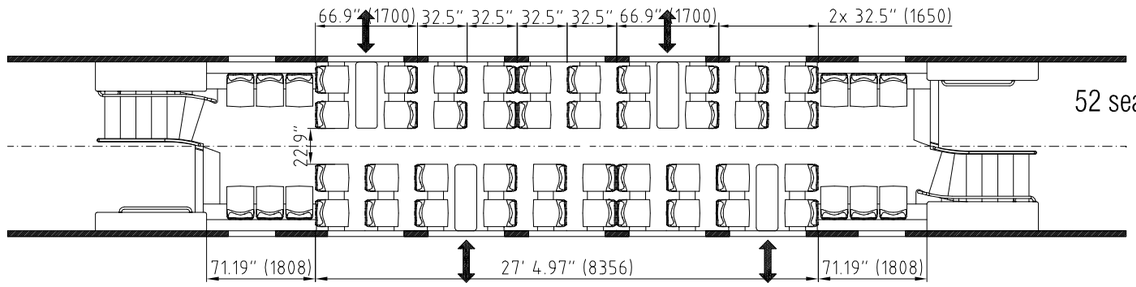
	Datum	Name	
Bearb.	23.08.2017	borluc	KISS Caltrain 6-car trainset - Car D
Gepr.	23.08.2017	sd	
STADLER			130276 k
Ursprung			Ers. für:
			Ers. durch:

L-4380
Page: 4/6

Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D. 1 supplementary page with separated zoomed view of the car F

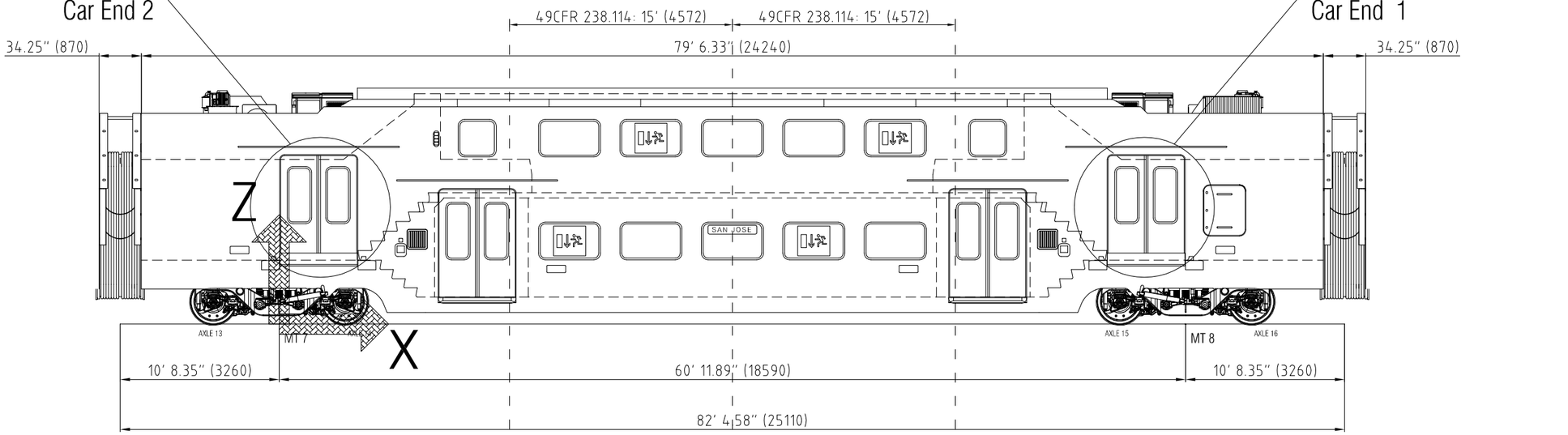
Car "E"

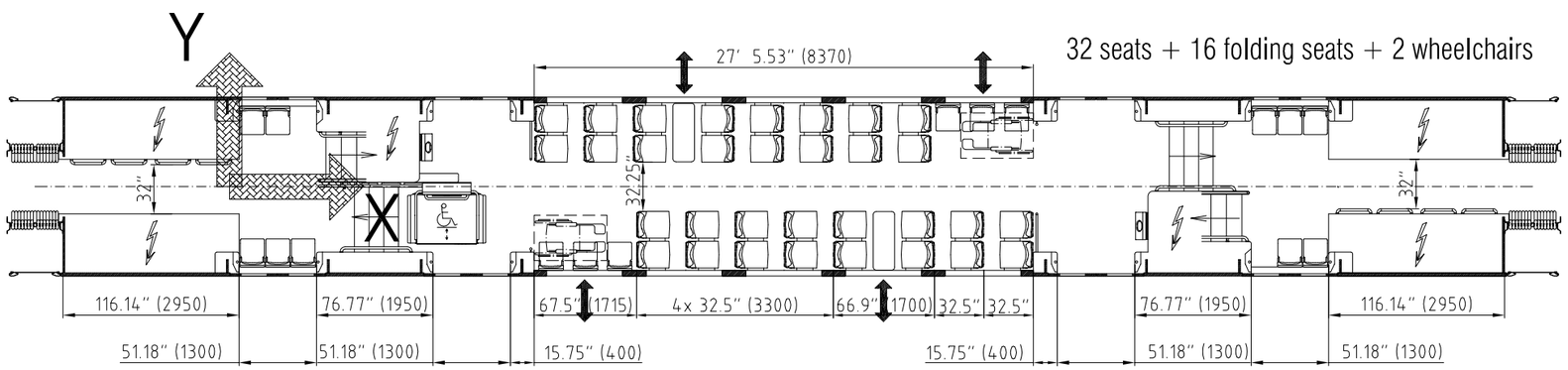
84 seats, 16 folding seats, 2 wheelchairs



Use of door for emergency window exit and rescue access window in intermediate level without a window is in clarification with the FRA

Use of door for emergency window exit and rescue access window in intermediate level without a window is in clarification with the FRA

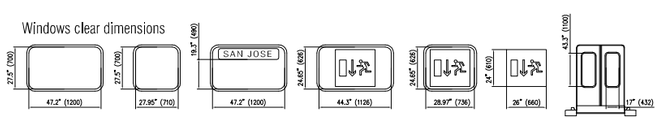




or 49 CFR 238.113 Emergency window exit

49 CFR 238.114 Rescue access window including
49 CFR 238.113 Emergency window exit

Windows clear dimensions



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Issue k: 16.03.2018

	Datum	Name
Bearb.	23.08.2017	borluc
Gepr.	23.08.2017	sd

KISS Caltrain 6-car trainset - Car E

STADLER

130276 k

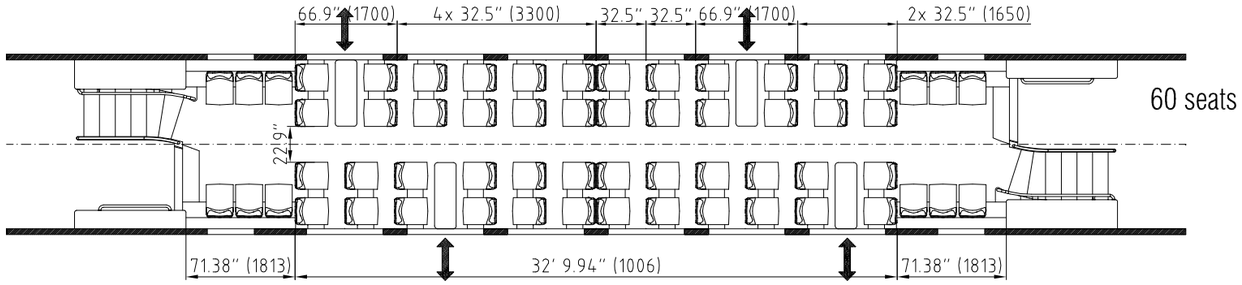
L-4380
Page: 5/6

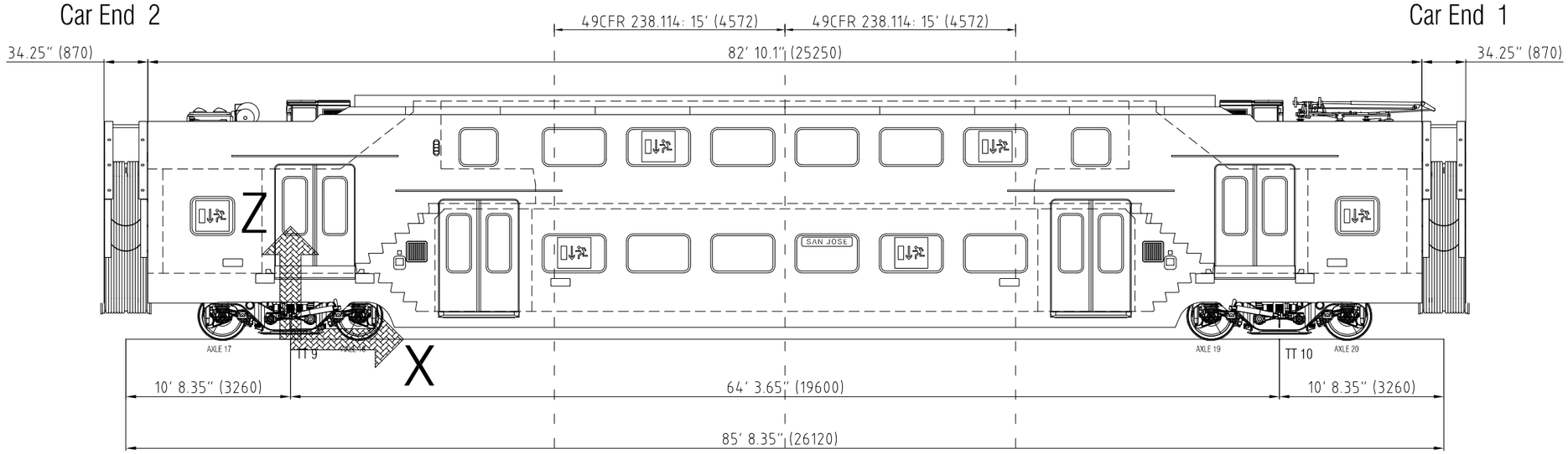
Ursprung | Ers. für: | Ers. durch:

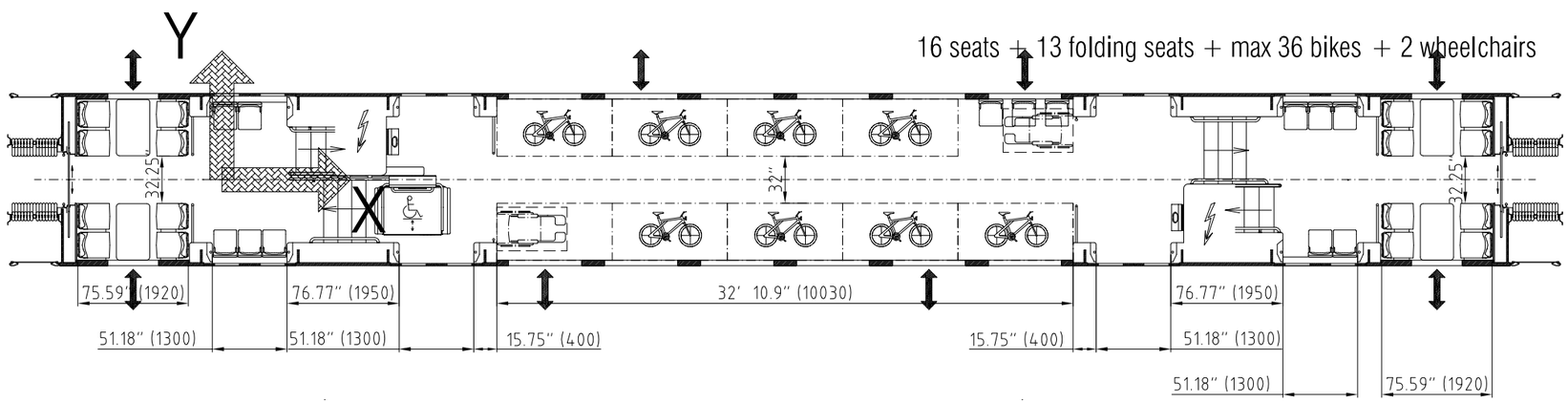
Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D. 1 supplementary page with separated zoomed view of the car F

Car "F"

76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs



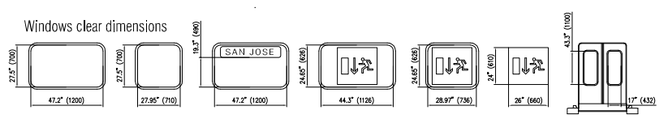




or 49 CFR 238.113 Emergency window exit

49 CFR 238.114 Rescue access window including
49 CFR 238.113 Emergency window exit

Windows clear dimensions



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CONFIDENTIAL

Issue k: 16.03.2018

	Datum	Name
Bearb.	23.08.2017	borluc
Gepr.	23.08.2017	sd

KISS Caltrain 6-car trainset - Car F

STADLER

130276 k

L-4380

Page: 6/6

Urspr. | Ers. für: | Ers. durch:

Update j: updated side view, interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D. 1 supplementary page with separated zoomed view of the car F

Appendix C. Passenger Emergency Brake Handle

Figure C1 – Emergency Brake Pull Handle

Figure C2 – Emergency Brake Pull Handle Decal (Sample)

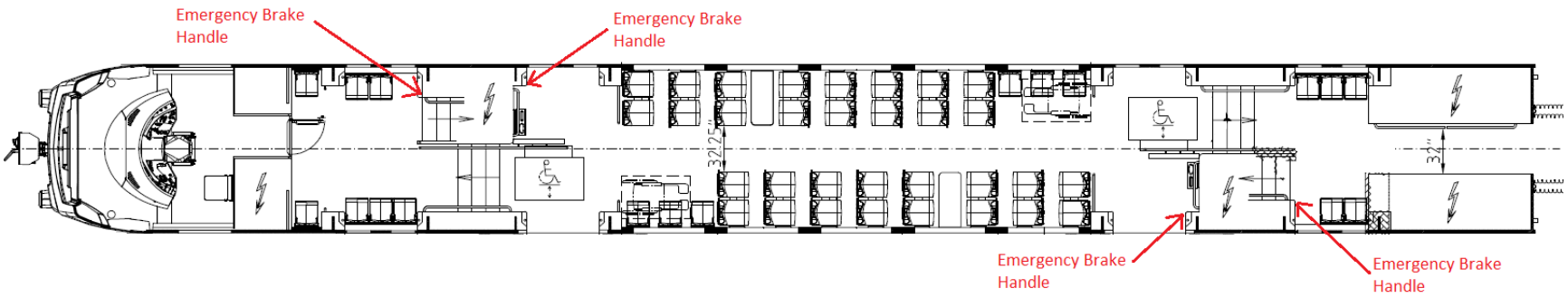


Figure C3 – Emergency Brake Pull Handle Locations (note: all cars are similar to car shown)

Appendix D. Magnetic Track Brake

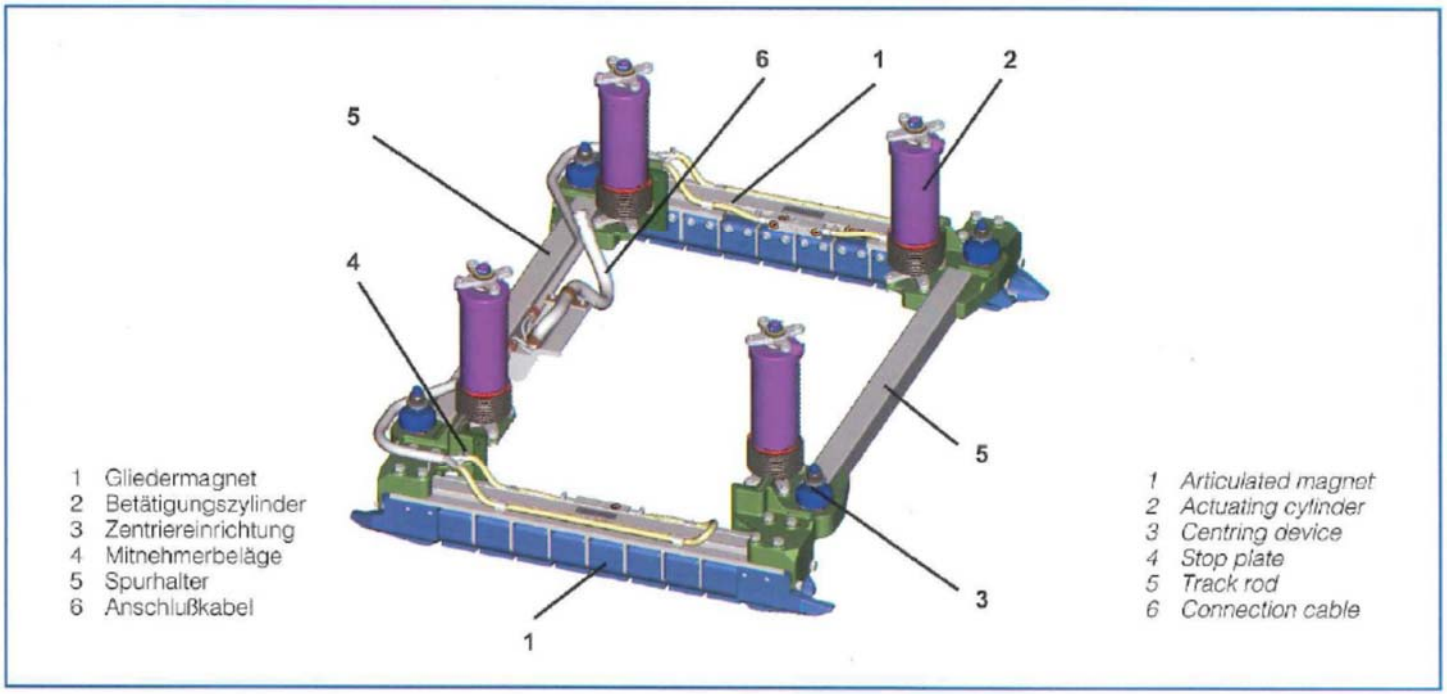


Figure D1 – Track Brake Rendering

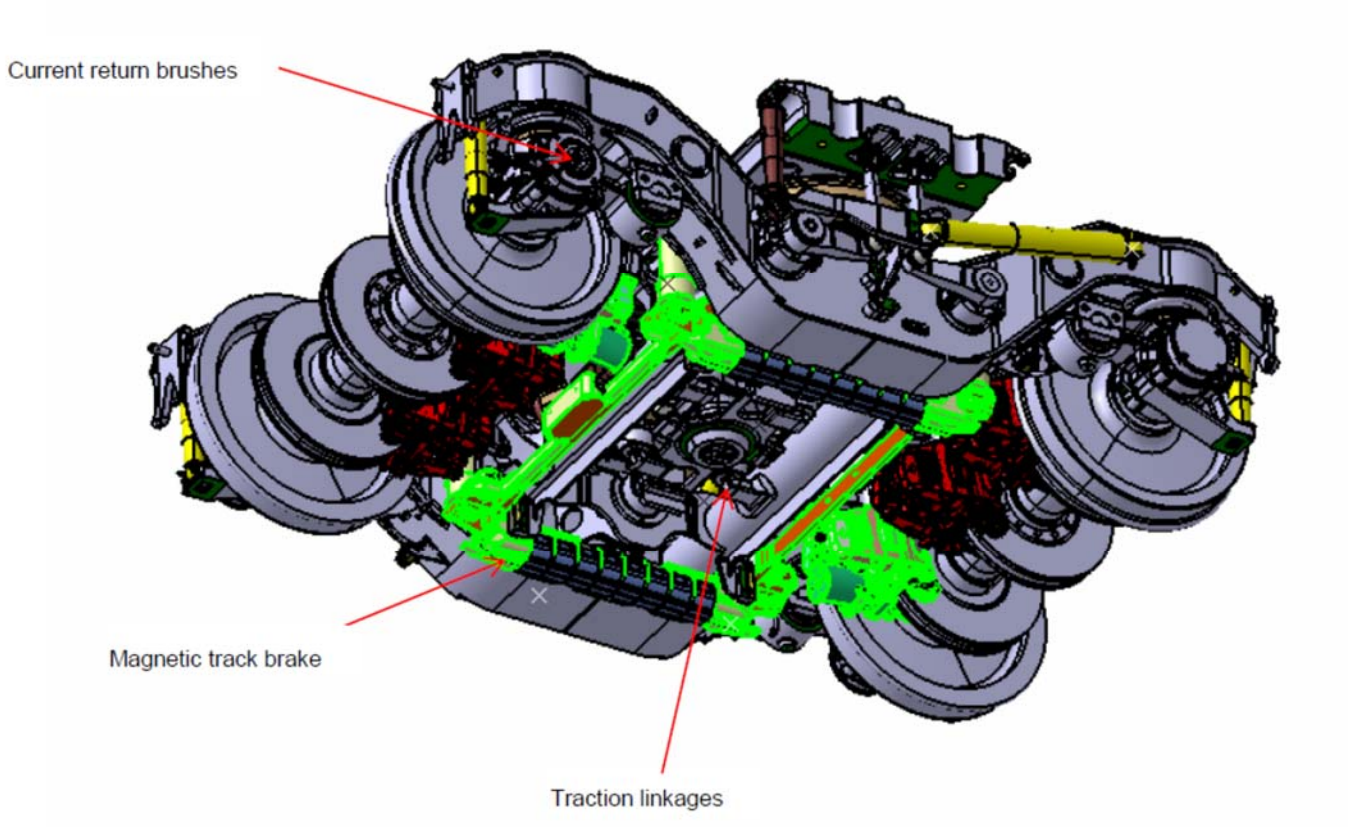


Figure D2 – Track Brake as Installed on Truck

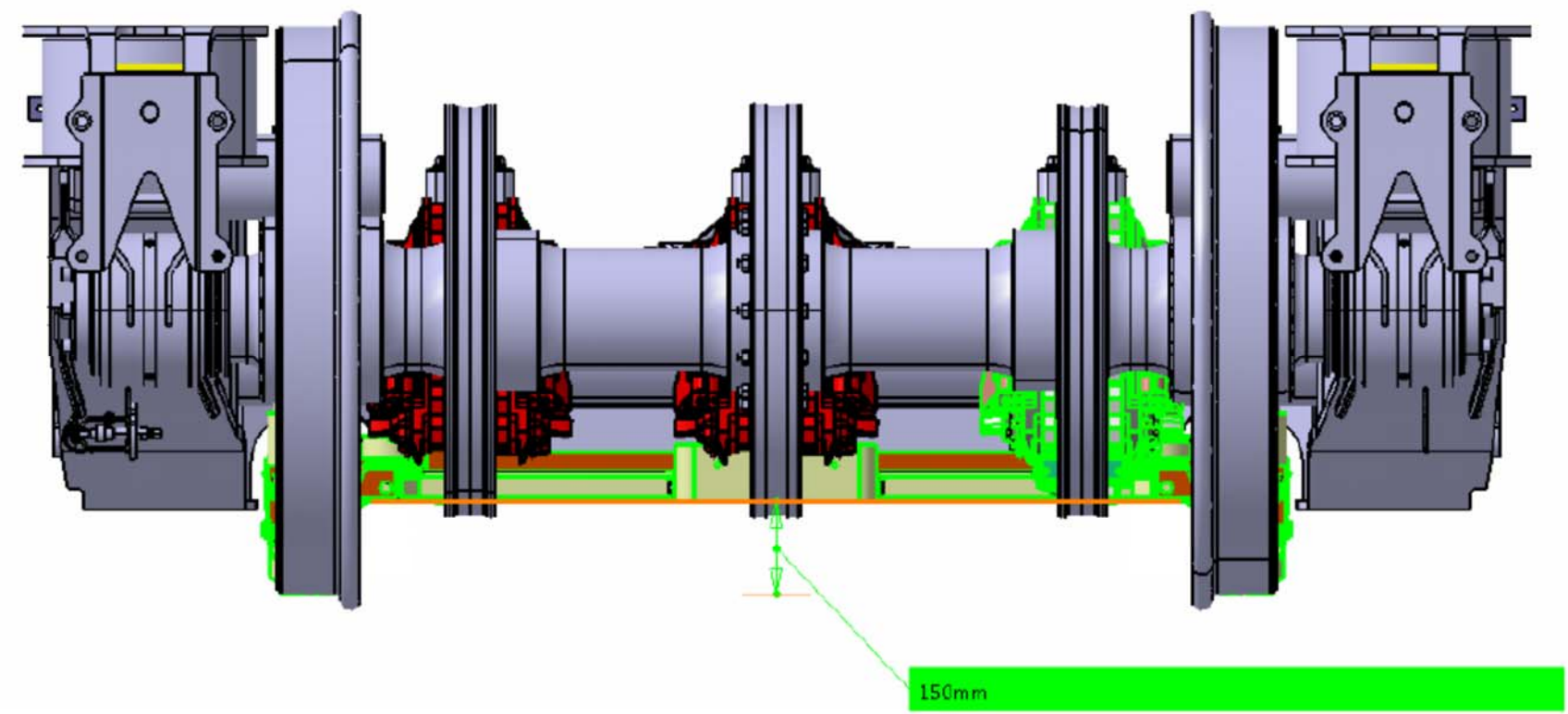
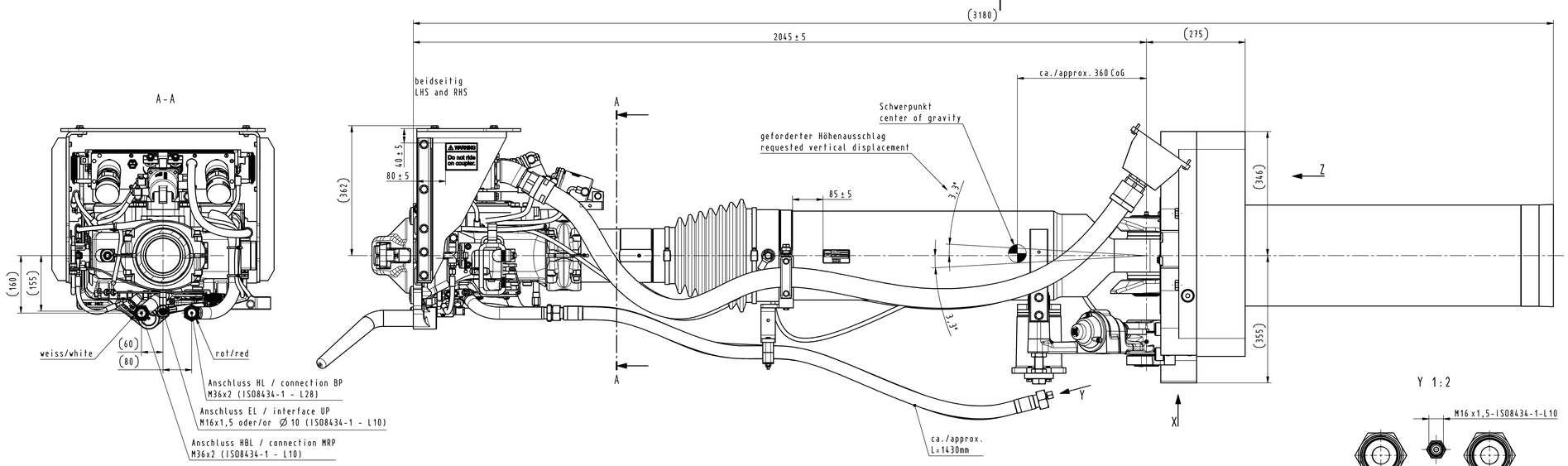
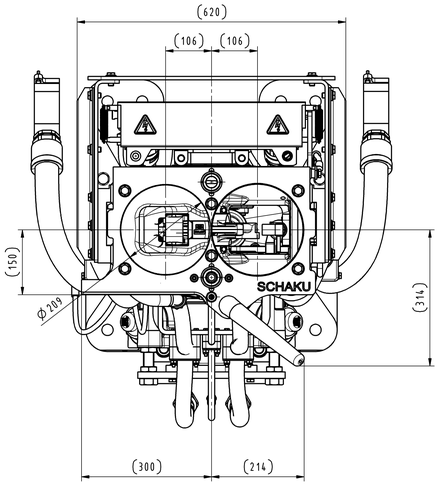


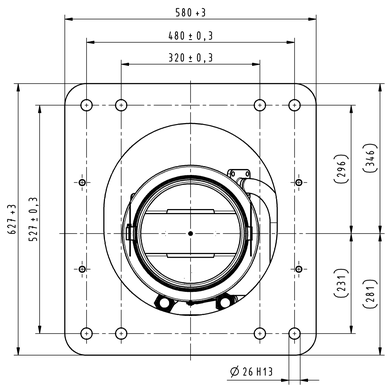
Figure D3 – Track Brake Between-Rail Nominal Clearance (150 mm ATOR)

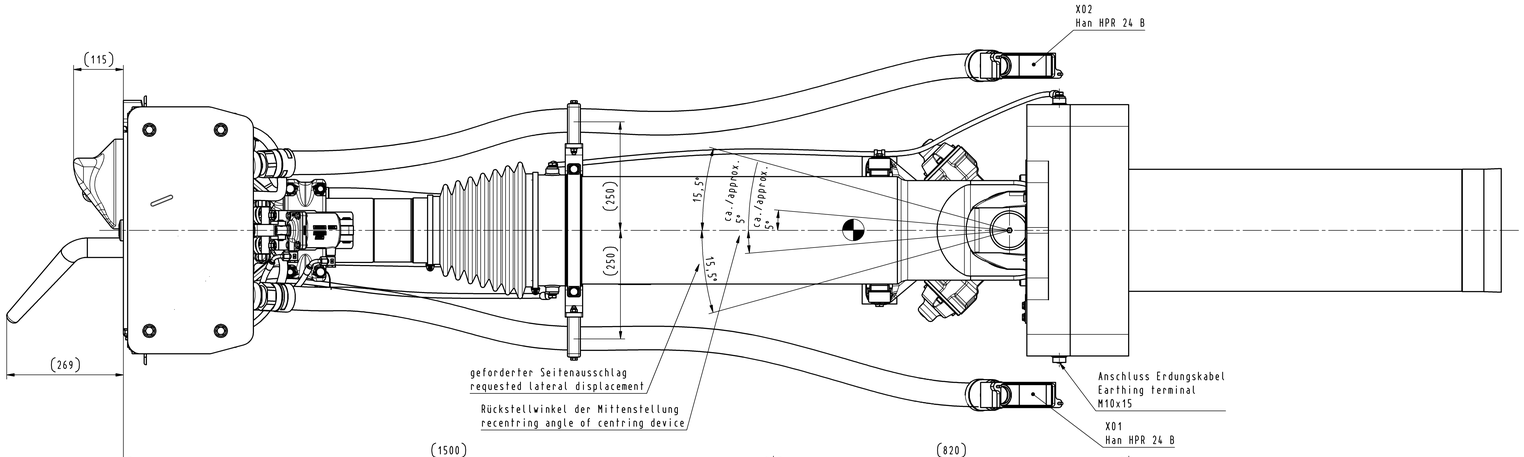
Appendix E. Automatic Coupler Drawing

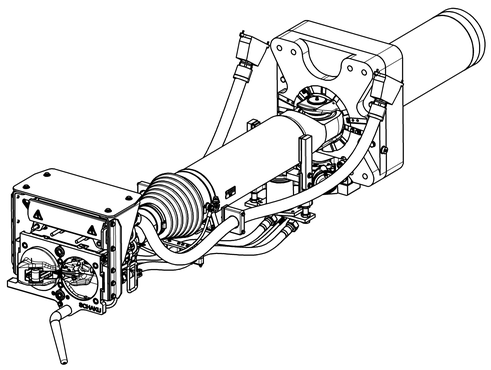


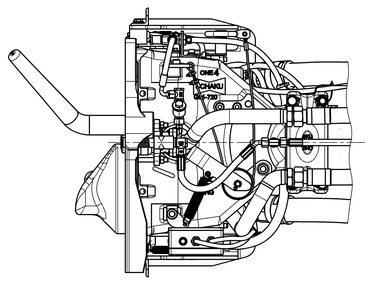


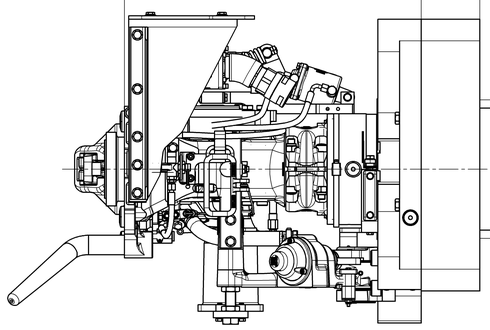
Z
Anschlussmaße am Fahrzeug
vehicle interface dimensions







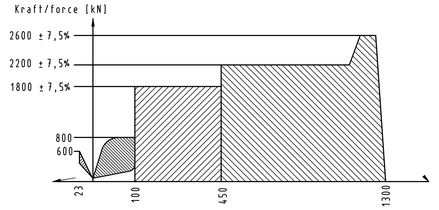




Vor Anbau und Inbetriebnahme von Produkten der Voith Turbo Scharfenberg GmbH und Co.KG und damit verbundener Ausrüstung, ist das technische Personal verpflichtet, alle zugehörigen Handbücher und Dokumentationen im Zusammenhang mit den Übersichtszeichnungen zu lesen.
Die Aufnahmeplatte im Untergestell des Fahrzeugs, an der die Kupplung befestigt wird, muss eben sein und vertikal wie horizontal rechtwinklig zur Untergestellebene liegen.
1. Ebenheit und winkelrechte Lage der Aufnahmeplatte vor Einbau der Kupplung gemäß ISO 2768-H prüfen, falls erforderlich, entsprechend herrichten.
2. Hinter der Aufnahmeplatte für ausreichenden Freiraum zum Werkzeugeinsatz sorgen.
Vor Inbetriebnahme der Kupplung sind die Kappen/Stopfen zu entfernen!

Prior to installing and commissioning products delivered by Voith Turbo Scharfenberg GmbH und Co. KG and associated equipment with them, it is mandatory for technical personnel to review all applicable manuals and documentation in conjunction with the overview drawings.
The anchoring plate for the coupler on the underframe of the car must be plane and rectangularly aligned to the underframe both vertically and horizontally.
1. Check the level surface and rectangular position of the plate according to ISO 2768-H. Adjust if necessary.
2. Make sure there is sufficient space behind the anchoring plate for the tools to be used.
Remove protection caps/plugs prior to putting the coupler into service!

Charakteristik des Energieverzehrs (theoretisch / quasistatisch)
absorption diagram (theoretical / quasistatic)



Anschlussplan elektr./pneumat. P1025
circuit diagram electr. / pneumat. P1025

			Allgemeintoleranzen:	STAHL kg	A0
				ISO 11405	
				Ersatz: ERSETZT	Ers. f.	Ers. d.
Index	Änderungsnummer	Datum	Name		
1 : 5		erstellt	2017-03-28	huettej	Scharfenbergkupplung Automatic Scharfenberg coupler
		geprüft			
		freigegeben			
		Datum	Name		
SCHAKU VOITH				P.010.8081	/23100545000	00	1 / 1
							A0

Appendix F. Side Door Step and Vertical Handhold Renderings and Dimensions

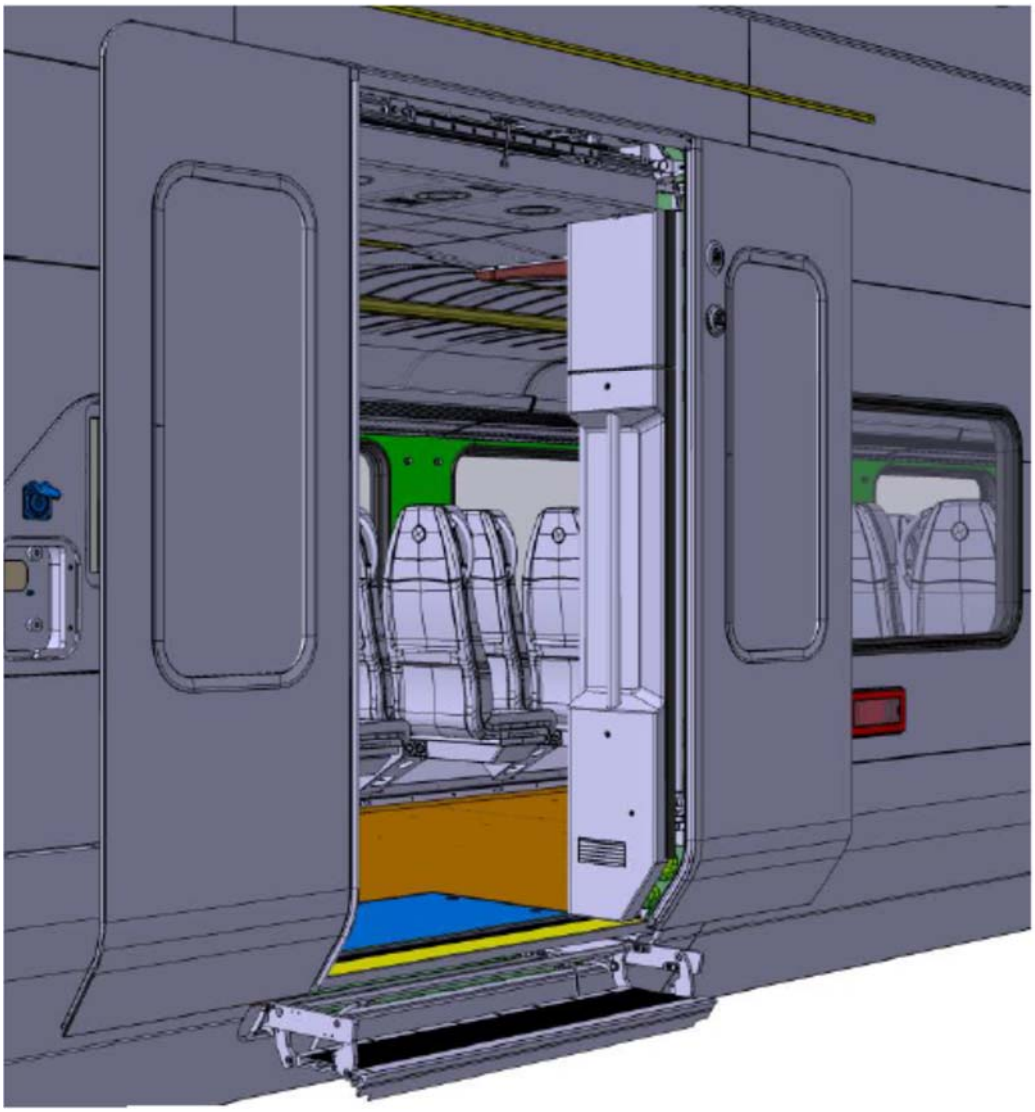


Figure F1 – CAD Rendering of Side Door Step and Side Door Handholds

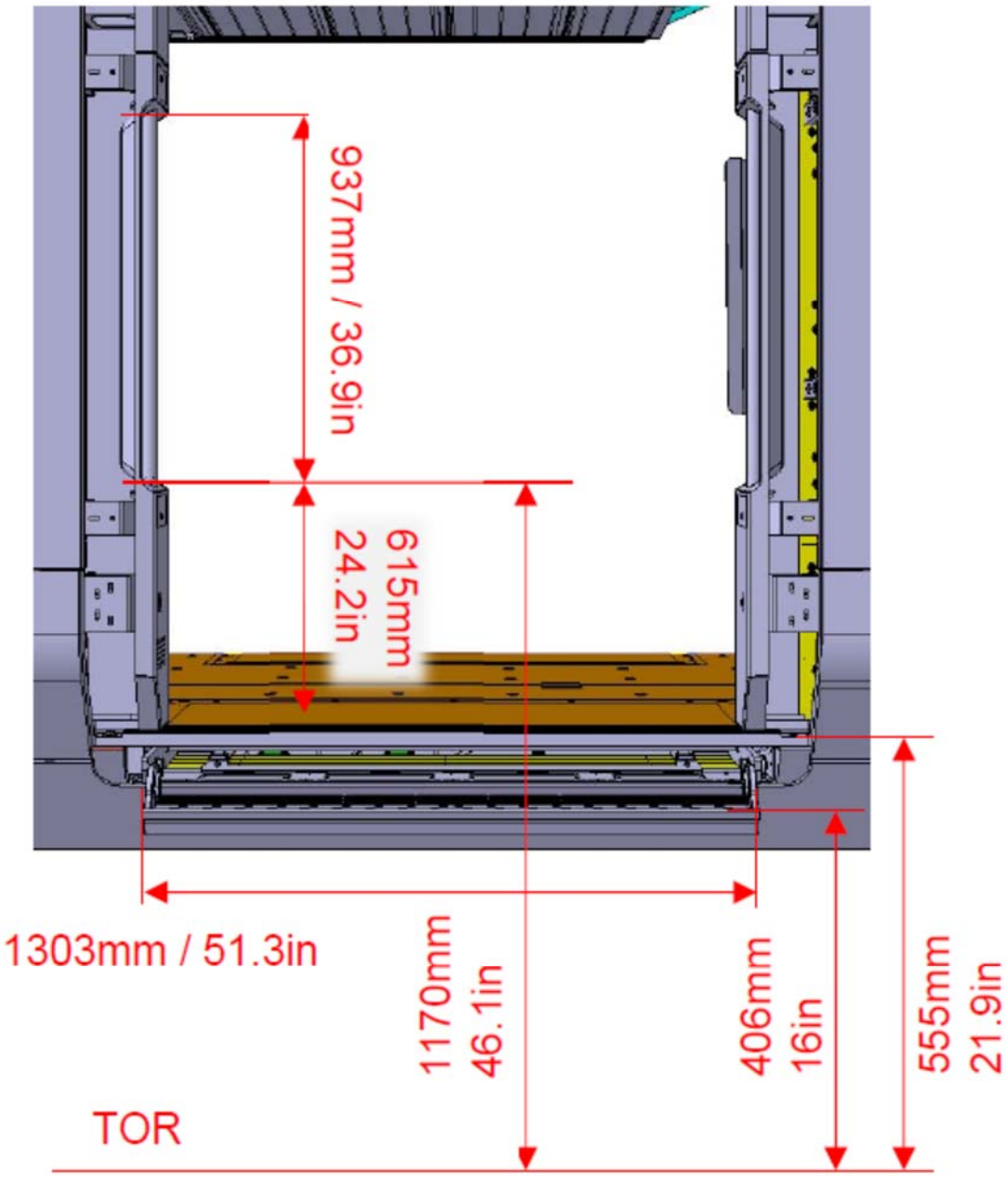


Figure F2 – Dimensions of Side Door Step and Side Door Handholds

Figure F3 – Photo Rendering of Side Door Handhold

Safety Appliances KISS Caltrain EMU

8.November.2018

Response to email from Check Kam dated September 20, 2018:

JPB/Caltrain and Stadler have jointly considered both the technical details and operational procedures on the low floor sliding step and how this relates to compliance with "side-door-step" safety appliances under §231.14(f). These considerations are detailed in the table below as line-item responses to Check's email and are summarized in the following paragraphs:

The sliding steps installed under each low floor door are provided as a convenience to passengers and crew for boarding/alighting the KISS Caltrain EMU during revenue service from/to the 8" platforms. Since the sliding step technically has no other essential function, JPB/Caltrain proposes to keep the waiver docket for safety appliances unchanged, thus excluding any references to the sliding steps. As mentioned in the docket, the low-floor arrangements at the door thresholds are directly in compliance with §231.14(f), without any additional steps (analogous to TexRail Flirt and DCTA and CMTA GTW's). This includes the operational and emergency cases of mechanically opening the door via emergency release handle (e.g. due to a fault in the door or power supply), in which case the low floor steps remain retracted and latched. However, it is wished by the Caltrain Maintenance Services to use the sliding steps as a convenience for crew and service personnel when the door is opened via crew key during maintenance and non-revenue service as well (this assumes sufficient battery power is available to fully cycle the doors and steps electrically). For this case the sliding step and its attachments are verified at a minimum, to be compliant with the strength requirements for side-door steps under §231.14(f). This analysis is part of the submitted project engineering documentation, but it is suggested to leave this out of the waiver docket to prevent any confusion about the use of the sliding step and compliance of the entrance without the sliding step.

It is to be noted that the sliding step currently cannot be deployed at any time during any type of unprotected/unmonitored train movement, including non-powered yard maneuvers. This restriction is necessary since the deployed step exceeds the defined limits of the currently valid static and dynamic envelopes. This is enforced by the train control and monitoring system during normal powered movement operations via direct interface to "green loop". For unpowered movements in the yard and/or locked-out doors, operational procedures require visual inspection of all doors and steps to ensure they are all closed and respectively retracted, latched, locked or otherwise secured prior to any movements, and if necessary provide additional protection measures by service personnel to ensure safe movement in the event maneuvers are necessary with open doors and/or deployed steps.

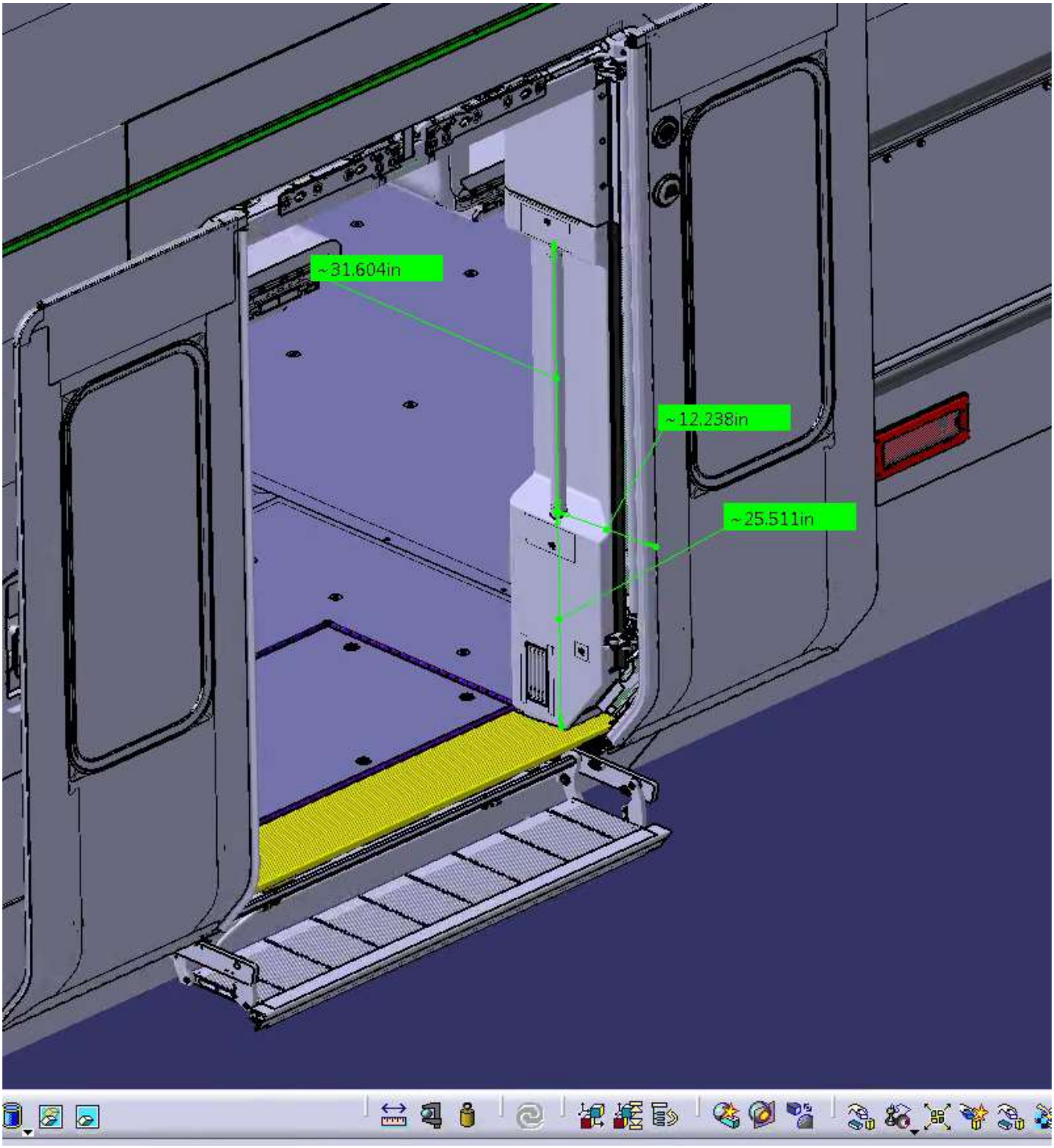
Detailed and specific replies to Check's points noted in his email:

KEY-1: *Query from Check Kam dated September 26, 2018*
KEY-2: Joint response from JPB/Caltrain and Stadler
KEY-3: Topic divider

There is not much in the justification portion that outlines the necessity for having such a side-door step design. This KISS EMU is stated to have safety appliances identical in concept to other Stadler equipment currently operating safety in the US under approved FRA waivers, with the exception of these new side-door steps on the lower levels.
The sliding step below the side doors is installed only as a convenience for passengers and crew boarding from the predominate platform height of 8 inches in the Caltrain infrastructure.
• *Why is level boarding not available in this corridor (e.g., California Public Utilities Commission General Order 26-D)?*
The EMUs are designed to interface with the current Caltrain infrastructure and platforms, which are at 8" above-top-of-rail (ATOR). The boarding and alighting will process will be the same as it is currently. Ambulatory passengers will board using the sliding steps, while wheelchair passengers will board using a 22-inch "mini-high" platform and a manually deployed bridge plate. Sometime in the future, level boarding will be implemented at either the 22" low floor doors or at the 51" high floor doors.
• *Additionally, Caltrain utilizes platforms at 8" ATOR and uses mini-high platforms at 22" ATOR to board ADA passengers. So there already seems to be an established method for the non-level boarding that is currently in use in this corridor, so how is this new step system justifiable?*
The sliding step is used only for able bodied passengers boarding from the 8" platform level. ADA passengers requiring level boarding, board from the 22" mini-high platform which includes a bridge plate to close the wide gap between the platform and the door threshold of the EMU. It is necessary for the step to be retractable because, when extended, it does not meet the clearance requirements of the system.
• *There are wheelchair accommodations on this EMU, so how will the mini-high platforms at 22" ATOR interface with these steps that extend out towards the platform?*
The sliding step is not used for interfacing with the 22" mini-high platforms. Interfacing to these platforms is performed exclusively with the manually deployed bridge plate.
As far as the design of the side-door step, there is not much in terms of explaining the operation.
The technical functional description of the sliding step is provided in FDR document AL_2187947 "CDR/PDR/FDR Doors". This document was submitted to John Manutes of the FRA Passenger Rail Division group.
• *It obviously extends and retracts, but what is the mechanism(s) behind this? It looks to be driven by its own motor.*
The sliding step extends and retracts with an autonomous motor installed each the unit. The motor is controlled by the door controller and interlocked with the door function.

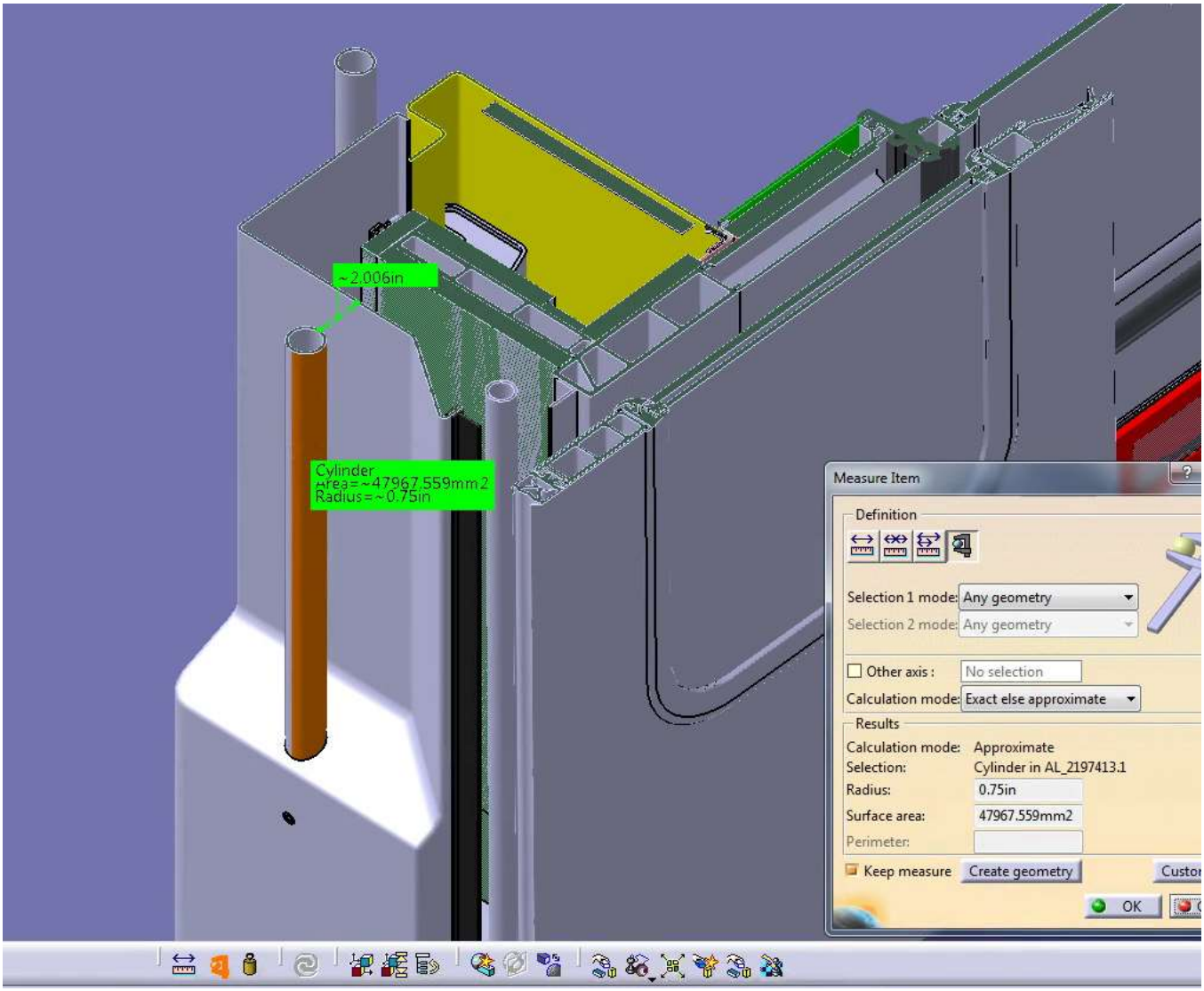
• *Is it integrated into the door opening electrical system? Is it independent of the door opening system?*
The sliding step is subordinate to the associated door and door control system. It can only be activated in normal revenue service operation when the associated door is activated. A door open command deploys the associated sliding step prior to opening the door and retracts the sliding step after closing the associated door. The door open/close cycle is not completed without the full deployment and full retraction of the sliding step. The sliding step is also integrated into the "green loop" preventing movement of the train until the sliding step is fully retracted and latched
• *Is it purely operated via an electrical switch that activates when the Engineer or Conductor pushes a button?*
In normal revenue service operation, the sliding step is activated only when the door is commanded to open. The "open" button resides on the conductor panel and can only be accessed via a crew key.
• *Is it mechanically integrated into the doorway such that it operates in tandem with the door (extends out as door opens and retracts as door closes)?*
There is no mechanical interface between the sliding step and door. The sliding step is controlled and monitored over the associated door control unit and is deployed or retracted only when the door is to be opened or closed respectively.
• *Is there a delay in the step deployment with relation to the door (certainly you don't the door to open before the steps are extended, or the steps to retract prior to the doors closing)?*
The door opening sequence enforces a complete deployment of the step prior to opening the door. The door closing sequence enforces a complete closing and latching of the door prior to retraction of the sliding step.
• *How will the steps activate in case of manual override during emergency?*
For safety reasons, the steps do not activate by manual release handles. The low floor door thresholds are less than 22 inches ATOR, thus not requiring any additional steps for emergency "override" operation (similar threshold arrangement as TexRail FLIRT and DCTA and CMTA GTW's).
• *If the steps are mechanically integrated with the door, then how will this impact emergency responders using the doorway for rescue access that may not be expecting a step to extend out?*
Since there is no mechanical integration, the steps remain in place when the doors are opened via emergency release from either inside or outside of the vehicle.

• *What is the vertical load capacity of the steps? It is 51.3" wide with handholds on both sides of the doorway so presumably two individuals can be boarding/alighting at the same time. Assuming two 95th percentile males, can the steps handle the continuous dynamic loading of 450 pounds or more?*
The steps are designed to support 2kN (~450 lbs) over a central load area of 100mm by 200mm, or a load of 5.2kN (~1,170 lbs) distributed over the whole surface of the step without plastic deformation.
As you can see, these are just some of the looming questions that I had regarding the side-door step system. Lastly, FRA has always had the stance that safety appliances be permanently fixed, preferably by means of mechanical fasteners (not welds), so the proposal of a hinged step system that extends and retracts (if approved by the Board) would in fact set a precedence for future safety appliance designs that would be contrary to FRA's stance.
The essential purpose of the sliding step is to provide safer access for passengers and crew between the low floor entrance and the 8" platform during revenue service. Although it would be preferred to use the sliding step to assist maintenance and service personnel in the depot or elsewhere during maintenance or non-revenue service, it is not mandatory. The prevention of any unsanctioned use of the sliding step is permanently implemented in the technical setup of the entrance door control system.



Location and Length of Side Door Handhold

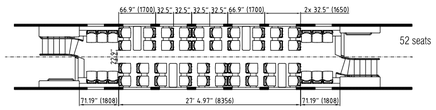
Notes: Lateral distance is from outside surface of door to centerline of handhold. Vertical distance is from car floor to bottom of handhold. Car floor is 22" ATOR (as shown on Schaltbau Bode drawing 25-309-0226-300).



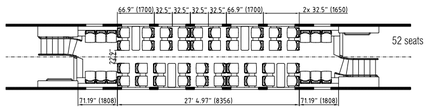
Size and Knuckle Clearance of Side Door Handhold

Notes: Diameter of handhold is 1.5” (2 times 0.75” radius shown). Knuckle clearance is 2.0” as shown.

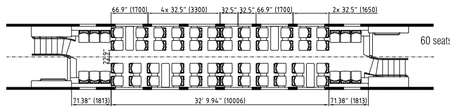
Car "B"
84 seats, 18 folding seats, 2 wheelchairs



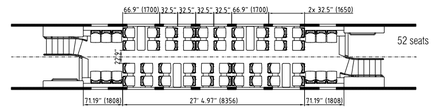
Car "C"
69 seats, 16 folding seats, 2 wheelchairs

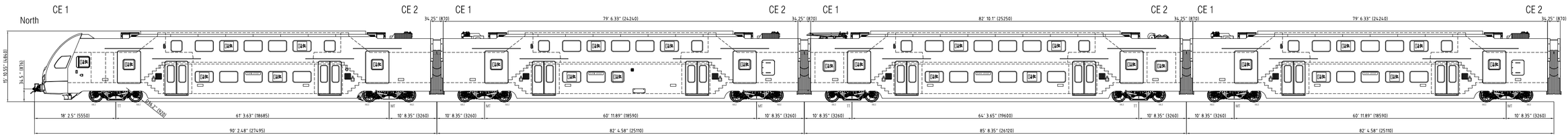


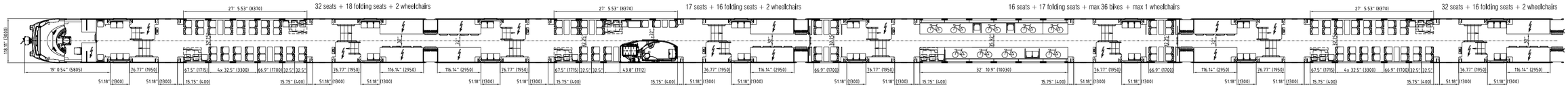
Car "D"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs



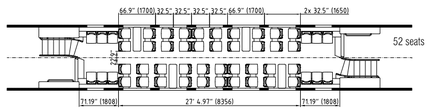
Car "G"
84 seats, 16 folding seats, 2 wheelchairs



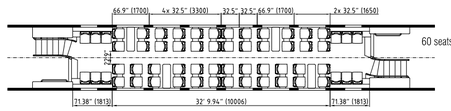




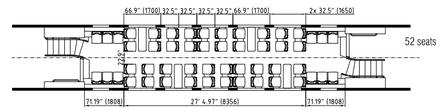
Car "E"
84 seats, 16 folding seats, 2 wheelchairs

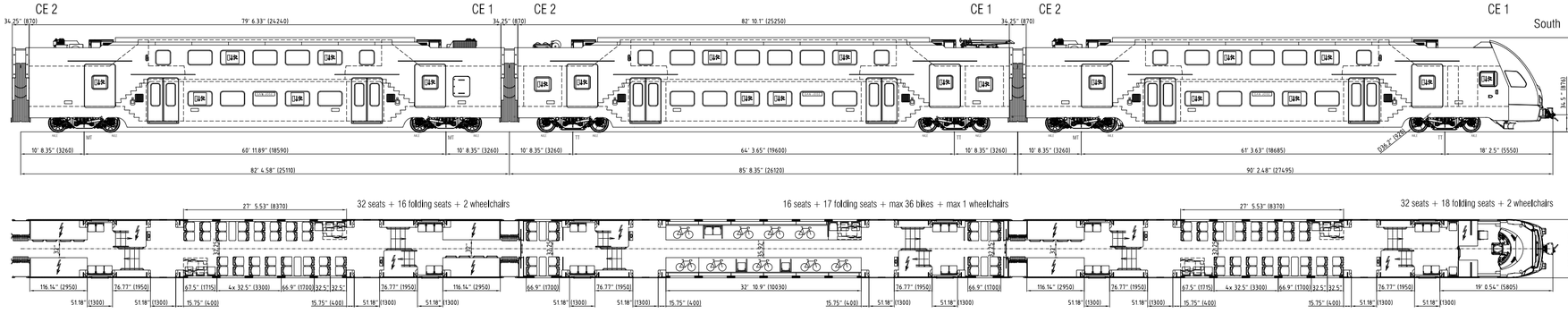


Car "F"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs

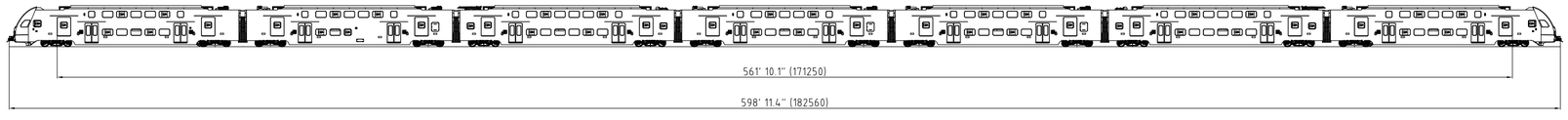


Car "A"
84 seats, 18 folding seats, 2 wheelchairs





	Car B	Car C	Car D	Car G	Car E	Car F	Car A	Total	Ratio
Fixed Seats	84	69	76	84	84	76	84	557	7.74
Folding Seats	18	16	17	16	16	17	18	118	
Total Seats	102	85	93	100	100	93	102	675	
Folding Seats - all passenger side doors operational	8	6	7	6	6	7	8	48	
Total Seats - all passenger side doors operational	92	75	83	90	90	83	92	605	
Countable Folding Seats - for the core number	16	13	13	14	14	13	16	105	
Total countable Seats (core number)	100	82	92	98	98	92	100	662	
Standees 4 P / m² - without Stairwells / Wheelchairs	138	143	150	141	141	150	138	**1001**	
Standees 6 P / m² - without Stairwells / Wheelchairs	207	214	225	212	212	225	207	**1502**	
Max Capacity 4 P / m² - without Stairwells / Wheelchairs	240	228	239	241	241	239	240	**1668**	
Max Capacity 6 P / m² - without stairwells / Wheelchairs	309	299	314	312	312	314	309	**2169**	
Max Wheelchairs	2	2	1	2	2	1	2	12	
Max Bikes (4 per stand)			36			36		72	



TT: Trailer Truck
MT: Motor Truck
CE: Car End

This drawing is dimensioned with metric values: imperial dimensions are converted and rounded

Issue p: 28.10.2021

	Date	Name
Bearb.	17.06.2016	borluc
Gepr.	17.06.2016	kaetho

KISS Caltrain 7-car trainset
32.5" seat pitch - optimized for maximum seating
CONFIDENTIAL

STADLER

130276 L-4380 Issue: p

Page: 1/7

Urspr. | Ers. für: | Ers. durch:

Update g: updated side view / For the zoomed view: indication of emergency rescue and exit windows, windows clear dimensions
Update h: updated small emergency window (cars C / D / F) and driver's seat (cars A / B), replacement of the folding seats with a bike rack (cars D / F), updated trainset capacity and ratio / For the zoomed view: indication of the car coordinate system, definition of the car ends and updated windows clear dimensions
Update i: corrected lower deck layout (cars D / F), updated Intermediate deck flip-up seat position, trainset capacity and ratio / For the zoomed view: indication of emergency rescue and exit windows in the side view of car end 1 (car B)
Update j: updated side view, Interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D, 1 supplementary page with separated zoomed view of the car F
Update l: Change from 6 car to 7 car trainset, new storage arrangement of bicycles in cars D and F, pathway to emergency windows
Update m: Car End added
Update n: Car D and F, In Intermediate level seat distance 1700 Instead of 1920
Update o: Cover "GFK" Instead of the entrance doors in the Intermediate deck, in cars D and F: only 1 wheelchair space each, plus 4 more folding seats, stairlifts removed
Update p: Car D and F with partition wall between wheelchair space and bicycle area

Caltrain KISS EMU
Base Waiver Request Report

Prepared by: Hatch, formerly LTK Engineering Services
Revision: Revision 1
Date: October 27, 2023

EXECUTIVE SUMMARY

Caltrain is pleased to submit this waiver request report for review by the FRA. This report describes aspects of the Stadler KISS Electric Multiple Unit (EMU) train that may not meet the specific requirements of 49 CFR Parts 200 through 299, and, where necessary, petitions the Administrator for issuance of acceptance based on alternate or equivalent compliance. This assessment does not include Alternative Vehicle Technology (AVT) related elements as those are addressed in docket FRA-2009-0124.

The elements covered by this report are:

- Passenger area emergency brake valve
- Track brake clearance
- Safety appliances

The Base Waiver Request Report was initially prepared and submitted in July 2018 and reflected the contract terms, design specification, assumptions, and work current at that time.

Caltrain, at the request of the FRA, has revised the Base Waiver Request Report to reflect the now-current contract terms, design specification, vehicle construction, and corridor work. Caltrain is still petitioning the Administrator for a waiver of the key items highlighted above and detailed in the following report.

TABLE OF CONTENTS

1 Introduction

Caltrain operates commuter rail passenger service throughout the Peninsula corridor from San Francisco to Gilroy under the auspices of the Peninsula Corridor Joint Powers Board (JPB). The northern terminal is at 4th and King Streets in San Francisco where there are local connections to Muni bus and streetcar services.

Caltrain currently utilizes platforms at 8 inches above top-of-rail (ATOR) and uses mini-high platforms at 22 inches ATOR to board ADA passengers.

During program planning, Caltrain operated 92 trains per day, with 5 trains per direction in peak hours. Caltrain had seen a steady growth in ridership over the past decade. In FY2015, Caltrain carried a record 18.5 million passengers and in 2016, average weekday ridership reached over 62,400 passengers. Current service is offered via 5-car diesel-hauled train sets. To meet growing demand, Caltrain increased the length of roughly half the fleet to 6-car train sets. Long term projections, now supported by Covid recovery, indicated that more trains per peak hour must be operated, which required major changes to infrastructure and rolling stock.

Caltrain Electrification of the alignment between San Francisco and Tamien will enable the introduction of multi-level EMU vehicles to meet Caltrain's continually expanding service. Significant operational benefits to be realized from the EMU vehicles include higher acceleration and braking capabilities resulting in shorter travel times, higher reliability, a more environmentally sensitive operation, and simplified operating and maintenance procedures. The Caltrain corridor is also the link to San Francisco within in the California High-Speed Rail (CHSRA) statewide network.

The EMU procurement began with a Request for Proposal in August of 2015. The contract was awarded to Stadler Rail Group of Switzerland in August of 2016. The contract, after two modifications, requires delivery of 23, seven-car trainsets with delivery of the first train occurring in spring of 2022. The project is currently in the final vehicle assembly, on-going vehicle delivery, and initial burn-in testing. To date, four EMU trainsets have been delivered.

Each seven-car trainset is identical and consists of 2 cab cars and 5 coach cars (a datasheet is provided in Appendix A and a general arrangement drawing is provided in Appendix B). Each is a multi-level car built upon the Stadler “KISS” platform and contains three types of levels: a lower level, two intermediate levels and an upper level. The lower and upper levels are considered “main levels”. In addition, each car contains both intermediate level doors and lower-level doors. Initially, Caltrain will utilize only the lower-level doors to serve their existing 8-inch platforms. Once CHSRA service begins in the corridor, there will be a station or two that will have high level platforms and will be served by the Caltrain EMUs via the intermediate level doors. Other Caltrain stations will remain low level and will be served by the lower-level doors. Both intermediate and low-level doors will be utilized by Caltrain EMUs once CHSRA service begins. For safety, security, and maintenance, the upper-level doors and all associated boarding steps, handholds, and passenger annunciation devices have been replaced with non-opening plugs; the upper-level doors can be restored at an appropriate time in the future.

2 Purpose

The purpose of this document is to describe aspects of the Caltrain KISS EMU design that may not meet the specific requirements of relevant portions of 49 CFR Parts 200 through 299, and where necessary, petition to the Administrator for issuance of clarification or acceptance based on alternate or equivalent compliance as required.

Each item includes a discussion of the CFR requirement, a description of the Caltrain KISS EMU configuration, and a detailed discussion of the acceptance justification. If a CFR Part or subpart is not listed, Caltrain believes that the EMU complies with the applicable requirements of that Part or subpart.

It should be noted that the Caltrain KISS EMU utilizes an Alternative Vehicle Technology (AVT) crashworthiness design and that Caltrain has been granted an AVT waiver by the FRA (reference docket FRA-2009-0124), therefore that subject, which is covered by 49 CFR Part 238, is not covered by this document.

3 Caltrain KISS EMU Relevant Details

As mentioned, each seven-car trainset is identical and consists of 2 cab cars and 5 coach cars. Each cab car has an automatic coupler at its front end. All cars in the seven-car trainset are connected using semi-permanent couplers and each trainset is intended to be operated as a single unit (i.e. the cars will not routinely be separated). There are 8 motor trucks and 6 trailer trucks per train. Each trailer truck is equipped with a magnetic track brake. For ambulatory passengers and crew members, the lower-level doors are accessed from the existing 8-inch platforms using a retractable step that is external to the car.

4 FRA Base Waiver Requests

4.1 Emergency Brake Valve (229.47 (b) and 238.305 (c)(5))

4.1.1 Regulation

49 CFR 229.47 (b) Emergency Brake Valve
DMU, MU, and control cab locomotives operated in road service shall be equipped with an emergency brake valve that is accessible to another crew member in the passenger compartment or vestibule. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each valve or shall be shown on an adjacent badge plate.

49 CFR 238. 305 (c)(5) Interior Calendar Day Inspection of Passenger Cars
(c) As part of the interior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the car defective whenever discovered in service, except as provided in paragraphs (c)(8) through (c)(12) and paragraph (d) of this section.

(5) The words "Emergency Brake Valve" are legibly stenciled or marked near each brake pipe valve or shown on an adjacent badge plate.

4.1.2 Caltrain KISS EMU Configuration

The Caltrain KISS EMU utilizes pull handles to provide a means for crew members and passengers to initiate an emergency brake condition. When a pull handle is activated (or "pulled"), propulsion is cut and an irretrievable emergency brake is initiated. The handle can only be reset using a crew key.

There is one emergency brake pull handle per doorway area, 4 total per car, and each is appropriately stenciled with the nomenclature "Emergency Brake". See Appendix C.

4.1.3 Justification

Though the Caltrain KISS emergency brake pull handles are not technically "valves" as specified in the regulatory language, they perform the same function as a valve. The vehicle is equipped with a modern electro-pneumatic brake system that does not rely on a conventional trainlined brake pipe to initiate an emergency brake command to the train. Therefore, an 'Emergency Brake Valve' is not applicable to this design. Instead, emergency brake commands are transmitted using electronic signals using fail-safe design principles. The emergency brake handles perform an equivalent function as the required Emergency Brake Valve.

4.1.4 Request

Caltrain petitions the FRA to agree that the use of the passenger emergency brake handle (4 per car) and associated decals meet the requirements of 49 CFR 229.47 (b) and 49 CFR 305 (c)(5).

4.2 Clearance above Top of Rail (229.71)

4.2.1 Regulation

49 CFR 229.71
No part or appliance of a locomotive except the wheels, flexible nonmetallic sand pipe extension tips, and trip cock arms may be less than 2-½ inches above the top of rail.

4.2.2 Caltrain KISS EMU Configuration

Magnetic Track Brakes are mounted on each non-powered (i.e. trailer) truck of the Caltrain KISS EMU. Track brakes are commonly used on light rail and high-speed rail vehicles to provide supplemental deceleration force independent of wheel rail adhesion limitations. The track brake is deployed when activated by pneumatic operating cylinders and energized using low voltage current from the vehicle battery. When energized, the track brake becomes an electromagnet that is pulled down to contact the rail. The combination of the magnetic attraction and the coefficient of friction between the track brake and the rail results in a deceleration force that is transferred from the rail to the track brake and into the truck side frame. The magnetic track brake has two positions: stowed and deployed. In its normal stowed position, the track brake is positioned 3.9 inches above-top-of-rail (ATOR). Under maximum permissible wear conditions, the track brake assembly will remain 2-½ above-top-of-rail. In the deployed position, the track brake is in contact with the top of rail thus violating the FRA-required clearance.

The magnetic track brake is further described and depicted in Appendix D.

4.2.3 Justification

The track brake system is designed to supplement the Caltrain KISS EMU dynamic and friction brake systems. Proper operation of the track brake requires the brake to come into contact with the railhead when activated.

4.2.4 Request

Caltrain petitions the FRA to accept the use of magnetic track brakes which do not meet the minimum clearances specified 49 CFR 229.71. The use of the magnetic track brake enhances the braking capabilities of the vehicle and only violates the FRA required clearance in the area where the track brake comes into contact with the rail.

4.3 Safety Appliances (231.14 (b) – (d), (f), (g), 238.229, 238.230 (d))

4.3.1 Regulation

49 CFR 231.14
(b) Sill steps
(c) Side handholds
(d) End handholds
(f) Side-door steps
(g) Uncoupling levers.

49 CFR 238.229
(a) Except as provided in this part, all passenger equipment continues to be subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in Federal regulations at part 231 of this chapter.

49 CFR 238.230 (d)
(d) Passenger cars of special construction. A railroad or a railroad's recognized representative may submit a request for special approval of alternative compliance pursuant to §238.21 relating to the safety appliance arrangements on any passenger car considered a car of special construction under §231.18 of this chapter. Any such petition shall be in the form of an industry-wide standard and at a minimum shall:

(1) Identify the type(s) of car to which the standard would be applicable;
(2) As nearly as possible, based upon the design of the equipment, ensure that the standard provides for the same complement of handholds, sill steps, ladders, hand or parking brakes, running boards, and other safety appliances as are required for a piece of equipment of the nearest approximate type already identified in part 231 of this chapter;
(3) Comply with all statutory requirements relating to safety appliances contained at 49 U.S.C. 20301 and 20302;
(4) Specifically address the number, dimension, location, and manner of application of each safety appliance contained in the standard;
(5) Provide specific analysis regarding why and how the standard was developed and specifically discuss the need or benefit of the safety appliance arrangement contained in the standard;

(6) Include drawings, sketches, or other visual aids that provide detailed information relating to the design, location, placement, and attachment of the safety appliances; and
(7) Demonstrate the ergonomic suitability of the proposed arrangements in normal use.

4.3.2 Caltrain KISS EMU Configuration

The Caltrain KISS EMU does not have sill steps, side handholds, end handholds, or uncoupling levers. The Caltrain KISS EMU safety appliance arrangement is identical in concept to other Stadler equipment operating safely in the US under approved FRA waivers.

The Caltrain KISS EMU does have side-door steps at the lower-level side doors, but not in the conventional sense as described in 49 CFR 231.14. These are described below.

4.3.3 Justification

Sill Steps/Side Handholds

Sill steps and side handholds are intended to allow railroad employees to ride the outside of the vehicle during switching moves to manually couple/uncouple cars and make up manual hose connections. Not only will Caltrain operating rules prohibit personnel to mount the exterior of the Stadler KISS EMU, but Caltrain will not use the EMU to make any equipment moves within yards, storage tracks or other areas where personnel would be required to utilize any exterior steps. The Stadler KISS EMU is equipped with an automatic coupler which allows coupling, uncoupling, and pneumatic and electrical connection make-up between trains to be accomplished without requiring employees to leave the car interior. A drawing and a photograph of the automatic coupler is provided in Appendix E.

End Handholds/Uncoupling Levers

End handholds and uncoupling levers are intended to provide a secure hand grip for a railroad worker while performing manual coupling or uncoupling of conventional rail vehicles where it is necessary for the mechanical end connections to be connected or disconnected manually from the ground by a railway employee. As described above, the Caltrain EMUs are equipped with fully automatic couplers. This fully automatic design allows all mechanical, pneumatic and electrical end connections to be accomplished without manual intervention and without requiring personnel to leave the vehicle.

Side Door Steps/Side Door Handholds

The Caltrain EMU vehicle is configured with both high-level and low-level side entry doors. When the EMU is first placed in service, only the low-level doors will be utilized and are accessed from Caltrain's existing 8-inch-high platforms. The high-level doors will be used at a later date once high-level platforms are installed and level boarding is implemented. Each low-level side door is equipped with a retractable step to allow passengers to transition from the 8-inch platform to the 22-inch lower-level floor height. The step is located at approximately 16 inches ATOR. In addition, extended vertical handholds are located inside the doorways to facilitate the boarding/alighting process. Photographs, drawings, and renderings of the side door step and the vertical handholds are included in Appendix F. In addition, further explanation of the side door step functionality is provided in Appendix G.

4.3.4 Request

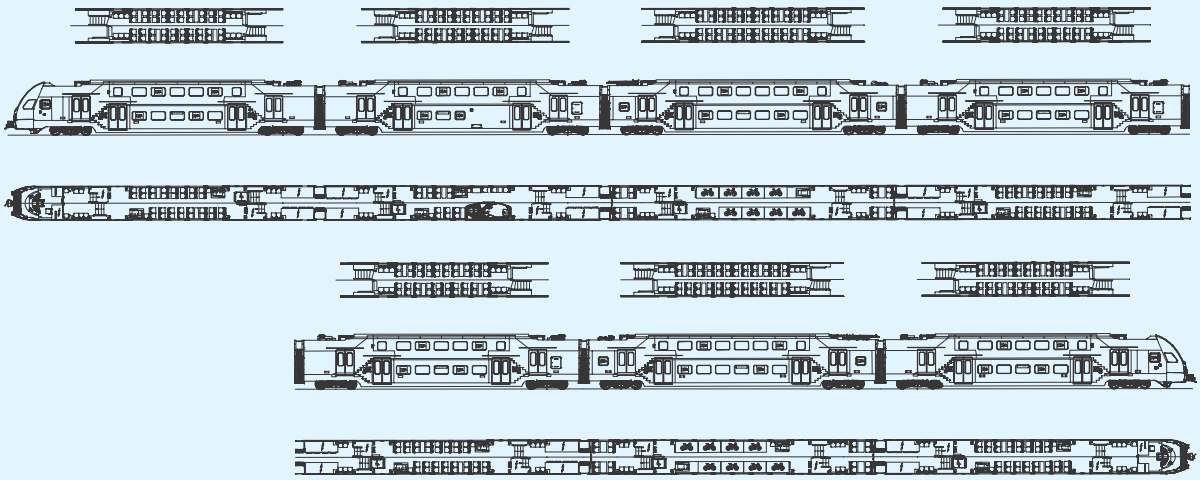
Caltrain petitions the FRA to accept the KISS EMU vehicle without sill steps, side handholds, end handholds, or uncoupling levers and to request the Secretary of Transportation to grant safety appliance exemption for technological improvements under 49 U.S.C § 20306 (a).

5 Conclusion

Caltrain believes that the KISS EMU design offers an equivalent level of safety and requests relief as described above for the following elements:

- Passenger area emergency brake valve
- Track brake clearance
- Safety appliances

Appendix A. Caltrain KISS EMU Datasheet



Technical Features

Technology

- Vehicle body made of extruded aluminum sections guarantees durable, corrosion-resistant and lightweight vehicles
- Specific Stadler design air-suspended trucks allow smooth running at exceptionally low vibration and noise levels
- High performance traction system not only permits very swift acceleration but also an almost complete recuperation of braking energy to the catenary

Comfort

- The generous and bright interior of each car provides space for wheelchairs, lifts between the ground and mezzanine floors, and one restroom per train, as per the regulations of the Americans with Disabilities Act (ADA)
- For the large number of commuters who bring their bikes, two large bicycle areas are provided in each train
- The state-of-the-art Passenger Information System and CCTV ensures the passengers have up-to-date transit information and can feel secure while in the train

Personnel

- With a strong focus on ergonomics, operability and field of vision the driver cab provides a positive and pleasant work space for the driver

Reliability/Availability/Maintainability

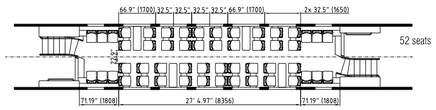
- Meets FRA Alternate Compliance requirements for operating in mixed traffic, which results in a very high level of passive safety by using crash energy management technology
- Crash absorption system for the protection of driver and passengers (fulfills FRA and EU crashworthiness standards)
- Emergency intercoms in passenger compartment
- Latest generation of vehicle control systems including detailed diagnostic features
- Redundant traction power system and redundant HVAC system
- Low Life Cycle costs due to light-weight design

Vehicle Data

	7-car EMU
Customer	Peninsula Corridor Joint Powers Board (Caltrain)
Line Operated	Caltrain, San Francisco Peninsula, through the South Bay to San Jose and Gilroy, California, USA
Commissioning (planned)	2019 - 2021
Number of Vehicles/Cars	19 vehicles / 133 cars
Track Gauge	1435 mm (4' 8 ½")
Designation	KISS
Supply Voltage	25 KV 60Hz AC
Axle Load Limit (AW3)	52100 lbs (23.6t)
Access Heights	8" and 22" for access from existing platforms 50 ½" for future high level HSR platforms
Access Width	51,2" (1300 mm)
Length Over Coupling	516' 7" (157450 mm)
Vehicle Width	9' 10" (3000 mm)
Vehicle Height	15' 10 ½" (4840 mm)
Axle Arrangement	2'Bo' + Bo'Bo' + 2'2' + Bo'Bo' + 2'2' + Bo'2'
Max. Power at Wheel	6000 kW
Starting Tractive Effort (up to 23 mph)	540 kN
Starting Acceleration, gross	2,24 mphps (1.0 m/s²)
Max. Braking Performance Rating	8200 KW
Maximum Speed	110 mph (177 km/h)

Appendix B. Caltrain KISS EMU General Arrangement Drawing

Car "B"
84 seats, 18 folding seats, 2 wheelchairs



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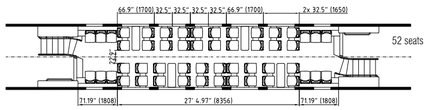
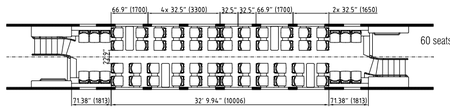


Car "D"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs



Car "G"
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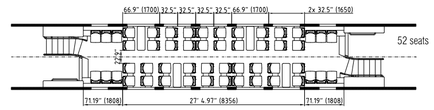
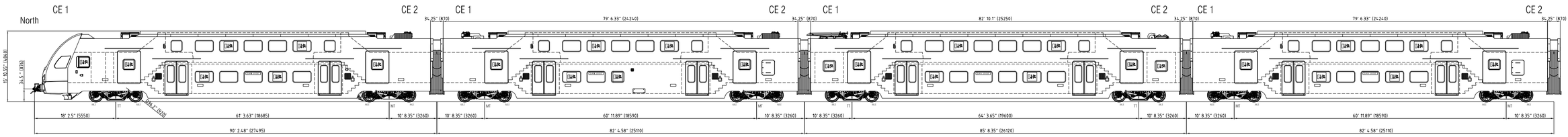
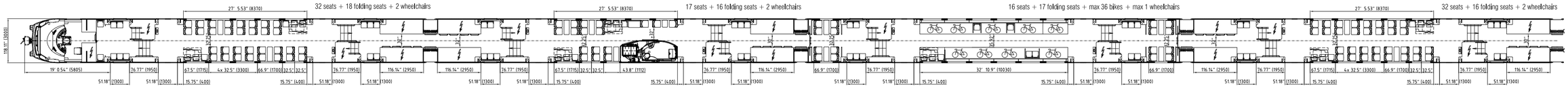
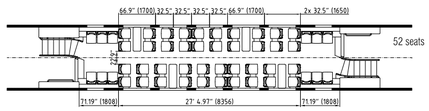


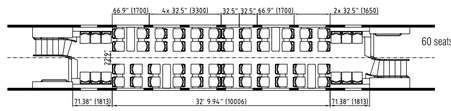




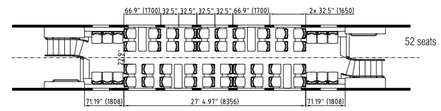
Car "E"
84 seats, 16 folding seats, 2 wheelchairs

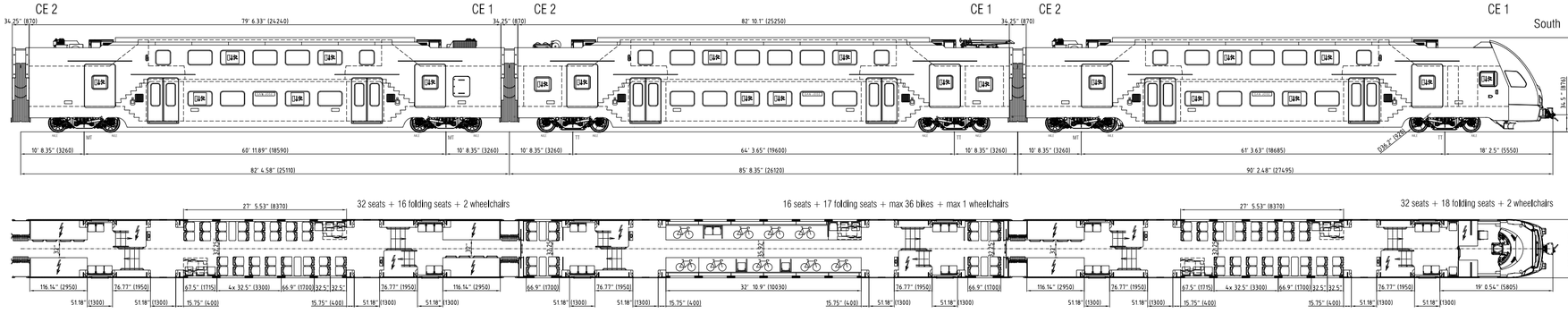


Car "F"
76 seats, 13 folding seats, max 36 bikes, 2 wheelchairs

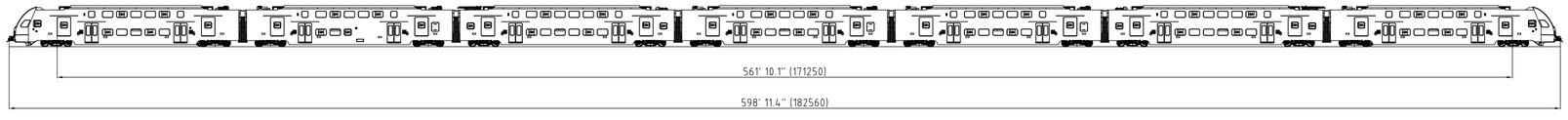


Car "A"
84 seats, 18 folding seats, 2 wheelchairs





	Car B	Car C	Car D	Car G	Car E	Car F	Car A	Total	Ratio
Fixed Seats	84	69	76	84	84	76	84	557	7.74
Folding Seats	18	16	17	16	16	17	18	118	
Total Seats	102	85	93	100	100	93	102	675	
Folding Seats - all passenger side doors operational	8	6	7	6	6	7	8	48	
Total Seats - all passenger side doors operational	92	75	83	90	90	83	92	605	
Countable Folding Seats - for the core number	16	13	13	14	14	13	16	105	
Total countable Seats (core number)	100	82	92	98	98	92	100	662	
Standees 4 P / m² - without Stairwells / Wheelchairs	138	143	150	141	141	150	138	**1001**	
Standees 6 P / m² - without Stairwells / Wheelchairs	207	214	225	212	212	225	207	**1502**	
Max Capacity 4 P / m² - without Stairwells / Wheelchairs	240	228	239	241	241	239	240	**1668**	
Max Capacity 6 P / m² - without stairwells / Wheelchairs	309	299	314	312	312	314	309	**2169**	
Max Wheelchairs	2	2	1	2	2	1	2	12	
Max Bikes (4 per stand)			36			36		72	



TT: Trailer Truck
MT: Motor Truck
CE: Car End

This drawing is dimensioned with metric values: imperial dimensions are converted and rounded

Issue p: 28.10.2021

	Date	Name
Bearb.	17.06.2016	borluc
Gepr.	17.06.2016	kaetho

KISS Caltrain 7-car trainset
32.5" seat pitch - optimized for maximum seating
CONFIDENTIAL

STADLER

130276 L-4380 Issue: p

Page: 1/7

Urspr. | Ers. für: | Ers. durch:

Update g: updated side view / For the zoomed view: indication of emergency rescue and exit windows, windows clear dimensions
Update h: updated small emergency window (cars C / D / F) and driver's seat (cars A / B), replacement of the folding seats with a bike rack (cars D / F), updated trainset capacity and ratio / For the zoomed view: indication of the car coordinate system, definition of the car ends and updated windows clear dimensions
Update i: corrected lower deck layout (cars D / F), updated Intermediate deck flip-up seat position, trainset capacity and ratio / For the zoomed view: indication of emergency rescue and exit windows in the side view of car end 1 (car B)
Update j: updated side view, Interior (entrance area, wheelchair lift, ADA toilet, seats, tables) and exterior (front coupler, gangway) design, trainset passenger capacity (standing area)
Update k: addition of the water-deflecting gutters on the side view and of the reference North - South, wheelchair lift displaced to car end 1 in the cars C and D, 1 supplementary page with separated zoomed view of the car F
Update l: Change from 6 car to 7 car trainset, new storage arrangement of bicycles in cars D and F, pathway to emergency windows
Update m: Car End added
Update n: Car D and F, In Intermediate level seat distance 1700 Instead of 1920
Update o: Cover "GFK" Instead of the entrance doors in the Intermediate deck, in cars D and F: only 1 wheelchair space each, plus 4 more folding seats, stairlifts removed
Update p: Car D and F with partition wall between wheelchair space and bicycle area

Appendix C. Passenger Emergency Brake Handle

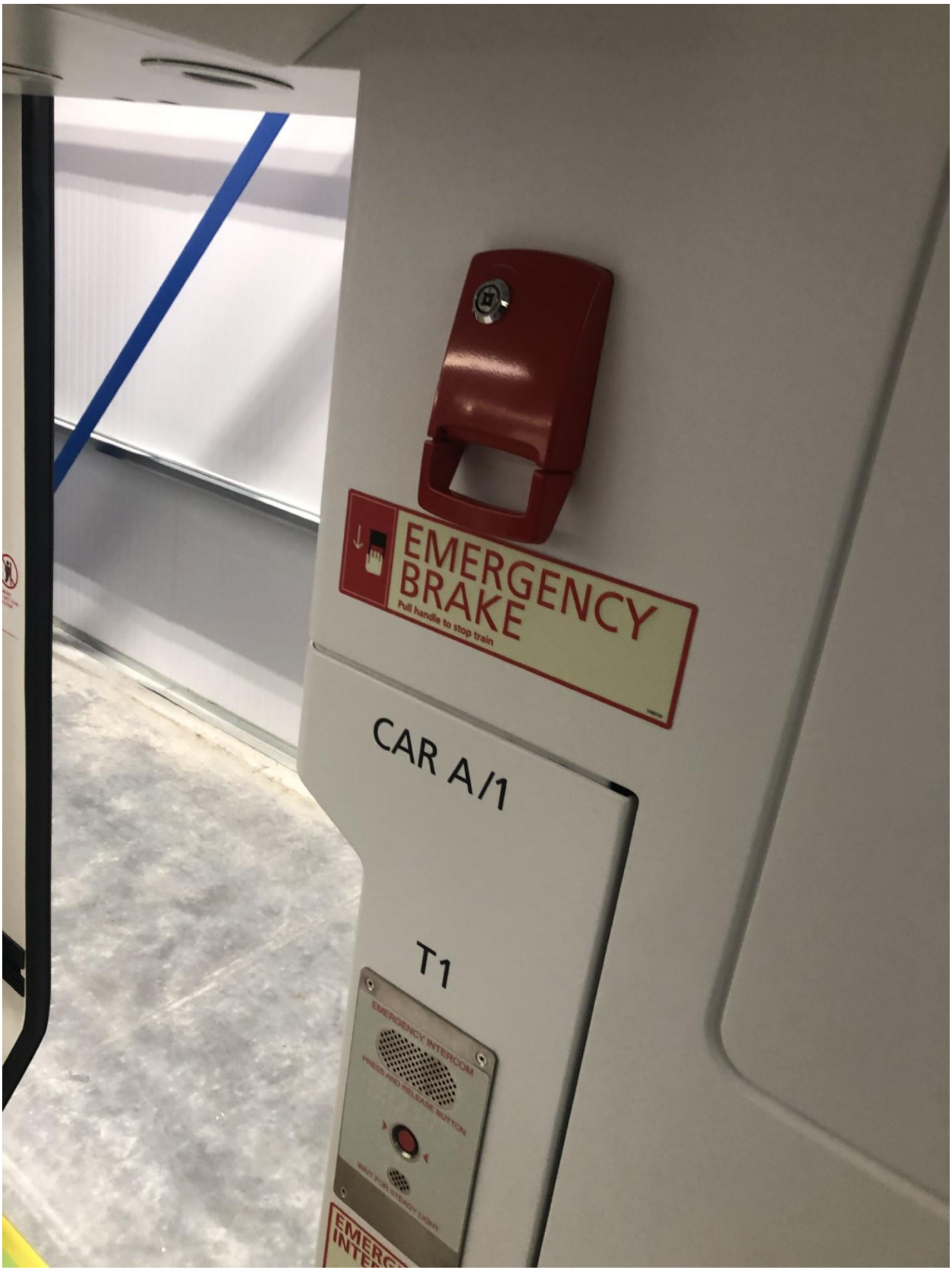


Figure C1 – Emergency Brake Pull Handle and Decal

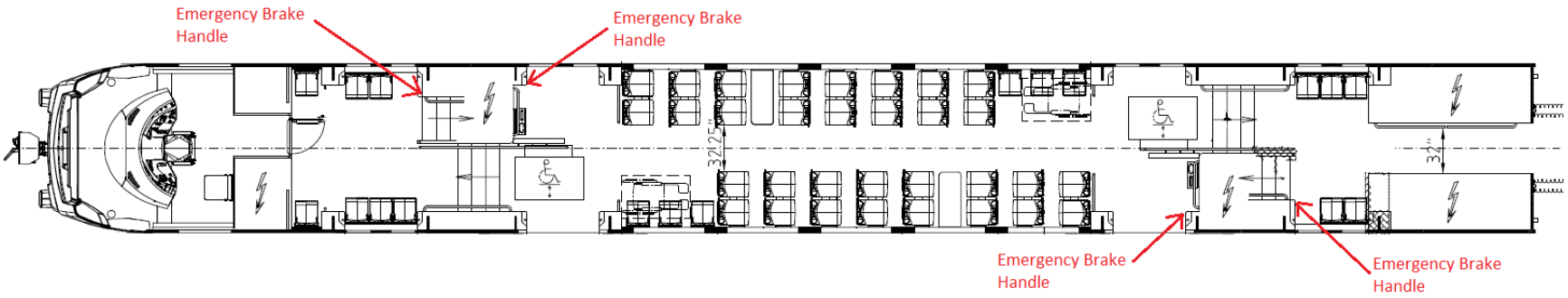


Figure C2 – Emergency Brake Pull Handle Locations (note: all cars are similar to car shown)

Appendix D. Magnetic Track Brake

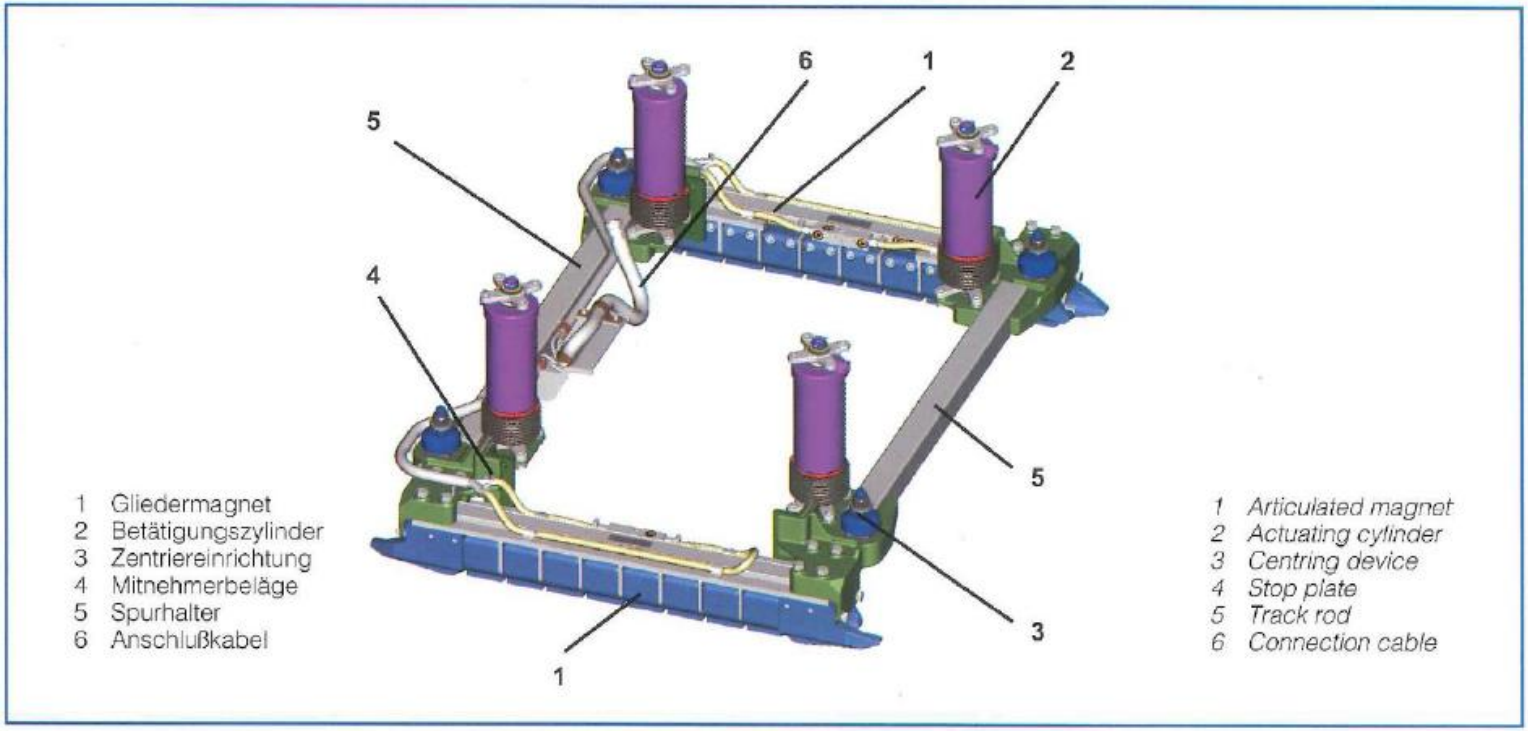


Figure D1 – Track Brake Rendering

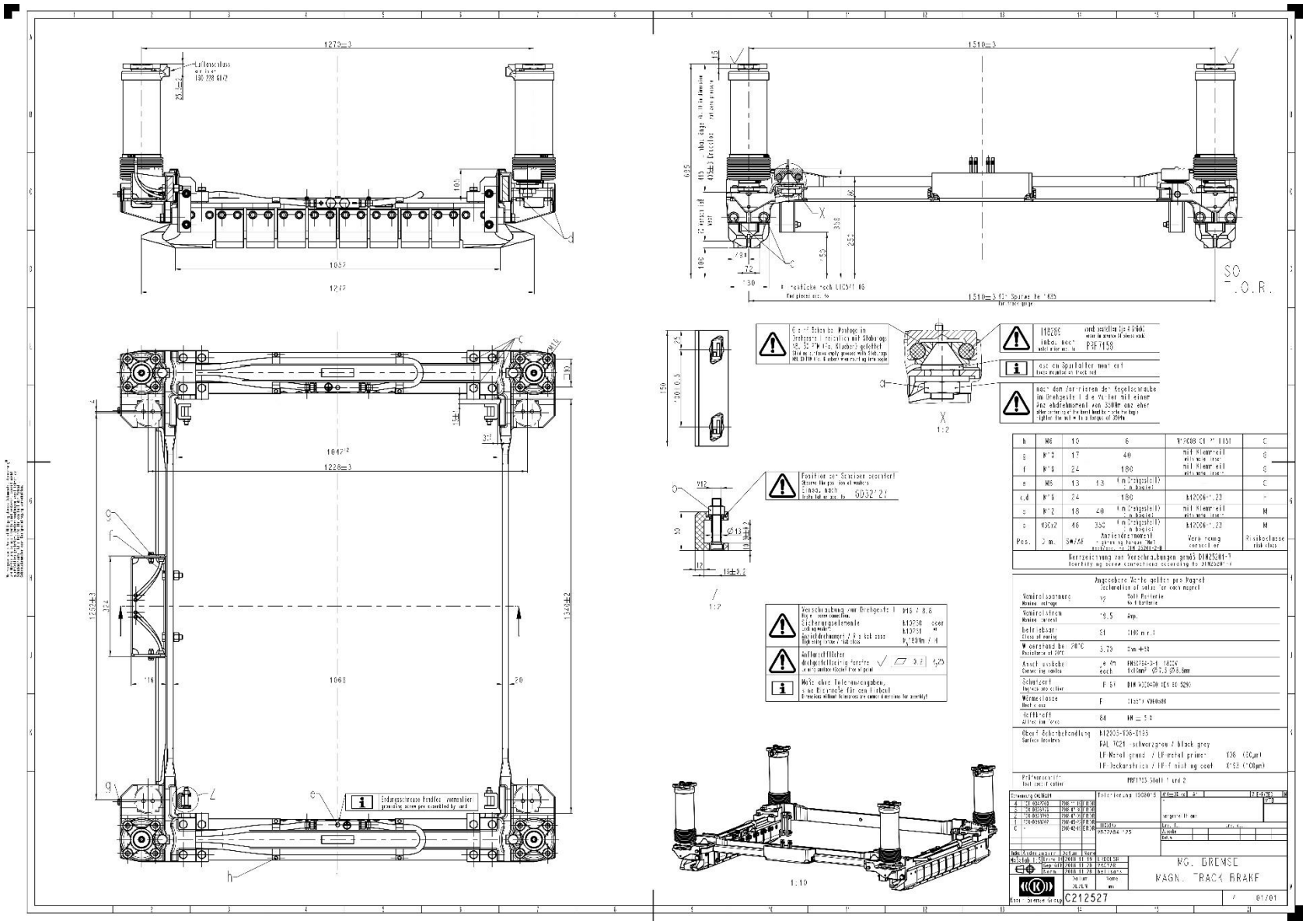


Figure D2 – Track Brake Drawing

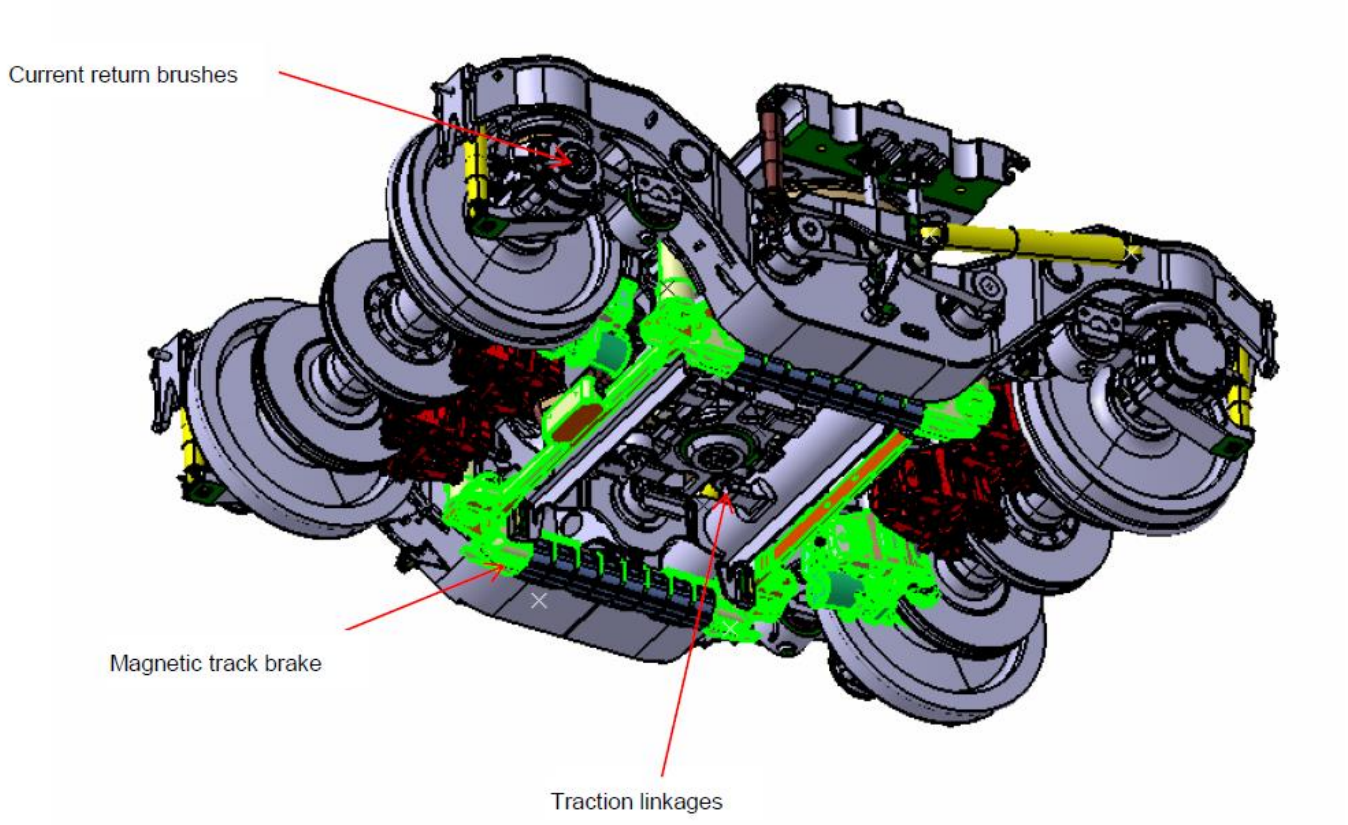


Figure D3 – Rendering of Track Brake as Installed on Truck

Figure D4 – Pictures of Track Brake as Installed on Truck

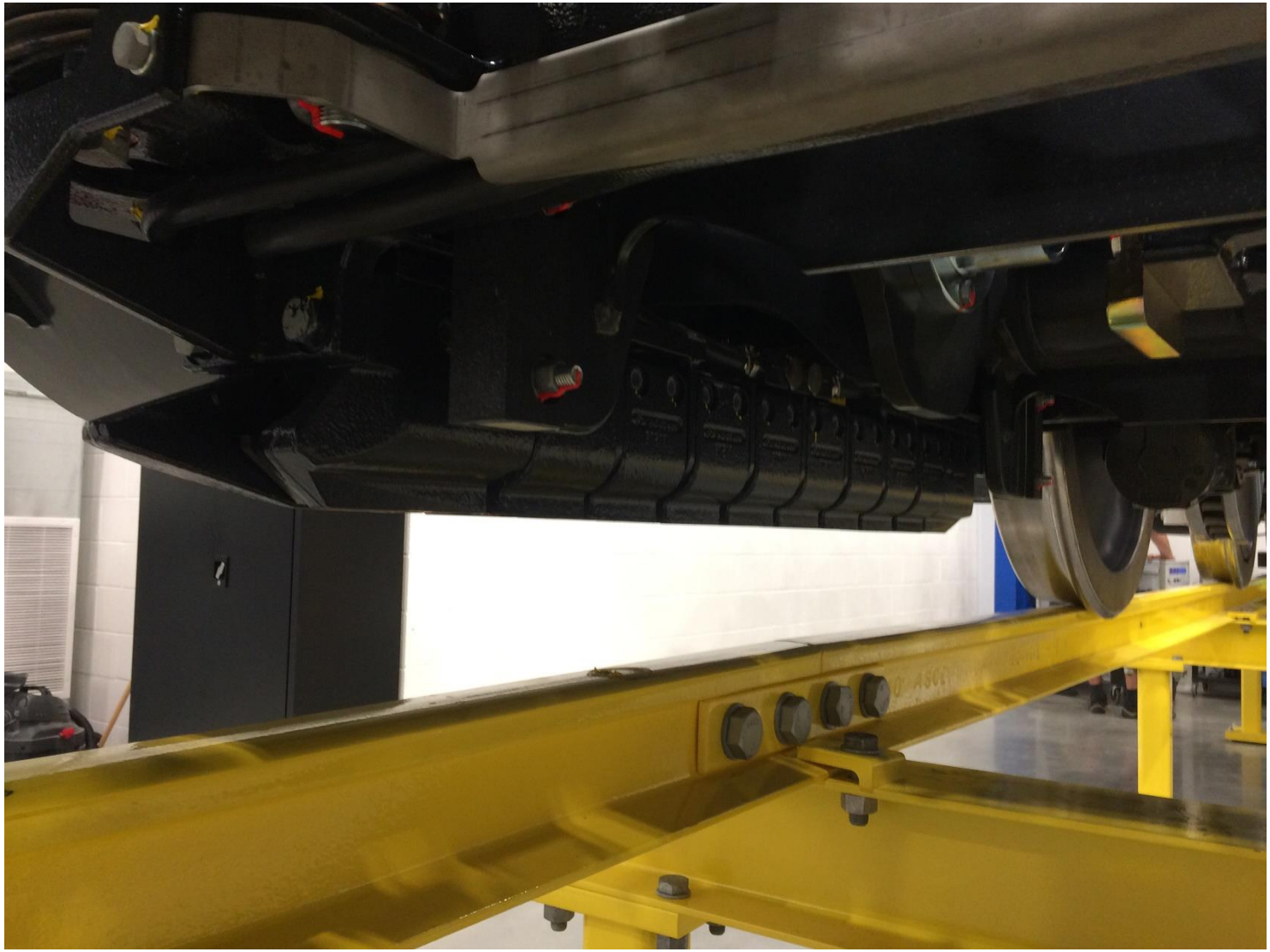


Figure D5 – Picture of Track Brake as Installed on Truck

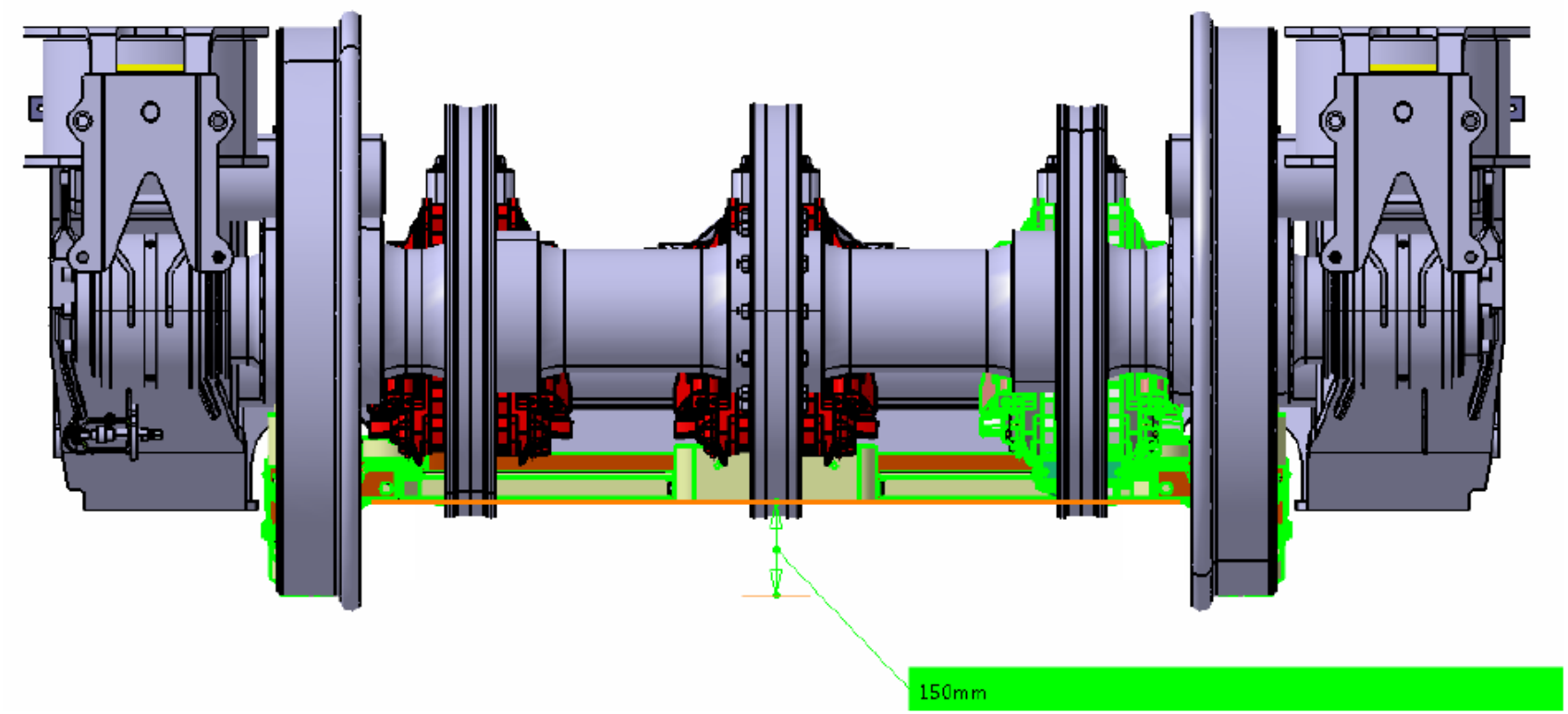


Figure D6 – Track Brake Between-Rail Nominal Clearance (150 mm ATOR)

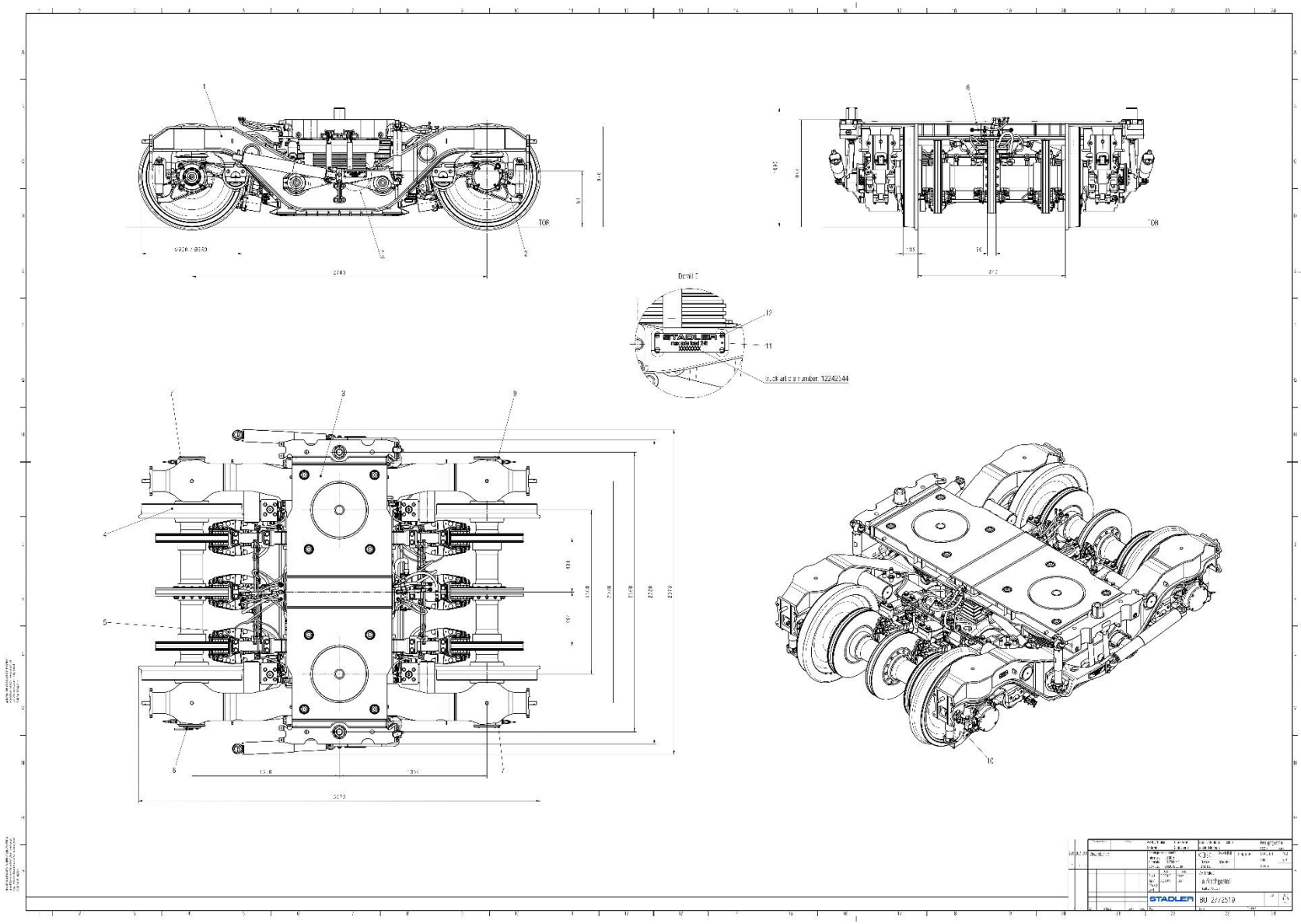


Figure D7 – Trailer Truck Drawing, Stowed Track Brake Depicted

Appendix E. Automatic Coupler Photo and Drawing

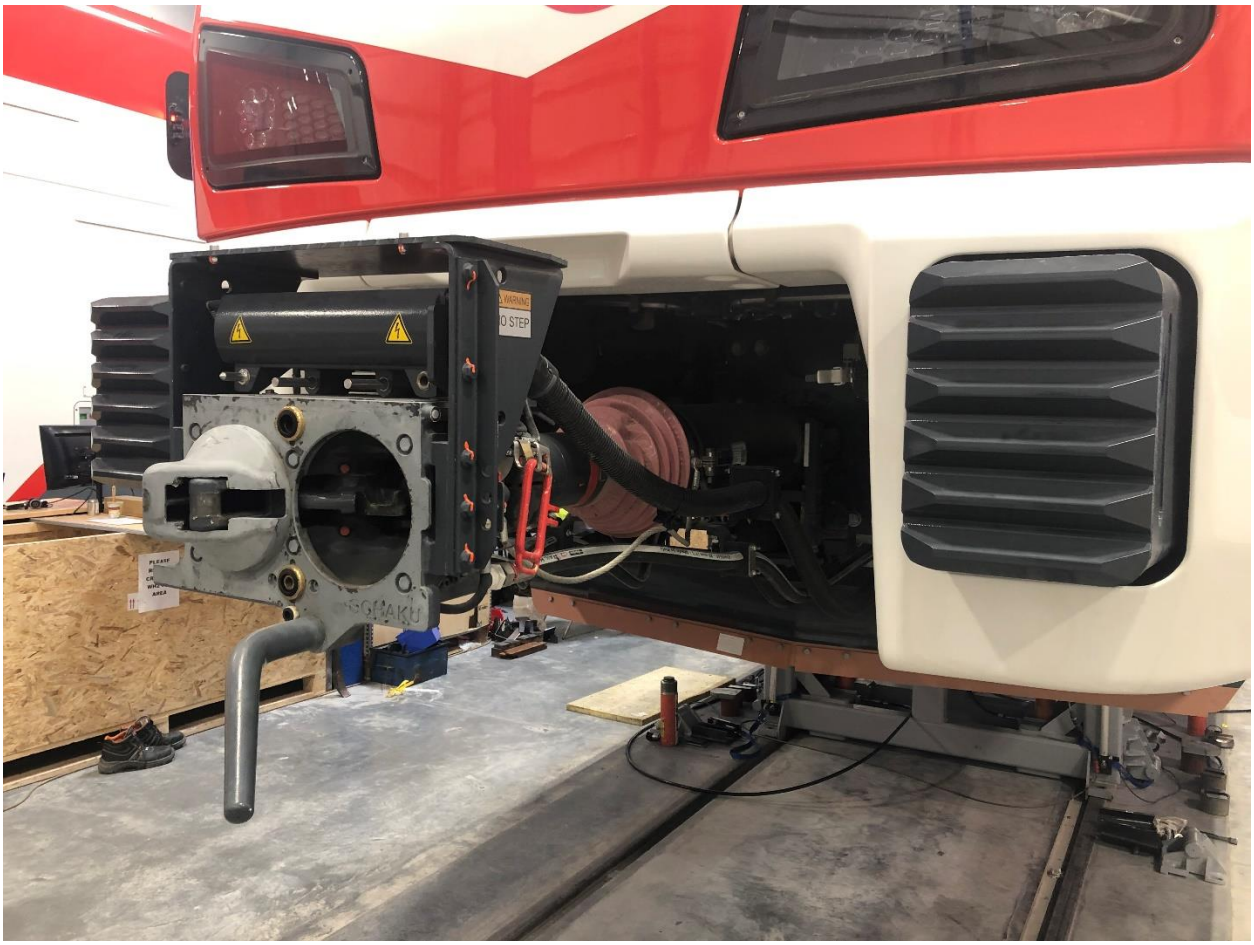
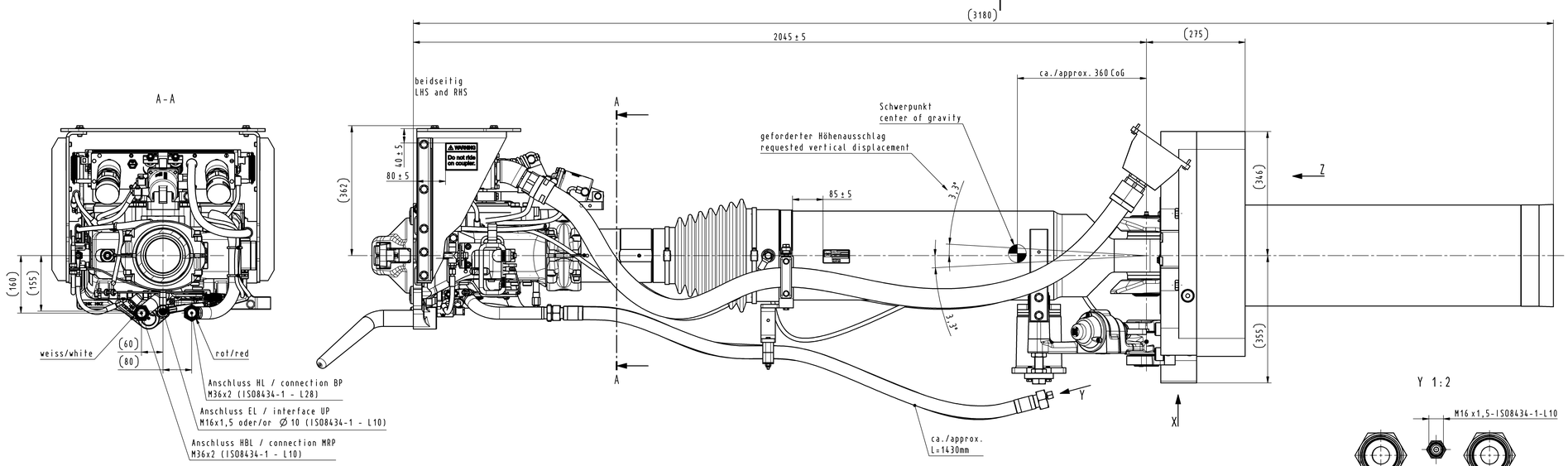
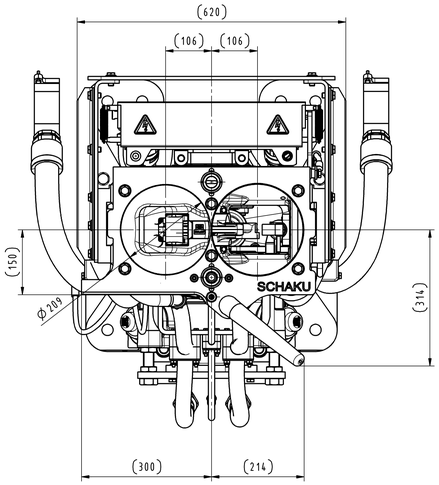
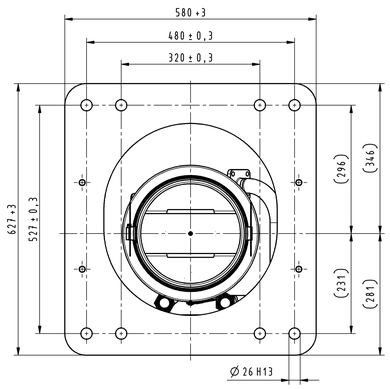


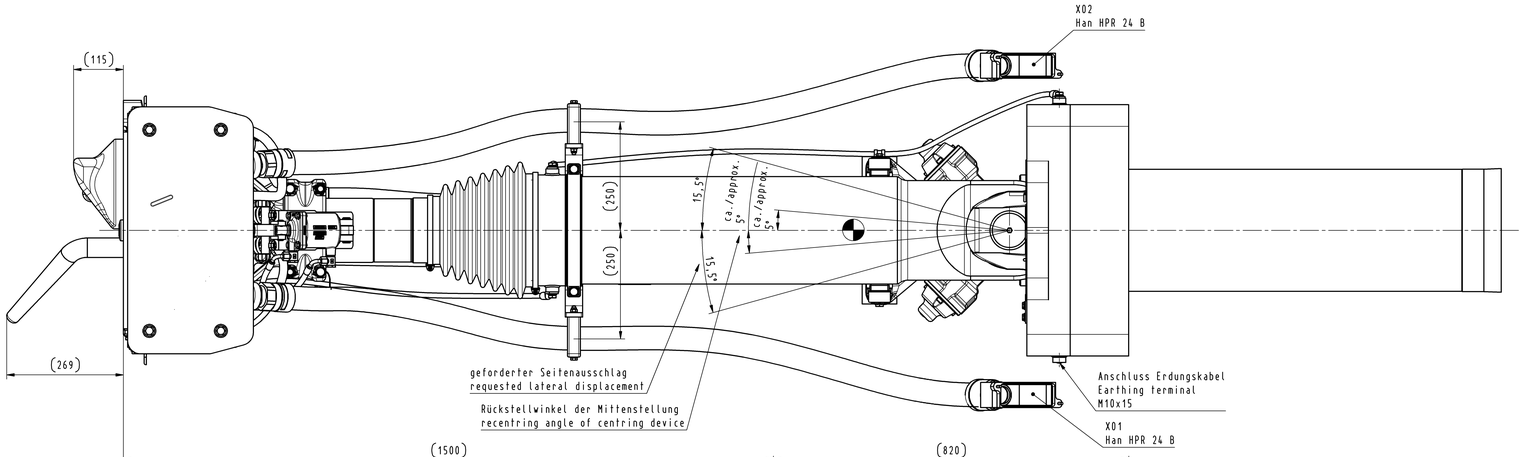
Figure E1 – Caltrain KISS Automatic Coupler

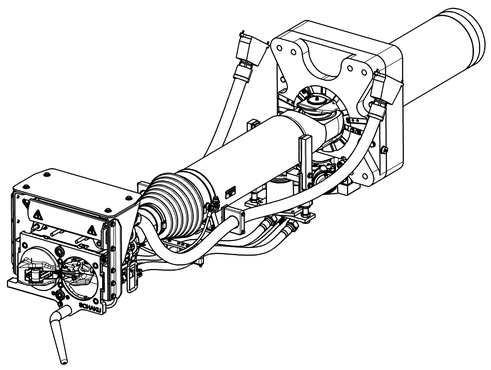


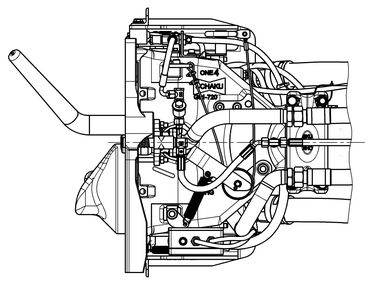


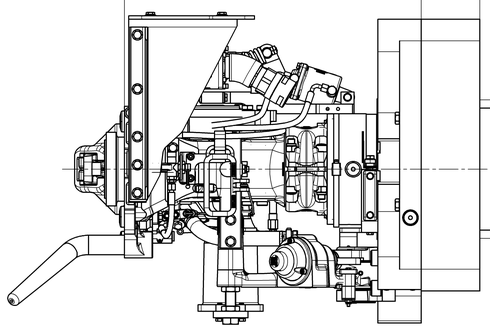
Z
Anschlussmaße am Fahrzeug
vehicle interface dimensions







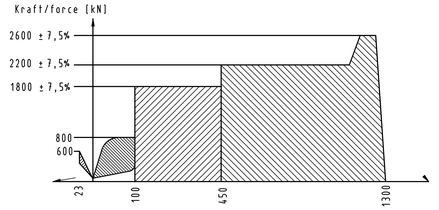




Vor Anbau und Inbetriebnahme von Produkten der Voith Turbo Scharfenberg GmbH und Co.KG und damit verbundener Ausrüstung, ist das technische Personal verpflichtet, alle zugehörigen Handbücher und Dokumentationen im Zusammenhang mit den Übersichtszeichnungen zu lesen.
Die Aufnahmeplatte im Untergestell des Fahrzeugs, an der die Kupplung befestigt wird, muss eben sein und vertikal wie horizontal rechtwinklig zur Untergestellebene liegen.
1. Ebenheit und winkelrechte Lage der Aufnahmeplatte vor Einbau der Kupplung gemäß ISO 2768-H prüfen, falls erforderlich, entsprechend herrichten.
2. Hinter der Aufnahmeplatte für ausreichenden Freiraum zum Werkzeugeinsatz sorgen.
Vor Inbetriebnahme der Kupplung sind die Kappen/Stopfen zu entfernen!

Prior to installing and commissioning products delivered by Voith Turbo Scharfenberg GmbH und Co. KG and associated equipment with them, it is mandatory for technical personnel to review all applicable manuals and documentation in conjunction with the overview drawings.
The anchoring plate for the coupler on the underframe of the car must be plane and rectangularly aligned to the underframe both vertically and horizontally.
1. Check the level surface and rectangular position of the plate according to ISO 2768-H. Adjust if necessary.
2. Make sure there is sufficient space behind the anchoring plate for the tools to be used.
Remove protection caps/plugs prior to putting the coupler into service!

Charakteristik des Energieverzehrs (theoretisch / quasistatisch)
absorption diagram (theoretical / quasistatic)



Anschlussplan elektr./pneumat. P1025
circuit diagram electr. / pneumat. P1025

			Allgemeintoleranzen:	STAHL kg	A0
				ISO 11405	
				Ersatz: ERSETZT	Ers. f.	Ers. d.
Index	Änderungsnummer	Datum	Name		
1 : 5		erstellt	2017-03-28	huettej	Scharfenbergkupplung Automatic Scharfenberg coupler
		geprüft			
		freigegeben			
		Datum	Name		
SCHAKU VOITH				P.010.8081	/23100545000	00	1 / 1
							A0

Appendix F. Side Door Step and Vertical Handhold Photos, Renderings and Dimensions

Figure F1 – Exterior View of Side Door Step and Side Door Handhold

Figure F2 –Side Door Open with Step Deployed and Handholds Accessible

Figure F3 –Side Door Closed with Step Stowed

Figure F4 –Interior View of Side Door Handholds (Step Stowed Under Floor)

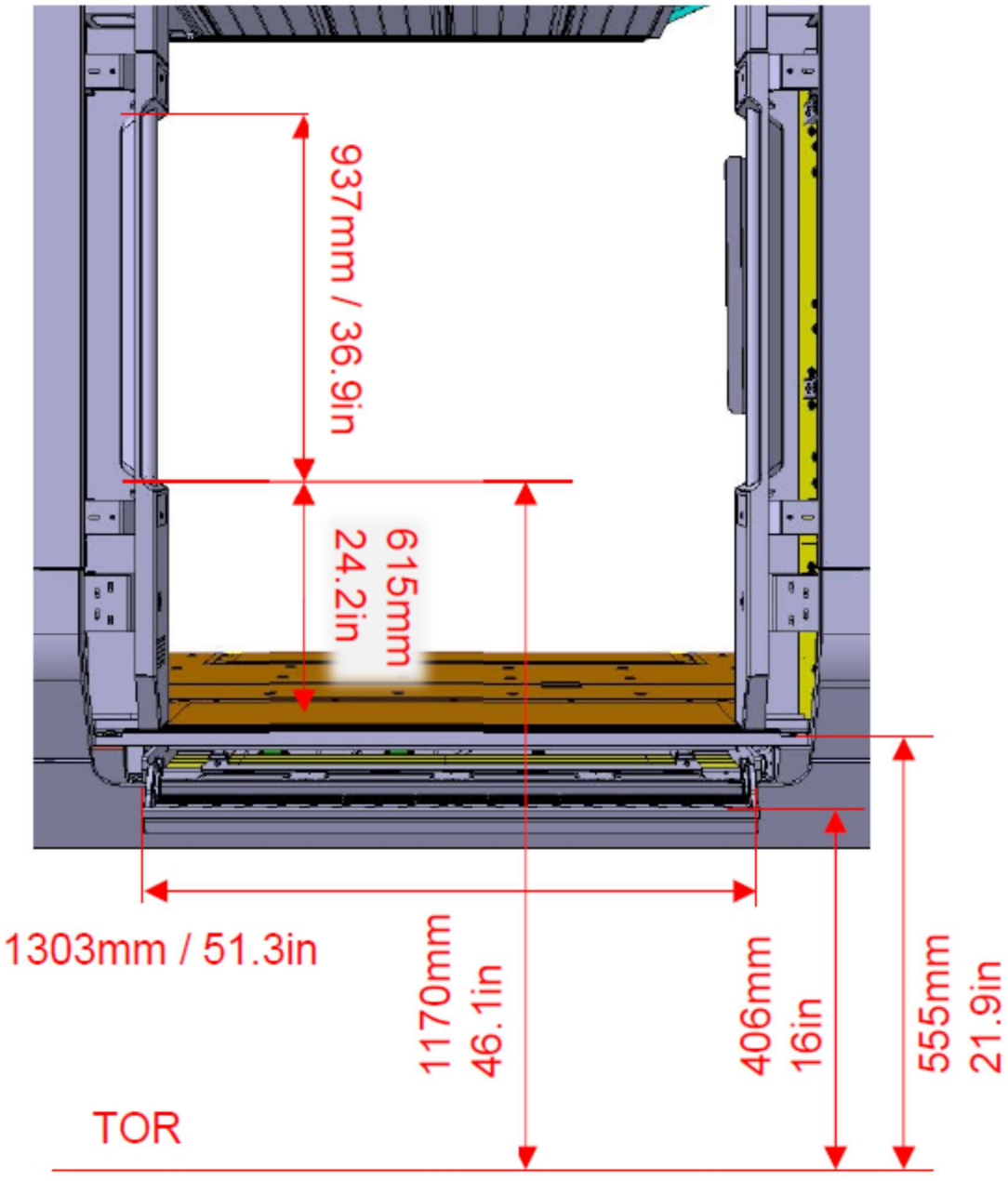


Figure F5 – Dimensions of Side Door Step and Side Door Handholds

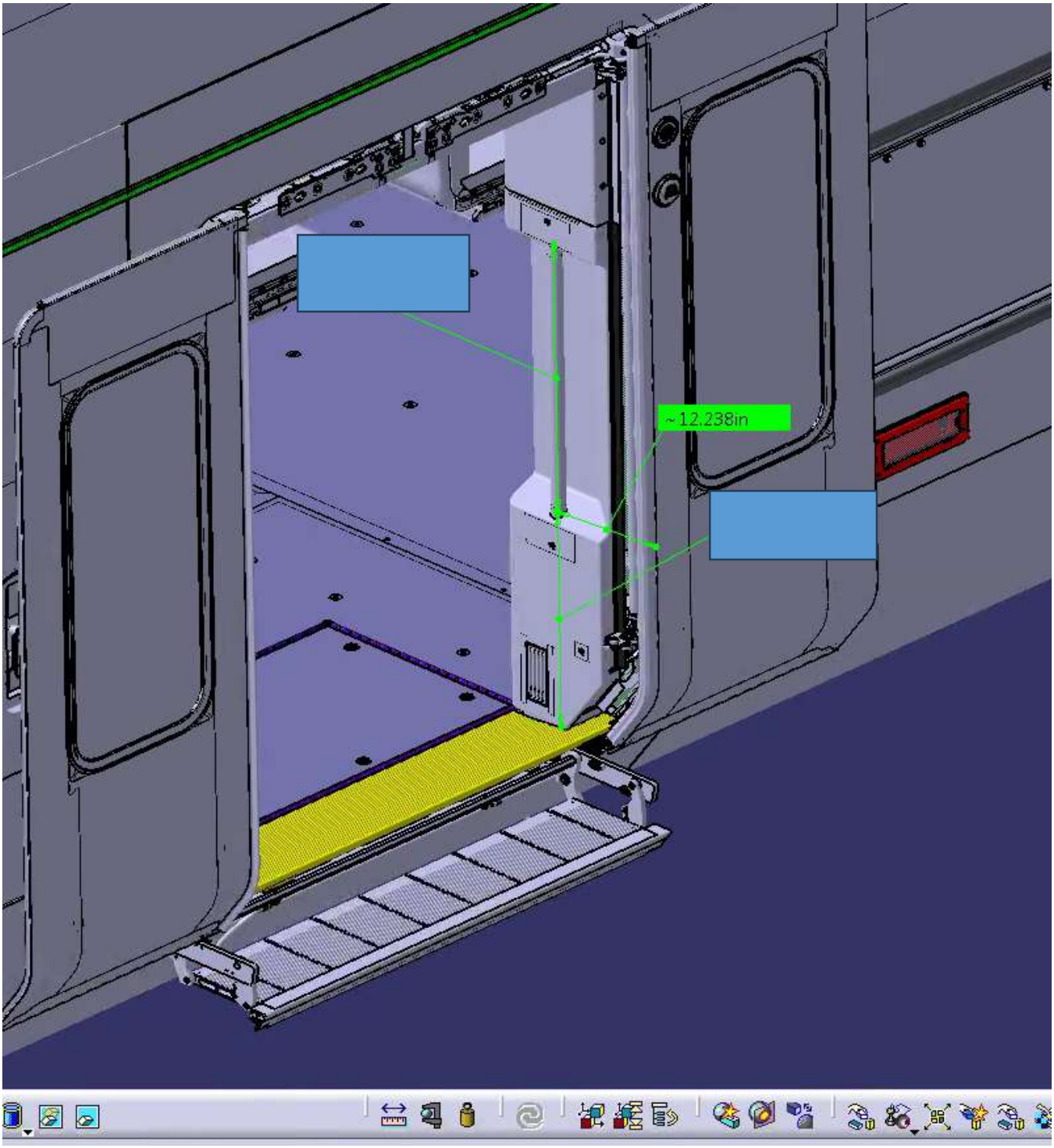


Figure F6 – Lateral Location of Side Door Handhold (from outside surface of door to centerline of handhold)

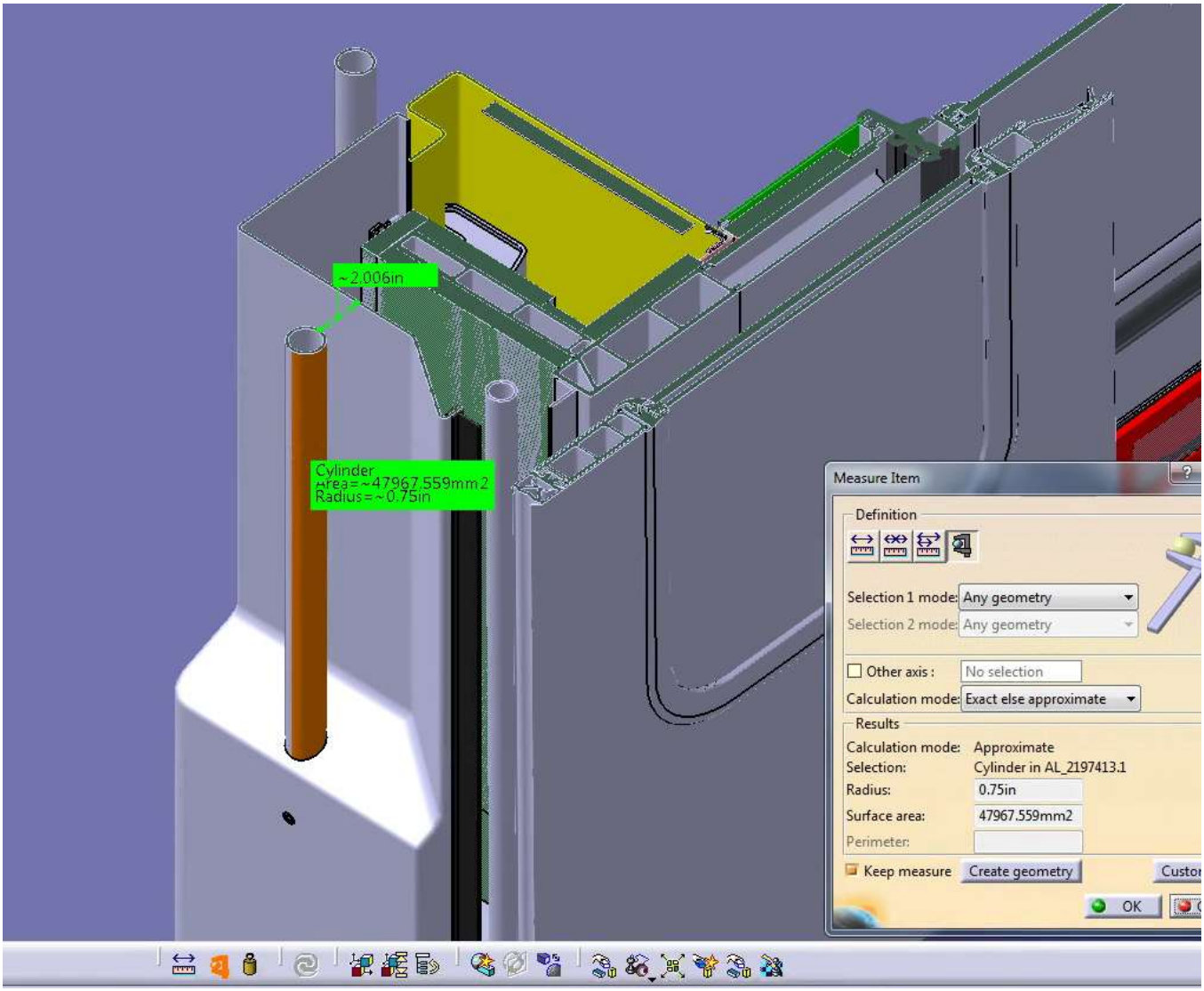


Figure F7 – Size and Knuckle Clearance of Side Door Handhold

Notes: Diameter of handhold is 1.5” (2 times 0.75” radius shown). Knuckle clearance is 2.0” as shown.

Appendix G. Response to Side Door Step Inquiry

Safety Appliances KISS Caltrain EMU

8.November.2018

Response to email from Check Kam dated September 20, 2018:

JPB/Caltrain and Stadler have jointly considered both the technical details and operational procedures on the low floor sliding step and how this relates to compliance with "side-door-step" safety appliances under §231.14(f). These considerations are detailed in the table below as line-item responses to Check's email and are summarized in the following paragraphs:

The sliding steps installed under each low floor door are provided as a convenience to passengers and crew for boarding/alighting the KISS Caltrain EMU during revenue service from/to the 8" platforms. Since the sliding step technically has no other essential function, JPB/Caltrain proposes to keep the waiver docket for safety appliances unchanged, thus excluding any references to the sliding steps. As mentioned in the docket, the low-floor arrangements at the door thresholds are directly in compliance with §231.14(f), without any additional steps (analogous to TexRail Flirt and DCTA and CMTA GTW's). This includes the operational and emergency cases of mechanically opening the door via emergency release handle (e.g. due to a fault in the door or power supply), in which case the low floor steps remain retracted and latched. However, it is wished by the Caltrain Maintenance Services to use the sliding steps as a convenience for crew and service personnel when the door is opened via crew key during maintenance and non-revenue service as well (this assumes sufficient battery power is available to fully cycle the doors and steps electrically). For this case the sliding step and its attachments are verified at a minimum, to be compliant with the strength requirements for side-door steps under §231.14(f). This analysis is part of the submitted project engineering documentation, but it is suggested to leave this out of the waiver docket to prevent any confusion about the use of the sliding step and compliance of the entrance without the sliding step.

It is to be noted that the sliding step currently cannot be deployed at any time during any type of unprotected/unmonitored train movement, including non-powered yard maneuvers. This restriction is necessary since the deployed step exceeds the defined limits of the currently valid static and dynamic envelopes. This is enforced by the train control and monitoring system during normal powered movement operations via direct interface to "green loop". For unpowered movements in the yard and/or locked-out doors, operational procedures require visual inspection of all doors and steps to ensure they are all closed and respectively retracted, latched, locked or otherwise secured prior to any movements, and if necessary provide additional protection measures by service personnel to ensure safe movement in the event maneuvers are necessary with open doors and/or deployed steps.

Detailed and specific replies to Check's points noted in his email:

KEY-1: *Query from Check Kam dated September 26, 2018*
KEY-2: Joint response from JPB/Caltrain and Stadler
KEY-3: Topic divider

There is not much in the justification portion that outlines the necessity for having such a side-door step design. This KISS EMU is stated to have safety appliances identical in concept to other Stadler equipment currently operating safety in the US under approved FRA waivers, with the exception of these new side-door steps on the lower levels.
The sliding step below the side doors is installed only as a convenience for passengers and crew boarding from the predominate platform height of 8 inches in the Caltrain infrastructure.
• *Why is level boarding not available in this corridor (e.g., California Public Utilities Commission General Order 26-D)?*
The EMUs are designed to interface with the current Caltrain infrastructure and platforms, which are at 8" above-top-of-rail (ATOR). The boarding and alighting will process will be the same as it is currently. Ambulatory passengers will board using the sliding steps, while wheelchair passengers will board using a 22-inch "mini-high" platform and a manually deployed bridge plate. Sometime in the future, level boarding will be implemented at either the 22" low floor doors or at the 51" high floor doors.
• *Additionally, Caltrain utilizes platforms at 8" ATOR and uses mini-high platforms at 22" ATOR to board ADA passengers. So there already seems to be an established method for the non-level boarding that is currently in use in this corridor, so how is this new step system justifiable?*
The sliding step is used only for able bodied passengers boarding from the 8" platform level. ADA passengers requiring level boarding, board from the 22" mini-high platform which includes a bridge plate to close the wide gap between the platform and the door threshold of the EMU. It is necessary for the step to be retractable because, when extended, it does not meet the clearance requirements of the system.
• *There are wheelchair accommodations on this EMU, so how will the mini-high platforms at 22" ATOR interface with these steps that extend out towards the platform?*
The sliding step is not used for interfacing with the 22" mini-high platforms. Interfacing to these platforms is performed exclusively with the manually deployed bridge plate.
As far as the design of the side-door step, there is not much in terms of explaining the operation.
The technical functional description of the sliding step is provided in FDR document AL_2187947 "CDR/PDR/FDR Doors". This document was submitted to John Manutes of the FRA Passenger Rail Division group.
• *It obviously extends and retracts, but what is the mechanism(s) behind this? It looks to be driven by its own motor.*
The sliding step extends and retracts with an autonomous motor installed each the unit. The motor is controlled by the door controller and interlocked with the door function.

• *Is it integrated into the door opening electrical system? Is it independent of the door opening system?*
The sliding step is subordinate to the associated door and door control system. It can only be activated in normal revenue service operation when the associated door is activated. A door open command deploys the associated sliding step prior to opening the door and retracts the sliding step after closing the associated door. The door open/close cycle is not completed without the full deployment and full retraction of the sliding step. The sliding step is also integrated into the "green loop" preventing movement of the train until the sliding step is fully retracted and latched
• *Is it purely operated via an electrical switch that activates when the Engineer or Conductor pushes a button?*
In normal revenue service operation, the sliding step is activated only when the door is commanded to open. The "open" button resides on the conductor panel and can only be accessed via a crew key.
• *Is it mechanically integrated into the doorway such that it operates in tandem with the door (extends out as door opens and retracts as door closes)?*
There is no mechanical interface between the sliding step and door. The sliding step is controlled and monitored over the associated door control unit and is deployed or retracted only when the door is to be opened or closed respectively.
• *Is there a delay in the step deployment with relation to the door (certainly you don't the door to open before the steps are extended, or the steps to retract prior to the doors closing)?*
The door opening sequence enforces a complete deployment of the step prior to opening the door. The door closing sequence enforces a complete closing and latching of the door prior to retraction of the sliding step.
• *How will the steps activate in case of manual override during emergency?*
For safety reasons, the steps do not activate by manual release handles. The low floor door thresholds are less than 22 inches ATOR, thus not requiring any additional steps for emergency "override" operation (similar threshold arrangement as TexRail FLIRT and DCTA and CMTA GTW's).
• *If the steps are mechanically integrated with the door, then how will this impact emergency responders using the doorway for rescue access that may not be expecting a step to extend out?*
Since there is no mechanical integration, the steps remain in place when the doors are opened via emergency release from either inside or outside of the vehicle.

• *What is the vertical load capacity of the steps? It is 51.3" wide with handholds on both sides of the doorway so presumably two individuals can be boarding/alighting at the same time. Assuming two 95th percentile males, can the steps handle the continuous dynamic loading of 450 pounds or more?*
The steps are designed to support 2kN (~450 lbs) over a central load area of 100mm by 200mm, or a load of 5.2kN (~1,170 lbs) distributed over the whole surface of the step without plastic deformation.
As you can see, these are just some of the looming questions that I had regarding the side-door step system. Lastly, FRA has always had the stance that safety appliances be permanently fixed, preferably by means of mechanical fasteners (not welds), so the proposal of a hinged step system that extends and retracts (if approved by the Board) would in fact set a precedence for future safety appliance designs that would be contrary to FRA's stance.
The essential purpose of the sliding step is to provide safer access for passengers and crew between the low floor entrance and the 8" platform during revenue service. Although it would be preferred to use the sliding step to assist maintenance and service personnel in the depot or elsewhere during maintenance or non-revenue service, it is not mandatory. The prevention of any unsanctioned use of the sliding step is permanently implemented in the technical setup of the entrance door control system.