

RRD22LR001- Questions Related to the WMATA Conformed Technical Specification Document

1. Describe the purpose of the WMATA Conformed Technical Specification (CTS) (Volume II) document dated August 16, 2010.

The Conformed Technical Specification sets forth requirements for the complete design, manufacture, delivery, testing, and acceptance of 7000 Series railcars for use on the Washington Metropolitan Area Transit Authority system. The Specification also addresses requirements for spare parts, materials & workmanship, quality standards, training, special tools & test equipment, and execution of the reliability demonstration program.

2. How did the CTS serve as a tool to ensure products, materials, and designs are safe and meet expectations?

The Conformed Technical Specification defines the safety, performance, qualification, reliability, and workmanship requirements for the railcar. The vehicle design is captured in the plans, analyses, drawings, and other documents specified in the CDRL list. Resolution and definition of all issues and requirements are derived from the Conformed Technical Specification.

The Technical Specification requires that Kawasaki and the sub-system OEM's perform hazard analyses to demonstrate that no unmitigated hazards exist in the design of the vehicle. In addition, The Technical Specification requires the component materials of the railcar to be analyzed to ensure that they comply with the Flame Smoke, and Toxicity (FST) requirements.

3. Who developed the CTS?

The Conformed Technical Specification was developed by Booze-Allen Hamilton with input from WMATA and LTK.

4. Who was responsible for representing the agency during compliance verifications with the CTS?

WMATA with the support of LTK SME's.

5. Who was responsible for representing the contractor during compliance verifications with the CTS?

Kawasaki and subsystems OEM's

6. Did either the contractor or the agency consider the wheel migration a defect per the document definition?

The wheel migration was considered a failure by WMATA and Kawasaki; it was not a defect as defined by the terms of the contract. The disposition/action to remedy the subject is dependent on the root cause which is still under

investigation.

7. Did either the contractor or the agency consider the wheel migration a failure per the document definition?

Yes. In all instances where the back-to-back measurement exceeded 53-3/8" both parties consider the wheel-set failed.

8. Did the agency or the contractor consider the wheel migration a safety risk? If so, how was it classified?

The wheel moving on the axle (wheel migration) in the Hazard tracking log (TK-03-01, Item 34.9) is classified it as Category I, Frequency E, Hazard index of 3.

Category I : Catastrophic - Equipment failures, human errors, and/or external circumstances that result in any fatalities, destruction of vehicle, or damage to terminal or track segments such that affected segments of the Authority cannot operate for an extended period. Category I hazards will result in what the public would consider a major accident or catastrophe, such as destruction of a train with fatalities. Effective Train Operator corrective action is not realistically possible. Train operation probably ceases system wide.

Frequency E : Improbable - Unlikely to occur, but possible

Hazard Index 3 : Acceptable with review – Shall be resolved using standard fail-safe engineering practices. May be acceptable with review by the Authority.

Hazard Resolution: Wheels are manufactured by an AAR certified facility in accordance with AAR M-107 Maintenance Manuals (CDRL 806) will provide details for daily inspection of wheel gauge using an AAR Simplified Wheel Gauge and Rim Gauge

9. What efforts were taken by the agency and or contractor to remediate the defect/failure?

All failed wheelsets were replaced under warranty and the failures and vehicle disposition were discussed during the daily warranty review meetings. The Technical Specification requires a Failure Analysis Report (FAR) to be submitted as a part of the FRACAS program. Kawasaki was informed and reminded to submit FAR's for wheel migration failures during FRACAS meetings.

WMATA performs a periodic back-to-back inspection of the 7K railcars at 90 day intervals during periodic inspection. Additionally, WMATA performs a separate inspection of the gap between the wheel hub and journal bearing to ensure there is no wheel movement. The gap at each wheel on the axle is measured, and the sum of the gaps cannot exceed .020". If the sum exceeds .020", the wheelset is replaced.

10. Since 2017, what steps were taken by the agency or the contractor to resolve the wheel migration issue?

A teardown of the first failed wheelset was performed in April 2017 after the wheelset was replaced under warranty. The assembly procedures and press records for the failed wheelset were reviewed and no issues were identified. There were no anomalies or defects identified after the wheels were pressed off. During the event, WMATA inquired if the pressing force could be increased to make it consistent with WMATA's revised press force adopted in 2014. Kawasaki and ORX evaluated the request and responded affirmatively. The associated drawings were updated accordingly. Revised wheelsets with higher pressing force began shipment to Kawasaki in October 2017.

The correspondence listed below provides all actions taken:

<https://ltk.sharefile.com/d-sf08be27d65564db28fa70cc3647e6d8f>

<u>Folder Name</u>	<u>KRC Letter Date</u>	<u>WMATA response Date</u>	<u>Description</u>
KTW.02837	March 8, 2012	March 27, 2012	MOC-209 Truck FDR. On slide 12 of attachment "FDR Package", KRC notes "Wheel and Journal bearing press tonnages are the same as the WMATA operating press fitting force."
KDW.00142_WDK.00139	March 1, 2012	April 10, 2012	Initial submittal of wheelset drawing. Notes press tonnage of 55-80 ton. Drawing Conditionally Approved, with no comments relating to press tonnage.
KDW.01999_WDK.01989	December 22, 2016	March 6, 2017	Submittal and approval of last revision D6915-000005 (rev e) of wheelset drawing still noting 55-80 tons.
N/A	N/A	N/A	4/27/2017 – Reported date of ORX teardown event. Attached MOC tracker assigns MOC-818 for this event.
KTW.13689_WTK.13092	May 8, 2017	May 18, 2017	KRC letter where KRC states that at the teardown event at ORX, WMATA requested Kawasaki to investigate whether it is feasible to change the wheel mounting requirements to match WMATA's legacy fleets, notes the pressure can be increased to 65-95 tons, and asks WMATA to update the contract drawings. WMATA responds that the contract

			drawings do not contain the wheel press tonnage nor is it part of the TS and requests KRC update their wheelset drawings to 65-95 tons. WMATA did not disposition the proposed interference fit.
KDW.02084_WDK.02053	May 31, 2017	June 16, 2017	Submittal and approval of revised wheelset drawing D6915-000005 (rev f) noting 65-90 tons.
KDW.02085_WDK.02050	May 31, 2017	June 15, 2017	Submittal and approval of revised wheelset drawing D6913-000040 (rev a) noting 65-90 tons.
KTW.13788_WTK.13198	June 9, 2017	July 3, 2017	KRC responds to WTK.13092 stating "noted" regarding press tonnage not being part of contract drawing nor in TS and additionally noting that revised wheelset drawings have been submitted per above letters. WMATA approved and closed letter chain.
KTW.16886	January 29, 2021	N/A	KRC request to remove back to back failure from reliability calculations.
KTW.17049	April 22, 2021	N/A	KRC request to remove back to back failure from reliability calculations.
KTW.17050	April 22, 2021	N/A	KRC request to remove back to back failure from reliability calculations.

11. Did the wheel migration trigger the provision set forth in the System Reliability Requirements of the truck and suspension in the specification document?

The truck and suspension system has not met the reliability requirements as set forth by the Conformed Technical Specification. The wheel migration failures are tabulated as part of the calculations; however there are separate failures of the leveling valve failures and center pin bushing movement that are the primary drivers impacting reliability. At no time did the number of wheel migration failures meet the definition of a fleet defect (5% of identical parts or 10% of the fleet in an 18-month period)

12. Describe the RAM Review Board discussed in the specification.

The Rams review board is tasked with determining if the railcar meets the requirements defined in the Conformed Technical Specification.

"The railcar and all of its systems, subsystems and components shall be

designed to perform the required functions under the full range of operating and design conditions specific in this technical specification. The car design and implementation of the design shall provide the Authority with equipment that meets the Mean Distance Between Delay (MDBD) requirements. The compliance with the MDBD requirement shall include all failure modes for systems, subsystems and components, to meet the following requirement:

*Vehicle level MDBD = 150,000 miles
Vehicle level MDBF = 20,080 miles”*

13. Was the wheel migration issue considered/addressed by the RAM Review Board?

No, wheel migration failures had a negligible impact on the MDBD of the cars due to the low number of occurrences.

The primary topics of discussion at the RAMS review were issues that were causing offloads and delays, such as failures of the Holding Brake Pressure Switch, Brake Released Pressure Switch, and Propulsion. Please refer to the below example, August 2021 Data reviewed October 13, 2021.

Item Description	Qty.
HVAC CONTROLLER; CONTROL BOX; HVAC; 7K	38
BOLSTER BUSHING; TRUCK	37
LEVELING VALVE ASSEMBLY; SUSPENSION; 1K - 7K	23
HEADLIGHT RESISTORS - Low Beam 3 OHM	20
SWITCH ASSY, HOLDING BRAKE PRESSURE; 7K	15
HVAC UNIT, ROOF MOUNTED; HVAC; 7K	15
MOTOR, CONDENSOR; HVAC; 7K	14
TAILLIGHT ASSY	14
MARKER LIGHT ASSY	14
MOTOR, EVAPORATOR; HVAC ; 7K	13
SYSTEM; FRICTION BRAKE	8
SYSTEM; HEATING, VENTILATION & AIR CONDITIONING	8
SHOCK ABSORBER/DAMPER; VERTICAL; SUSPENSION	7
WHEEL; TRUCK, OOR	7
MOTOR, BLOWER; APS/LVPS; 7K	7
BOARD, WMATA RELAY; ATC ENCLOSURE LOADED; 7K	6
SCHRADER VALVE HVAC UNIT; 7K	5
SWITCH, BRAKE RELEASE PRESSURE (BRPS); TCU; 7K	5
LOCK; CAB SWING DOOR	5
TRUCK&SUSPENSION: TRACTION MOTOR W/SPEED SENSOR & HALF COUPLING; 7K	4

SYSTEM; PROPULSION	4
ALIGNMENT BOLT; GROUND BRUSH ASSY	4

14. Was the wheel migration issue considered/addressed in Failure Reporting Analysis and Corrective Action (FRACAS) meetings?

Yes, Kawasaki replaced wheelsets that failed due to wheel migration, but have challenged the impact on the results of reliability demonstration test. WMATA has disapproved the challenge until the results of the investigation are complete.

15. Was Dispute Resolution as described in the specification document used to address the wheel migration issue?

The wheel migration failures did not require Dispute Resolution as defined in Technical Specification 7.6.3.1 because the root cause has still not been determined.

16. Who from WMATA is included on the Kawasaki Rail Car monthly warranty report?

WMATA

- Chief Mechanical Officer (CMOR)
- Car Maintenance (CMNT)
- Program Management (CENV)
- Quality Assurance (QICO)
- Reliability Engineering (REPA)
- LTK Engineering

Kawasaki

- Program Management
- Engineering
- Field Service

OEM sub-system suppliers

- Program Management
- Engineering

The complete list of recipients is below:

Algiers, Matthew [REDACTED]; Anderson, Willis
[REDACTED]; Battle, Reggie
[REDACTED]; Chavarry, Matthew
[REDACTED]; Clark, De'Andre
[REDACTED]; Claypoole, James
[REDACTED]; Coin, Kamruzzaman
[REDACTED]; danesi [REDACTED]; Gray,
Stephen [REDACTED]; Guzman, Sergio
[REDACTED]; [REDACTED]; Jones, LaMont
V. [REDACTED]; Kariuki, Richard
[REDACTED]; Lozano, Jeanette
[REDACTED]; Mbapte, Jacquard
[REDACTED]; McKeown, Patrick
[REDACTED]; Polzin, Kurt
[REDACTED]; Quezada, Damien
[REDACTED]; Stevenson, Christopher
[REDACTED]; Yoshimura, Shuichiro
[REDACTED]; Young, Danisha
[REDACTED]; [REDACTED]; Mackie,
Chiarajane [REDACTED]; Scalia, Timothy A.
[REDACTED]; Adutwum, Felix [REDACTED]; Alira,
Cosmos A. [REDACTED]; Meshesha, Anteneh
[REDACTED]; Cason, Barry T. [REDACTED];
Barthelemy, Lucien [REDACTED]; Bejo, Karl C.
[REDACTED]; Shanks, Benjamin F. [REDACTED];
Bissessar, Gjok [REDACTED]; Bolander Jr., Wayne N.
[REDACTED]; Bruce, Michael M. [REDACTED];
[REDACTED]; Chandler, Mark E. [REDACTED];
Bisson, Charles (Contr) [REDACTED]; Coleman, Benjamin
[REDACTED]; Coleman, Gary S. [REDACTED];
Coon, John E. [REDACTED]; Crawford, Karen A.
[REDACTED]; 'DAVID BOSSARD'
[REDACTED]; 'David Eichler'
[REDACTED]; Dawson, Jermaine J.
[REDACTED]; 'DDEF'
[REDACTED]; Dell, Camille K.
[REDACTED]; Despertt, Armond D. [REDACTED];
Doherty, John J. [REDACTED]; 'e chance' [REDACTED];
'Forakis, Thomas' [REDACTED]; Claude, Frantz
[REDACTED]; Gant, Quincy G. [REDACTED]; Gopie,
Howard [REDACTED]; Graham, James [REDACTED];
Green, Christopher [REDACTED]; Guyton, Wesley B.
[REDACTED]; Harper, Earl O. [REDACTED]

[REDACTED]; Holmes, Lyndon D. [REDACTED]; Hurt,
Jeffrey [REDACTED]; 'john rogel'
[REDACTED] Seylar, John R. [REDACTED];>
[REDACTED] Klomstad, Christopher M. [REDACTED]
Kokhan, Mijail [REDACTED] Kuratie, Mihireteab E.
[REDACTED]; Delmotte, Kyle [REDACTED]; 'leo'
[REDACTED]; Loney, Brand A.
[REDACTED]; Lowe, Van [REDACTED]; 'mark sophavandy'
[REDACTED]; McKernan, Michael
[REDACTED]; Achter, Michael (Contr)
[REDACTED]; 'Newton, Joshua' [REDACTED]; Odusanya,
Charles B. [REDACTED]; O'Neal, Aaron
[REDACTED]; Stumpf, Paul J. [REDACTED]
'paul vollmar' [REDACTED]; Pichini, Ron M. [REDACTED];
Hughes, Patrick J. [REDACTED]; Poe, James
Q. [REDACTED]; Pope, Rhonda R. [REDACTED]; 'Powell,
Billy' [REDACTED]; 'prenesh ramaachandran'
< [REDACTED]; Esemoto, Raphael N. [REDACTED];>
'Reid, Lambert' [REDACTED]; Keach, Robert A.
[REDACTED];> [REDACTED]; Rucker, Lafayette W.
[REDACTED]; Sauter, David F. < [REDACTED]; 'Simmonds,
Winston' [REDACTED]; Somaweera, Indika N.
[REDACTED]; Taper, Louis M. [REDACTED];> 'TCS
WDC Group' [REDACTED]; Teshome, Zufan K.
[REDACTED]; Simonson, Thomas J. [REDACTED];>
Trinh, Phibao [REDACTED]; Tsampos, John
[REDACTED];> Tungcod, Anthony [REDACTED];>
Thomas, Warren [REDACTED]; Watson, Chris
[REDACTED]; Weekes, Sherek K. [REDACTED];>
'william thompson' [REDACTED]; Townsend, William E.
[REDACTED]; Williams, Winston D.
[REDACTED]; Wineke, Tim < [REDACTED];>
Chan, Yanyan < [REDACTED]; Zverev, Alexander V.
< [REDACTED]; Saadati, Siavash < [REDACTED];
[REDACTED]; Breece, Ken < [REDACTED];>
[REDACTED];> [REDACTED]; Gawlik, Stan F.
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Please provide supporting documentation all responses if available.