1.0 OVERVIEW DESCRIPTION OF THE TEST PROGRAM, INCLUDING PRELIMINARY SCHEDULE.

a. General

Oregon Iron Works is planning to fully test the prototype vehicle in accordance with the RFP requirements and, additionally, to perform all necessary (and typical) testing applicable to a production manufactured street car vehicle (functional and performance testing). OIW's approach is to work only with service proven products that are the same, equal or better than the components used for the vehicles currently running in Portland. Deviations from the original design are therefore minimized.

For areas where the design is the same as the current Portland vehicle and the manufacturing process is the same or similar (and certified) with the current vehicle process and, also, for existent components/systems, OIW is planning to provide type test data (existing documentation in the form of test reports, measurements and verification) to prove out compliance with the RFP requirements.

OIW is planning to collaborate with the customer, identify and approve in common such areas where the vehicle compliance is proved out using existing data. The objectives of the testing and assurance program is to provide a safe, functional, defect free, high quality and fully compliant vehicle.

b. Certification and Sub-Components

The testing process will be conducted in parallel to the production of the streetcar when applicable, with the functional and performance tests coming at the end. The testing activity will start with design reviews to identify the design differences, and if necessary, the appropriate testing will be performed to prove that the design is the same or better.

A key element of the testing and assurance program is the material and vendor certification of the components/systems supplied. Sub-supplier selection and certification is carefully conducted with attention to the components reliability, design and past performance. OIW will provide the suppliers with the components technical and functional specifications and the tests they need to pass and will follow their successful completion.

The required certifications and/or sub tests are part of the purchase order, and are maintained as part of the history/record book. These reports are submitted with contract letters in compliance with the test program. Dimensional compliance, workmanship, and overall quality are recorded as the build progresses. The suppliers are required to certify the correct installation, at OIW, of their components/systems and to provide on site support/participation (where applicable).

The major components/systems that will be pre-tested and certified at the supplier will include, but not be limited to:

- Traction Inverter
- Traction Motors
- Door system
- Auxiliary power supplies
- Drive Management Control
- HVAC unit
- Brakes
- Pantograph
- Bridgeplate
- Major components of the electrical system (master controller, knife switch, dash display, etc.)

c. Test Documentation, Procedure and Results

All testing will have a test procedure written before the test is conducted; the procedure will contain as a minimum the following:

a) Title and revision level
b) Pass/failure criteria in quantitative terms
c) Relevant Specification references
d) Sequence of testing
e) Equipment and instrumentation required
f) Test setup, description, diagrams, and schematics.
g) Test methodology
h) Data evaluation procedure
i) Type of report or data to be submitted

OIW will issue a test report for each significant test performed. The report will contain as a minimum the following:

- Test description
- Date and location when and where the test was performed
- Pass/fail criteria and/or values test results and compliance with the test requirements
- The scheduling of all tests will include notification of the customer before the testing date. The major test milestones are identified in the testing schedule

d. Testing Classification

The following testing categories are planned for the new prototype vehicle:

- Typical manufacturer conformance tests (for a full description/listing of the manufacturer tests please see the Test Plan Chart 2 that follows this section (pages 177 - 184)
- Component qualification tests (for a full description/listing of the qualification tests please see Test Plan Chart 2 that follows this section)
- System qualification tests (for a full description/listing of the qualification tests please see Test Plan Chart 2 that follows this section)
- Car level qualification tests (for a full description/listing of the qualification tests please see Test Plan Chart 2 that follows this section)
- System conformance tests (for a full description/listing of the conformance tests please see Test Plan Chart 2 that follows this section)
- Vehicle static tests (for a full description/listing of the static tests please see Test Plan Chart 2 that follows this section)
- Acceptance tests (for a full description/listing of the acceptance tests please see Test Plan Chart 2 that follows this section)

    a) Wire continuity
    b) Insulation resistance
    c) High potential
    d) Vehicle water tightness
    e) Operation of the inverter and all auxiliaries
    f) Communications
    g) Interior and exterior lighting
    h) HVAC operation
    i) Destination signs
    j) Door systems
    k) Boarding ramp
    l) Brake systems
    m) On-board diagnostic interfaces
    n) Total coach operation

e. Preliminary Testing Schedule

The preliminary testing schedule follows this section (page 185).

For additional description of the testing program please see section 14 of the Technical Specification attachment. The testing plan: (Testing Matrix and the Test Plan Complete, follows this section) have the OIW proposal for areas where re-testing will not be necessary and existing data could be used.

f. Assurance Program

In addition to the testing program OIW is planning to perform the necessary and required assurance and checking program for this type of vehicle. Please see the Assurance and Checking Chart 1 that follows this section (pages 186 – 192), describing all activities planned to be performed in order to provide a compliant, reliable and high quality product.

2.0 TEST MATRIX, SHOWING ALL COMPONENT AND SYSTEM DESIGN CONFORMANCE TESTS.

Please see the Test Plan Chart 1 Matrix that follows this section (pages 193 -195). It is the test matrix and it provides all necessary information regarding the testing plan. In addition we have enclosed the full test plan – please see Test Plan Chart 2. This additional chart lists all tests, checking and measurements to be considered and performed for a typical manufactured vehicle.

3.0 DESCRIPTION OF THE APPROACH APPLIED BY OIW TO THE INCORPORATION OF SAFETY CONSIDERATIONS IN ITS DESIGN

The main objective of the OIW/Skoda team is to provide a safe and reliable product. Safety and minimum risk are our first priority and the entire activity of our team is directed to serve this purpose. In addition, we have verified and will continue to verify, test and evaluate every feature of the vehicle such that it presents maximum assurance that our product is completely safe and complies will all applicable standards and regulations.

The proposed prototype street car has in many areas the same design with the current Portland vehicle and the new design areas (electrical) were identified in sub-part B of the RFP reply. Based on the same/similar design used, the proposed vehicle has been safety proven for thousands of hours of service on the streets of Portland. Specifically, five vehicles of this design have been operating since 2001, with two more cars brought into service in 2002. In addition, three identical/similar streetcars have been used in Tacoma, WA since 2002.

Our approach is when systems or components are replaced by new ones; they are designed, evaluated and tested with safety and reliability as prime considerations. OIW uses a team approach to understand system functions and requirements, considering the operational and environmental factors of the City of Portland. All available information, including drawings, specifications, schematics, and functional descriptions of the systems, are organized and researched for comparison against the existing design. OIW will track and manage actions taken throughout the design process. We believe this approach will guarantee that any safety issues are identified early in the process and solved.

Several features have been incorporated into the design which has a direct effect on the safety of the passengers and city traffic. Following is a brief list of some of these features (yet, the list includes only a few features of the vehicle that have been created for safety):

- Impact protection using anti-climbers at both ends of the vehicle
- Structural integrity proven using compression testing and FEA calculations
- Seating and interior trim have been fully proven out regarding smoke and flammability
- Ergonomically designed seating, for both passengers and drivers
- Safety hand rail systems, with hand grips integral to the backs of the seat frames
- Laminated safety glass, providing a PVB layer which retains broken glass shards
- Intercom system between passengers and drivers
- Door safety features and controls (see door system description)
- Bridge-plate system and control (see bridgeplate system description)
- Anti-slip floor covering throughout all areas of the vehicle
- A high visibility, textured safety cover at the head of each step
- An ergonomically correct and highly visible driver's desk and environment
- "Green-line" (door and bridge plate electronic controls) for open/close position
- Extensive vehicle insulation and grounding
- Emergency stop buttons in both passenger and driver compartments

In addition to the above listed features, the design of the prototype vehicle ensures that passengers and operators are not exposed to tripping hazards, sharp points or edges, or similar hazards. At the passenger interior, consideration has been given to the advantage of color contrast and anti-skid texture at the floor and steps.

At the operator's cab, we want to improve the labeling and visibility of controls on the desk. Legible and easily understandable graphics will be provided wherever passengers or drivers operate either routine or emergency equipment

With regards to the maintenance facility: training and manuals will provide for the proper handling, storage, and disposal of hazardous materials. Manuals will be used to clearly identify any hazardous maintenance procedure and will include instructions on how to reduce or eliminate the hazards of the procedure.

Any equipment containing hazardous materials, high voltages or other risk will be clearly labeled both inside and out. Exposure to voltage will be reduced through enclosures, interlocks, and similar measures.

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
TYPICAL MANUFACTURER CONFORMANCE TESTS (These are typical tests/checking that are performed by the manufacturer as part of the normal verification of the manufacturing process; some of them are not listed on the RFP; some of them are a duplication of other tests listed under a different classification)	**A**	**Completed vehicle - Test room – rail track with assembly pit, vehicle on assembly bogies**					
	1	Assembly completeness check	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	2	Vehicle chassis rail grounding contact min. 35 mm^2	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	3	Preparation of dielectric tests – power supply 24VDC, test jigs	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	4	Circuit connection check, network division check	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	5	Performance of dielectric tests	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- insulation resistance meter 500V, 1000V and regulated power supply 0 – 4kV, 50Hz, 500mA					
		- issuing of test report with measured values					
	6	Reconnecting after tests, disassembly of jigs	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	7	Check of connections of individual circuits according to design and wiring diagrams,	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- check of types and sections of cables according to wiring diagrams					
		- check of types of devices according to design drawings					
		- check of breaker and fuse values					
		- power supply 24VDC, testing jigs					
	8	Bogies	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- check of connections and operation of all sensors					
		- check of completeness of assembly, types of devices, sections and their connections					
	B	**Vehicles bound to original bogies - Test room - on track with assembly pit**	OIW/Skoda (Elec & Transp)				
	1	Activation of battery circuits and cabin activation	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	2	Activation of interior lighting circuits	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	3	Activation of exterior lighting circuits	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	4	Activation of ticket dispenser and ticket markers.	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	5	Check of electric positioning of rear mirrors.	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	6	Filling of bogie A brake hydraulic system as specified	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- filling, filtration, venting					
		- equipment for oil filtration – jig					
	7	Filling of bogie B brake hydraulic system as specified	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- filling, filtration, venting					
		- equipment for oil filtration – jig					
	8	Activation of the regulator of brake of bogies A and B as specified	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	9	Test of forced release of mech. brake	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- by manual pressurizing					
		- by mech. release of grippers (caliper)					
	10	Activation of 24V vehicle circuits – brakes of bogie A, bogie B	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	11	Test of functioning of diagnostic SW of mech. brake, real time signals, defect memory.	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	12	Setting of load sensors.	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	13	Circuits of rail brake, functions	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	14	Activation of 24V circuits – vehicle control, emergency brake circuits, speed and temperature sensors	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- according to test specification, notebook with test SW					
	15	Test of function of diagnostic SW of master control and traction drive	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- real time signals, downloading of defect memory					
	16	Mechanic adjustment of doors according to test specification	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	17	Mechanic adjustment and cleaning of platform for the disabled according to test specification	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	18	Activation of door and platform according to test specification	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- notebook with test SW				Test performed on manufactured vehicle	
	19	Activation of panels and door control	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
	20	Test of stability of door adjustment – 100 cycles of opening and closing	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- after the test check of the permanency of the mechanic setting and check of door closing power					
		- device for measuring door closing power, issuing of test report					
	21	Measuring resistance of heaters of saloon heating, warm-air furnace heating, brake resistor heating	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- ohmmeter					
	22	Activation of 24V circuits – collector, dead man circuits, sanding, filling of sanders	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	23	Speed recorder	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- notebook with speed recorder test SW					
	24	Activation of bridging, selection switches of emergency operation, high-speed switches, travel by 24V, circuits	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- zero speed, emergency driving					
	25	Activation of rail switch, opticom, radio, canceller, GPS	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- check of signals by means of tester, testing specifications of manufacturers					
	26	Activation of information system	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- laptop with test SW					
	27	Single test of axle power collector	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- by volt-ampere method, measuring of contact resistance in three various positions					
		- of the slip ring, check of brush pressure					
		- current supply 200ADC, issuing of test report with measured values					
	28	Measuring of vehicle rail earthing contact – from the highest point of each part to the rail	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- impedance meter 50A, AC, issuing of test report with measured values					
	C	**Tests of vehicle under voltage - Test room**	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	1	Test of saloon and sander heating	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- power supply 0-750V DC, 40A, clip-on DC ammeter 0-200A				Test performed on manufactured vehicle	Yes
	2	Test of accumulation battery chargers 24V DC,	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- power supply 0-750V, 40A, clip-on DC ammeter 0-200A				Test performed on manufactured vehicle	Yes
	3	Test of auxiliary drive converters	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- check of diagnostic SW operation, real time signals, downloading defects.					
		- check of output voltage 3x400V AC by multi-meter RMS					
		- check of converter cooling fan rotation direction					
		- test of standby operation if one converter breaks down					
		- check of earth current signaling					
		- power supply 0-750V DC, 40A, multi-meter RMS, laptop with test SW					
		Test of warm-air furnace heating 1, cabin 2 – direction of fan rotation	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	4	Test of air-conditioning of cabin 1, cabin 2, saloon, temperature setting,	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- check of air conditioning protection setting, air conditioning position setting					
		- laptop with test SW					
	5	Check of traction inverter cooling fan rotation direction	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- power supply 0-750V DC, 40A					
	6	Test of vehicle forward drive– directions, speed sensors, check of contact line voltage signaling	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- from min. allowed voltage in driver's panels					

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
		- power supply 0-750V DC, 400A, oscilloscope for checking signals from sensors 60 MHz					
	7	Test of emergency ride, test of driving at 24V	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
			OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	D	**Tests of vehicle under voltage at test track – power supply 750V DC, 1000A**	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	1	Test of switching devices and controls	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	2	Test of driving-braking up to 20 km/hour.	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	3	Test of operation and safety during ride	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	4	Test of slip and anti-skid protection - sanding, sound signaling	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	5	Test of brake synergy	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	6	Test of independent brake	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	7	Test of cabin and saloon air-conditioning	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	8	Test of driving-braking at minimal contact line voltage 500V DC	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	9	Test of driving-braking at maximal contact line voltage 900V DC	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	10	Test of speed recorder operation and black-box records, check of controlling from the main panel, by means of diagnostic SW setting of black box and card PCMCIA)	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	11	Test of dead man circuit during ride (check of functioning and setting in various traction modes)	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	12	Test of emergency ride	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	13	Test of operation of STOP buttons at minimum speed	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	14	Test of emergency bogie brake release	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	15	Test of information system in sequence to stops announcements	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	16	Performance of stopping distances	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	17	Records of signals for measuring of compliance with type tram	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	18	Driving test 100km, speed according to local safety specifications	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	19	Downloading of error messages from all computers, evaluation and clearing of error memories	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
		- laptop with test SW, thermometer, anemometer, 8-canal. recording device					
			OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	E	**Vehicle on water spraying test buck**	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	E1	Technological test of individual parts of the tram before interior assembly	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	E2	Complete street car or complete street car with running auxiliary drives	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	1	Check of closing of all lids and covers of electric devices	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	2	Water spraying by testing equipment, water pressure, jet placement on the whole vehicle roof area, sides and faces for 20minutes	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	3	Opening of all boxes and terminals on vehicle roof in order to check waterproof tightness	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	4	Check of saloon and driver's cabins tightness	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
	5	Check of wiper operation	OIW/Skoda (Elec & Transp)	Vehicle	Typical conformance test	Test performed on manufactured vehicle	Yes
DESIGN QUALIFICATION TESTS	2.1.4	Accessibility	OIW	Design review, vehicle measurement	Customer approval before build, verify as part of Functional Testing	Tie to ADA compliance	Yes
(referenced on RFP - included)	2.2.1.1	Station Platforms	OIW	Design review, vehicle measurement	Customer approval before build, verify as part of Functional Testing	Tie to ADA compliance	Yes
	2.2.2	Right of Way Interface Design Constraints	Skoda T	Past test data from last contract as tested in Plzen	Test report to Customer, limited agreed demonstration in Portland with approved written test plan	Tie to existing fleet	Limited
	2.2.3	Anticipated Climatic Conditions	Skoda T	Report	Operational report of current fleet	Tie to existing fleet	Yes

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
	2.2.4	Wayside Power Supply	OIW/Skoda T/Skoda E	Vehicle	Performance Testing with written plan	Test performed on manufactured vehicle, recording input power with variable performance allowed	Yes
	2.3.1	Carbody Dimensions	OIW	Vehicle	First Article	Variance sheet	Yes
	2.3.2	Pantograph Dimensions	Supplier/OIW	Subassembly/Vehicle	First Article	Variance sheet	Yes
	2.3.3	Wheel Dimensions	Supplier/OIW	Subassembly/Vehicle	First Article	Variance sheet	Yes
	2.3.4	Truck Dimensions	Supplier/OIW	Subassembly/Vehicle	First Article	Variance sheet	Yes
	2.3.5.2	Dynamic Envelope	OIW	Vehicle	First Article	Dynamic envelope drawing, measurement, limited system test with feeler extensions	Limited
	2.3.6.1	Weights	OIW	Vehicle	First Article	Need weight control plan and review process, do final vehicle weight in all conditions	Yes
	2.3.6.2	Weight Balance	OIW	Vehicle	First Article	Need weight control plan and review process, do final vehicle weight in all conditions	Yes
	2.4.1	Low Voltage Power System	OIW / Skoda T / Skoda E	Bench and Vehicle	First Article and Performance Testing	Should be tied to past supply, but will need to be verified at the vehicle level	Yes
	2.4.2	AC Power Supply	OIW / Skoda T / Skoda E	Bench and Vehicle	First Article and Performance Testing	Should be tied to past supply, but will need to be verified at the vehicle level	Yes
	2.4.3	Abnormal Electrical Levels	OIW / Skoda T / Skoda E	Bench and Vehicle	First Article and Performance Testing	Test performed on manufactured vehicle	Yes
	2.5.1	Propulsion and Braking Assumptions	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Test performed on manufactured vehicle	Yes
	2.5.2	Acceleration Requirements	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Test performed on manufactured vehicle	Yes
	2.5.3	Continuous and Balancing Speed Requirements	OIW / Skoda T / Skoda E	Vehicle	Operational report of current fleet	Tie to existing fleet	Yes
	2.5.4	Service Brake Requirements	OIW / Skoda T / Skoda E / Knorr	Vehicle	First Article and Performance Testing	Critical test over full range conducted at night with safety escorts. Detailed approved written plan required	Yes
	2.5.5	Emergency Braking Requirements	OIW / Skoda T / Skoda E / Knorr	Vehicle	First Article and Performance Testing	Critical test over full range conducted at night with safety escorts. Detailed approved written plan required, Part of 2.5.4	Yes
	2.5.6	Wheel Spin/Slide Correction	OIW / Skoda T / Skoda E	Vehicle	Test report to Customer, limited agreed demonstration in Portland with approved written test plan	Tie to existing fleet	Limited
	2.5.7	Jerk Limits	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Test performed on manufactured vehicle, critical test for passenger safety	Yes
	2.5.8	Mode Change Dead Times	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Measured timing test, critical test for safety certification	Yes
	2.5.9	No-Motion Detection	Portland	Vehicle		Part of performance testing with test procedure	
	2.5.10	Parking Brake	Portland	Vehicle		Part of performance testing with test procedure	
	2.5.11	Duty Cycle Rating	Portland	Vehicle		Sub-part of performance testing with test procedure plus bench test	
	2.6	Noise, Vibration and Ride Quality	OIW / Skoda T / Skoda E, with independent consultant	Vehicle	First Article and Performance Testing	Part of noise reduction program that is followed at the design detail level. Final test conducted by independent consultant providing written report	Yes
	2.7	Electromagnetic Interference and Compatibility	OIW / Skoda T / Skoda E, with independent consultant	Bench and Vehicle	Part of system development following EN5021-3-1. Compiles type test reports at the bench level, and final from full vehicle test	As Part of equipment development Skoda E will provide progress report of the system type testing. Engineering testing is conducted on the full up vehicle and filter adjustments are made. Final testing verified by independent firm as part of performance testing	
	2.8.2	General Safety Design Requirements	OIW	Design review, vehicle verification	Design review, internal, with milestone review with customer. Physical verification during Performance Testing	Critical process	Yes
	2.8.3	Failure Induced hazards	OIW / Skoda T / Skoda E	Vehicle	Performed during functional test	This will be a separated and controlled test with detailed procedure and customer whiteness	Yes
	2.8.4	Fire and Life Safety	OIW / Skoda T / Skoda E	Design review, vehicle verification	Docket 90 based materials review	Report / Certification	No
	2.8.5	Safety Under Normal Operation and Maintenance Conditions	OIW / Skoda T / Skoda E	Design review, vehicle verification	Design review, internal, with milestone review with customer. Physical verification during Performance Testing	Report / Certification	Yes
	3.2.1	Vertical design Load Strength Requirements	OIW / Skoda T / Skoda E	Past test data from last contract as tested in Plzen	Skoda certification of OIW complying with the original design as built	Past report and design check off report	No
	3.2.2	End Sill Compression Load	OIW / Skoda T	Past test data from last contract as tested in Plzen	Skoda certification of OIW complying with the original design as built	FEA to support the values and old design to new build with no changes. Report only	No

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
	3.2.3	Anti-Telescoping Load Above Floor	OIW / Skoda T	Past test data from last contract as tested in Plzen	Skoda certification of OIW complying with the original design as built	Report for last build	No
	3.2.4	Anti-Telescoping Load At Floor	OIW / Skoda T	Past test data from last contract as tested in Plzen	Skoda certification of OIW complying with the original design as built	Report for last build	No
	3.2.5	Structural Shelf	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.6	Corner Post, Horizontal Load	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.8	Anticlimber Loads	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.9	Articulation Joint Anticlimbing Loads	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.10	Floor Load	OIW / Skoda T	Fixture test	Establish worst case span, and test in a fixture state as part of material selection	Report and self certification	Yes
	3.2.11	Roof Load	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.12	Side Load	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.13	Jacking Loads	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same, do limited demo for safe jacking and file results and report	Limited test with report	Limited
	3.2.14	Steps	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.15	Equipment Loads	OIW / Skoda T / Skoda E	Past test data from last contract as tested in Plzen, differences to provide test report from calculation	Evaluate weight difference from past build, if weights are more than 5%, show calculation, if 10% limited test	Limited test with report	Limited
	3.2.16	Truck Running Gear Loads	OIW / Skoda T	Past test data from last contract as tested in Plzen	Show design hasn't changed and weights are the same	Report for last build	No
	3.2.17	Natural Frequency	OIW / Skoda T / Skoda E	Vehicle	Part of performance testing		Yes
	4.1	Operator's Controls	OIW / Skoda T / Skoda E	Vehicle	Critical part of functional testing	This section with each part has a detailed plan to test each function in all switch placement combination	Yes
	5.2.2	Strength Requirements, Door Panels	OIW / Door supplier	Subsystem	Supplier test and certification		Yes
	5.2.3	Weather Sealing	OIW	Vehicle	Water test all cars, part of acceptance testing	Piece test	Yes
	5.3	Door Operation	OIW / Door supplier	Vehicle	Functional test with safety and ADA requirements	Self certification	Yes
	5.4.1	Bridgeplate Operation	OIW / Bridgeplate supplier	Subsystem	Supplier test and certification		Yes
	5.4.2	Bridgeplate Construction	Bridgeplate supplier	Subsystem	Supplier test and certification	Report	Yes
	5.5	Door Operator and Bridgeplate Control Panel	OIW / Skoda T / Skoda E /Door Supplier / Bridgeplate Supplier	Vehicle	Installation certification, and functional test	Part of Functional test program	Yes
	5.6	Door Function Requirements	OIW / Skoda T / Skoda E /Door Supplier / Bridgeplate Supplier	Vehicle	Part of 5.5	Part of Functional test program	Yes
	5.7	Door Obstruction Detection	OIW / Skoda T / Skoda E /Door Supplier / Bridgeplate Supplier	Vehicle	Part of 5.5	Part of Functional test program	Yes
	5.8	Control Switches and Pushbuttons	OIW / Skoda T / Skoda E	Vehicle	Part of functional test and safety certification	Part of Functional test program	Yes
	5.9	Manual Door Release Mechanism	OIW / Door supplier	Vehicle	Part of functional test and safety certification	Part of Functional test program	Yes

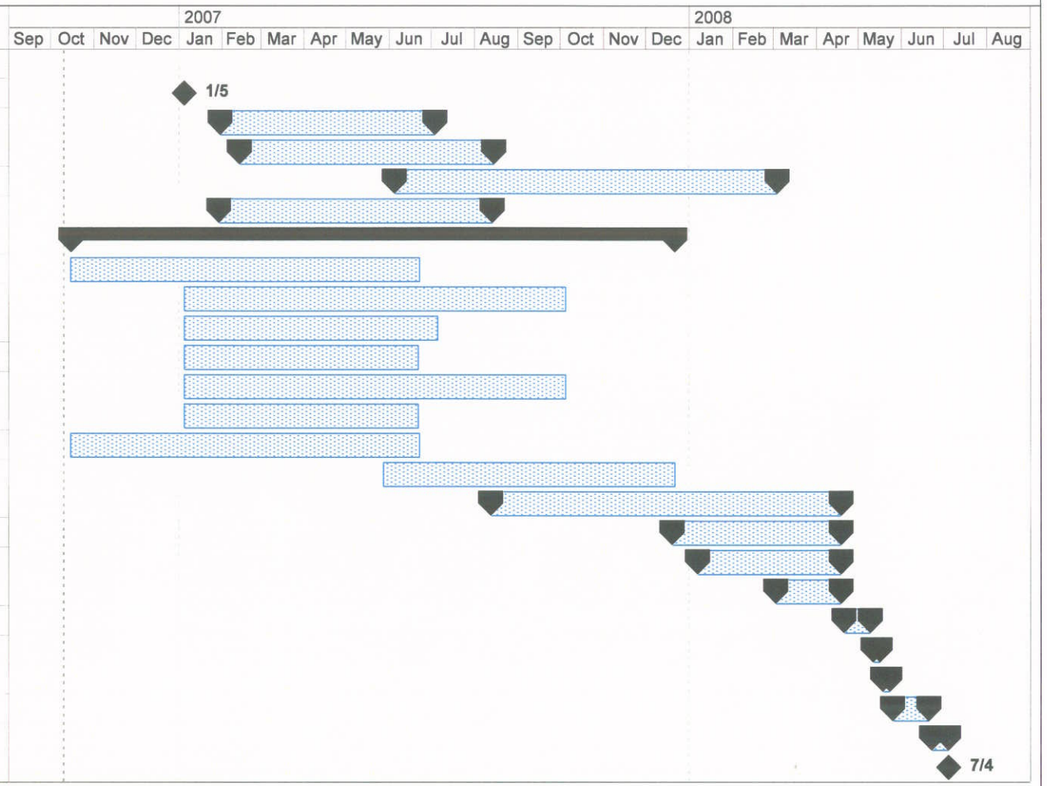
Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
	5.1	Interlock Requirements	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Critical test, part of function, and safety certification	Yes
	5.11	Bypass Devices	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Critical test, part of function, and safety certification	Yes
	5.12	Annunciations	OIW / Skoda T / Skoda E	Vehicle	First Article and Performance Testing	Part of Functional test program	Yes
	7.2	Interior Lighting	OIW / Light supplier	Vehicle	First Article and Performance Testing	Part of installation certification from supplier, and verification of light levels per ADA Standards	Yes
	7.3	Exterior Lighting	OIW / Light supplier	Vehicle and component level	Specification compliance for lights, and location by design	Report	Yes
	7.4	Emergency Lighting	OIW / Light supplier	Vehicle	Part of safety certification	Report	Yes
	8.2	Primary Power System	OIW/Skoda Electric	Vehicle	Supplier & OIW test	Design review, bench test, part of car system test	
	8.2.1	Pantograph	OIW/Supplier	System & Vehicle	Supplier & OIW test	Pressure measurement	
	8.3	AC Power Supply	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Sub-part of performance testing with test procedure plus bench test	
	8.4.2	Low Voltage Power Supply	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Sub-part of performance testing with test procedure plus bench test	
	8.4.3	Storage Battery	OIW	System & Vehicle	Supplier & OIW test	Part of performance testing with test procedure, with Emergency Power	
	8.4.4	Emergency Power	OIW	System & Vehicle	Supplier & OIW test	Part of performance testing with test procedure	
	9.2	Propulsion System Requirements	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	System Design review with report	
	9.3	Propulsion Equipment Thermal Capacities	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Bench Test to simulate extreme condition with written procedure	
	9.4	Switching Line Transients	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Bench Test to simulate extreme condition with written procedure final acceptance during pilot testing	
	9.5	Electromagnetic Interference	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Part of performance testing with test procedure, with EMI/EMC Tests	
	9.6	Performance Characteristics	OIW/Skoda Electric	System & Vehicle	Supplier & OIW test	Plan that details all parts provided for review includes bench, static, and performance testing of complete vehicle	
	9.7.1/14.5.3	Traction Motors	Skoda Electric	System & Vehicle	Supplier & OIW test	Engineering report, motor same as in fleet	
	9.7.2/14.5.4	Gear Drive	Penn Machine	System & Vehicle	Supplier & OIW test	Engineering report, gear drive same as in fleet	
	9.7.3	Dynamic Brake Resistors	Skoda Electric	System & Vehicle	Supplier & OIW test	Certificate, proven at bench test	
	10 / 14.6.9	Truck Assemblies	Penn Machine	System & Vehicle	Supplier & OIW test	Design review, truck the same design as fleet, NDT Report on each truck	
	11	Friction Brake System	Knorr-Bremse	System & Vehicle	Supplier & OIW test	Design review, supplier certification, system test in Portland	
	12	Communication System	OIW	Vehicle	OIW test	Design reviews, Part of Function testing	
	12.5	Passenger Information System	OIW	Vehicle	OIW test	Design reviews, Part of Function testing	
	12.6	Train-To-Wayside Communication System	OIW	Vehicle	OIW test	Design reviews, Part of Function testing	
	13.2.3	Floor Covering	Vendor	System	Supplier & OIW test	Certificate	
	13.2.6	Passenger Seats	Vendor	System	Supplier & OIW test	Design review, supplier certification	
	13.2.8	Stanchions, Handrails and Windscreens	Vendor	System	Supplier & OIW test	Design review, supplier certification	
COMPONENT QUALIFICATION	14.2.1	FLAMMABILITY & SMOKE EMISSION	Components Suppliers	Component at supplier		The suppliers will submit compliance certificate	Yes
	14.2.2	AC TRACTION MOTORS	Skoda Electric	Component at supplier	Existing component testing performed	Skoda to submit test results from existing motors	Yes
(referenced on RFP - included)	14.2.3	AC AUXILIARY MOTORS	Skoda Electric	Component at supplier	Existing component testing performed	Skoda to submit test results from existing motors	Yes
	14.2.4	TRACTION GEAR UNIT : - 100 hours with load - gear box noise	Penn Machine/OIW/Skoda	Component at supplier	New supplier, same design, re-test	**100 hours:** Penn Machine with OIW and Skoda will set up this test and decide the best site to perform the test. **Noise:** Penn Machine	Yes
	14.2.5	AUXILIARY POWER SUPPLY	Skoda Electric	Component at supplier	Existing component testing performed	Skoda to submit test results from existing components	No
	14.2.6	LOW VOLTAGE POWER SUPPLY AND BATTERY CHARGER	Skoda Electric	Component at supplier	Component testing	S-E to perform test and provide results	Yes
	14.2.7	TRUCK	Skoda Transportation OIW/Penn Machine	Component at supplier	Existing component new supplier compliant with original supplier manufacturing and/or process	Skoda Transportation to provide test report; their test was done on Astra 03T - one end vehicle. Get from Analysis Co. results/equivalence for 2 ends car	No
	14.2.8	CAR BODY STRUCTURAL TESTS		Component at supplier			
	14.2.8.2	VERTICAL LOAD TEST	OIW/Skoda Transportation	Component at supplier	Existing component new supplier compliant with original supplier manufacturing and/or process	Skoda Transportation to provide existing test report.	No
	14.2.8.3	COMPRESSION LOAD TESTS	OIW/Skoda Transportation	Component at supplier	Existing component new supplier compliant with original supplier manufacturing and/or process	The sill load compliance to be proven by Skoda existing data: analysis-test correlation on existing documents	No
(not referenced on the RFP)		Additional major components	Supplier	Component at supplier	Supplier test	The specific component to be delivered fully tested	Yes

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
SYSTEM QUALIFICATION TESTS	14.3.1	PROPULSION SYSTEM	Skoda Electric	System at supplier	Supplier test	Electric propulsion system to be delivered fully tested	Yes
	14.3.2	FRICTION BRAKE SYSTEM	Knorr-Bremse	System at supplier	Supplier test	Brake system to be delivered fully tested	Yes
(referenced on RFP - included)	14.3.3	DOOR AND BRIDGEPLATE SYSTEM	Bode/Faiveley and CTS	System at supplier	Supplier test	Doors and bridge-plate to be delivered fully tested	Yes
	14.3.4	UNITIZED HVAC SYSTEM	HVAC supplier	System at supplier	Supplier test	HVAC system to be delivered fully tested	Yes
(not referenced on the RFP)		Additional major systems	Supplier	System at supplier	Supplier test	The specific system to be delivered fully tested	Yes
VEHICLE LEVEL CONFORMANCE AND QUALIFICATION TESTS	14.4.1	WATER TIGHTNESS TEST - CAR BODY	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW	Duplicate listing - see Typical conformance test E	Yes
		WATER TIGHTNESS TEST - Electric containers	Skoda Electric	Container	Test at manufacturer - Skoda Electric	Duplicate listing - see Typical conformance test E	Yes
	14.4.2	AIR LEAKAGE	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
(referenced on RFP - included)	14.4.3	DOOR AND BRIDGEPLATE OPERATION	OIW/Skoda Transportation and Bode/Faiveley & CTS	Systems on vehicle	Test at manufacturer - OIW		Yes
	14.4.4	LIGHT INTENSITY	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
		- exterior and interior lights testing					
	14.4.5	NOISE AND VIBRATION	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW	See methods to reduce noise	Yes
	14.4.6	HORN AND BELL	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
	14.4.7	ELECTROMAGNETIC COMPATIBILITY	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
SYSTEM CONFORMANCE TESTS	14.5.1	ELECTRICAL APPARATUS	Electric suppliers and Skoda Electric at OIW	Systems on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
(referenced on RFP - included)	14.5.2	AIR CONDITIONING UNIT	HVAC supplier at OIW	System on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.3	MOTORS	Skoda Electric at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.4	TRACTION GEAR UNITS	Penn Machine at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.5	TRACTION POWER CONTROL	Skoda Electric at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.6	INVERTER	Skoda Electric at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.7	LOW VOLTAGE POWER SUPPLY AND BATTERY CHARGER	Skoda Electric at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.8	BATTERY	Battery supplier at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.9	FRICTION BRAKE EQUIPMENT	Knorr-Bremse at OIW	Component on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
	14.5.10	COMMUNICATIONS SYSTEM	OIW or suppliers	System on vehicle	Supplier test with manufacturer participation	Test/compliance report required	Yes
VEHICLE STATIC CONFORMANCE TESTS	14.6.1	VEHICLE WIRING	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Test performed on manufactured vehicle	Yes
	14.6.1.1	WIRING CONTINUITY CHECKS	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Test performed on manufactured vehicle	Yes
(referenced on RFP - included)	14.1.2	INSULATION TESTING	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Test performed on manufactured vehicle	Yes
	14.1.2.1	INSULATION RESISTANCE TESTS	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Test performed on manufactured vehicle	Yes
	14.6.1.2	INSULATION TESTING	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Duplicate listing - see 14.1.2 above	Yes
		- insulation resistance test					
	14.1.2.2	HIGH POTENTIAL TESTS	OIW/Skoda (Elec & Transp)	Component and/or Vehicle	Typical conformance test at manufacturer	Test performed on manufactured vehicle	Yes
		- ground contact test and back-current connection check					
		- ground contact brushes check					
	14.6.2	DOORS, BRIDGEPLATES, OPERATORS AND CONTROLS	OIW/Skoda Transportation and Bode/Faiveley & CTS	Systems on vehicle	Test at manufacturer - OIW		Yes
	14.6.3	AIR CONDITIONING	OIW/HVAC supplier	Systems on vehicle	Test at manufacturer - OIW		Yes
	14.6.4	HEATING	OIW/Supplier	Systems on vehicle	Test at manufacturer - OIW		Yes
	14.6.5	HEADLIGHTS AND STOP LIGHTS	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
	14.6.6	TRACTION POWER CONTROL	OIW/Skoda Electric	Vehicle	Test at manufacturer - OIW		Yes
	14.6.7	BRAKES/FRICTION BRAKE	OIW/Knorr-Bremse	Vehicle	Test at manufacturer - OIW		Yes
	14.6.8	COMMUNICATION	OIW/Skoda Transportation	Vehicle	Test at manufacturer - OIW		Yes
	14.6.9	TRUCK QUALITY TESTING	OIW/Penn Machine	Systems on vehicle	Test at manufacturer - OIW		Yes

Test Classification	RFP Paragraph or ID No.	Description	Responsible (who will perform it)	Test level	Approach	Comments	Test Performed Yes/No
	14.6.10	WHEEL BACK-TO-BACK DISTANCE	OIW/Penn Machine	Vehicle	Test at manufacturer - OIW		Yes
	14.6.11	SHUNT RESISTANCE	OIW/Penn Machine	Vehicle	Test at manufacturer - OIW		Yes
							Yes
ACCEPTANCE TESTING	14.7.1	FUNCTIONAL TESTS	OIW/Skoda (Elec & Transp) with customer participation	Systems on vehicle	Test on vehicle prior to track testing	See above tests listed	Yes
(referenced on RFP - included)	14.7.2	VEHICLE PERFORMANCE TEST	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	a	Acceleration (positive and negative)	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	b	Traction motor current (each truck)	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	c	Brake cylinder pressure (each truck)	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	d	Contact wire voltage	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	e	Total catenary current	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	f	Vehicle speed	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	g	Propulsion and braking control signals	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	h	Time	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
		BRAKES	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
		- service braking test	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
		- hydraulic brakes test	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
		- electromagnetic truck brake test	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
		- hazard brake check	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle to prove compliance with RFP Section 2 Technical Specification	Yes
	14.7.3	OPERATIONAL TESTING	OIW/Skoda (Elec & Transp) with customer participation	Vehicle	Test on customer's track	Test performed on manufactured vehicle	Yes

OIW Portland Prototype Street Car Program - Preliminary Test Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1					
2	**Notice to Proceed**	0 wks	Fri 1/5/07	Fri 1/5/07	
3	Design reviews process	22 wks	Wed 1/31/07	Tue 7/3/07	
4	Design approval process	26 wks	Wed 2/14/07	Tue 8/14/07	3SS+2 wks
5	Prototype build	39 wks	Tue 6/5/07	Mon 3/3/08	
6	Material and components certification documentation submittal (suppliers)	28 wks	Tue 1/30/07	Mon 8/13/07	
7	**Components/systems fabrication. Qualification testing - test reports (suppliers)**	**310 days**	**Mon 10/16/06**	**Fri 12/21/07**	
8	Electrical traction system and components	36 wks	Mon 10/16/06	Fri 6/22/07	
9	Truck assembly	39 wks	Fri 1/5/07	Thu 10/4/07	
10	Doors and bridgeplates	26 wks	Fri 1/5/07	Thu 7/5/07	
11	HVAC	24 wks	Fri 1/5/07	Thu 6/21/07	
12	Brakes	39 wks	Fri 1/5/07	Thu 10/4/07	
13	Pantograph	24 wks	Fri 1/5/07	Thu 6/21/07	
14	Electrical system - vehicle integration	36 wks	Mon 10/16/06	Fri 6/22/07	
15	Miscellaneous electrical/others	30 wks	Mon 5/28/07	Fri 12/21/07	
16	**Manufacturer conformance (checking and tests)**	36 wks	Mon 8/13/07	Fri 4/18/08	
17	**Design Qualification tests**	17.4 wks	Thu 12/20/07	Fri 4/18/08	
18	**System conformance tests**	15 wks	Mon 1/7/08	Fri 4/18/08	
19	**Vehicle level qualification tests**	7 wks	Mon 3/3/08	Fri 4/18/08	
20	**Vehicle static conformance tests**	3 wks	Mon 4/21/08	Fri 5/9/08	
21	**Move to the current Portland track**	1 wk	Mon 5/12/08	Fri 5/16/08	20
22	**Functional testing with the customer**	1 wk	Mon 5/19/08	Fri 5/23/08	21
23	**Acceptance testing**	4 wks	Mon 5/26/08	Fri 6/20/08	22
24	**Approval**	2 wks	Mon 6/23/08	Fri 7/4/08	23
25	Operational testing start	0 wks	Fri 7/4/08	Fri 7/4/08	24



10/12/06

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
	A. Body shell assembly				
1	The check of the welding material and parts for welding compliance	Certificates of welding material and parts for welding	Acceptance at overtaking in shop, checks in production phase	12 mhpsc	
	Streetcar Underframe – front and rear				
1	The check of steel vehicle front, the check of dimensions, visual check of welds after welding completed and adjusted	Drawing,specicification, accompanying document, guide	Check record	1+1 mhpsc	
2	Crack detection check of steel vehicle front according the request on drawings	Drawing,specicification, accompanying document, guide	Report record	2+2 mhpsc	
3	Dimensions check of steel vehicle front after steelworking	Drawing, specification, accompanying document	Report record	1+1 mhpsc	
4	Transversal transom check, check of dimensions and visual check of welds after welding completed and adjusted	Drawing, specification, accompanying document	Report record	1+1 mhpsc	
5	Transversal transom Crack detection check according the requests of drawing	Drawing,specicification, accompanying document, guide	Check record	2+2 mhpsc	
6	Transversal transom dimensions check after steelworking	Drawing, specification, accompanying document	Report record	1+1 mhpsc	
7	The check of underframe assembly	Drawing, specification, accompanying document	Report record	1+1 mhpsc	
8	Underframe dimensions measurement after pre-welding and checking of the gaps for weld	Drawing,specicification, accompanying document, guide	Check record	1+1 mhpsc	
9	Visual check of welds after underframe completely welded	Drawing, accompanying document, guide, Welds Check Protocol	Welds check, Names of who welded, Welds check protocol	2+2 mhpsc	
10	Underframe Crack detection check according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	4+4 mhpsc	
11	Underframe dimensions measurement after welding completed and adjusted	Drawing, Dimensional check protocol	Dimensional check protocol	2+2 mhpsc	
12	Check of sand-cleaned external surfaces of underframe by abrasive for paint, paint final check	Drawing,specicification, accompanying document, guide	Check record	6+6 mhpsc	
	Streetcar Underframe – central				
1	The check of steel vehicle front, the check of dimensions, visual check of welds after welding completed and adjusted	Drawing, specification, accompanying document	Check record	1 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
2	Crack detection check of steel vehicle front according the request on drawings	Drawing,specicification, accompanying document, guide	Dimensional check protocol	2 mhpsc	
3	Dimensions check of steel vehicle front after steelworking	Drawing, specification, accompanying document	Check record	2 mhpsc	
4	Transversal transom check, check of dimensions and visual check of welds after welding completed and adjusted	Drawing, specification, accompanying document	Check record	1 mhpsc	
5	Transversal transom Crack detection check according the requests of drawing	Drawing,specicification, accompanying document, guide	Test protocol	2 mhpsc	
6	Transversal transom dimensions check after steelworking	Drawing, specification, accompanying document	Check record	1 mhpsc	
7	The check of underframe assembly	Drawing, specification, accompanying document	Check record	4 mhpsc	
8	Underframe dimensions measurement after pre-welding and checking of the gaps for weld	Drawing, specification, accompanying document	Check record	1 mhpsc	
9	Visual check of welds after underframe completely welded	Drawing, accompanying document, guide, Welds Check Protocol	Welds check, Names of who welded, Welds check protocol	2 mhpsc	
10	Underframe Crack detection check according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	4 mhpsc	
11	Underframe dimensions measurement after welding completed and adjusted	Drawing, Dimensional check protocol	Dimensional check protocol	2 mhpsc	
12	Check of sand-cleaned external surfaces of underframe by abrasive for paint, paint final check	Drawing,specicification, accompanying document, guide	Check record	6 mhpsc	
	Body shell face structure – front and rear				
1	Dimensions check and sidewall face end structure welds after welding completed and adjusted	Drawing, specification, accompanying document	Check record	1+1 mhpsc	
2	Measurement of dimensions and a visual check of welds of the complete body shell face structure	Drawing,specicification, accompanying document, guide	Check record	1+1 mhpsc	
	Body shell sidewall – front, central, rear; left and right				
1	Assembly and dimensional check	Drawing, specification, accompanying document	Check record	6 x 1 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
2	Welds and dimensions check after welding and adjusting	Drawing, specification, accompanying document	Check record	6 x 2 mhpsc	
3	Crack detection check of sidewall according to requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	6 x 2 mhpsc	
	Body shell roof structure – front, central and rear				
1	Roof structure assembly and dimensional check	Drawing, specification, accompanying document	Check record	3 x 2 mhpsc	
2	Welds and dimensions check after welding and adjusting	Drawing, specification, accompanying document	Check record	3 x 2 mhpsc	
3	Roof steel sheeting check	Drawing, specification, accompanying document	Check record	3 x 1 mhpsc	
	Body shell assembly – front, central and rear				
1	Body shell assembly and dimensional check	Drawing, specification, accompanying document	Check record	3 x 10 mhpsc	
2	Dimensional and check of welds of the complete body shell	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	3 x 4 mhpsc	
3	Crack detection check of the upper arm according the drawings	Drawing,specicification, accompanying document, guide	Test protocol	3 x 3 mhpsc	
4	Overtaking by customer	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	3 x 2 mhpsc	
5	Body shell external sheeting	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	3 x 3 mhpsc	
6	Overtaking by customer	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	3 x 2 mhpsc	
7	Check of bottom cavity paint, external final paint, damping paint TEROPHON on complete body shell front, central and rear	Drawing,specicification, accompanying document, guide	Check record	37,5 mhpsc	
8	Overtaking by customer of bottom cavity paint, external final paint, damping paint TEROPHON on complete body shell front, central and rear	Drawing,specicification, accompanying document, guide	Overtaking protocol	7,5 mhpsc	
	Body shell sections coupling together				
1	Dimensional check of complete body shell after front, central and rear sections coupled together	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	4 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
2	Overtaking by customer	Drawing, accompanying document, Dimensional check protocol	Dimensional check protocol	2 mhpsc	
	B. Streetcar undercarriage				
	Wheelsets				
1	Completing of documentation – documents and certificates, axle measuring protocol, wheels, braking discs, axle bearing boxes, gearboxes, gears run-in protocol	Documents and certificates for wheelset components	External supplier documentation	4 x 1 mhpsc	
2	Hydraulic brake disc pressing on the axle	Drawing, specification, accompanying document	Pressing diagram	2 mhpsc	
3	Check of braking disc location and its dimensions on the axle after pressing	Drawing, accompanying document, Wheelset measuring protocol	Wheelset measuring protocol	1 mhpsc	
4	Check of grounding ring location and its dimensions on the axle after hot-stretching	Drawing, accompanying document, Wheelset measuring protocol	Wheelset measuring protocol	1 mhpsc	
5	Check of pressing and mounting of axle bearings on the axle	Drawing, specification, accompanying document	Check report	2 mhpsc	
6	Measuring and calculation of washer thickness for wheel pressing on the axle	Drawing, specification, accompanying document	Check report	2 mhpsc	
7	Pressing check of wheels on the axle	Drawing, specification, accompanying document	Pressing diagram	2 mhpsc	
8	Evaluation of pressing programs for braking discs and wheels	Drawing, specification, accompanying document	Pressing diagram	4 mhpsc	
9	Dimensional check of wheelset and measuring certificates draft	Drawing, specification, accompanying document	Measuring certificate	4 mhpsc	
10	Check of final paint of the axle	Drawing, specification, accompanying document	Check report	8 mhpsc	
11	Overtaking the wheelset by customer	Drawing, accompanying document, Measuring certificate	Certificates, measuring certificates of components and measuring certificate	2 mhpsc	
	Truck frame				
1	The check of welding material and parts for welding	Certificates of welding material and basic material to be weld	Check of overtaking into assembly, check during a production	2 mhpsc	
2	Check of the internal welds inside the longitudinal	Drawing, accompanying document	Check report	4 mhpsc	
3	Crack detection check of flanges and webs according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	16 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
4	Check of internal test of transversal girder prior to their closing	Drawing, specification, accompanying document	Check report	2 mhpsc	
5	Crack detection check of webs according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	2 mhpsc	
6	Check of the welds and dimensions of longitudinal girders after welding, alignment and working	Drawing, specification, accompanying document	Check report	4 mhpsc	
7	Crack detection check of longitudinal transom according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	10 mhpsc	
8	Welds and dimensions check after welding, alignment and working	Drawing, specification, accompanying document	Check report	2 mhpsc	
9	Crack detection check of transversal transom according the requests of drawings	Drawing,specicification, accompanying document, guide	Test protocol	4 mhpsc	
10	Detection of weld gaps after truck frame is assemble before final welding	Drawing, accompanying document and Weld Check Protocol	Check report	2 mhpsc	
11	Truck frame dimensions check prior to welding	Drawing, specification, accompanying document	Check report	1 mhpsc	
12	Visual check of frame welds after frame welding, issue of Weld Check protocol	Drawing, accompanying document, guide, Welds Check Protocol	Welds check, Names of who welded, Welds check protocol	4 mhpsc	
13	Crack detection check of truck frame according the requests of drawings	Drawing,specicification, accompanying document, guide	Test report	12 mhpsc	
14	Dimensional and flatness truck frame check after welding	Drawing, specification, accompanying document	Check report	2 mhpsc	
15	Check of sand-cleaned external surfaces of truck frame by abrasive for paint	Drawing, specification, accompanying document	Check report	1 mhpsc	
16	Final paint check	Drawing, specification, accompanying document	Check report	8 mhpsc	
17	Frame dimensional check and working	Drawing, accompanying document and Measuring Check Protocol	Measuring Check Protocol	6 mhpsc	
18	Truck frame overtaking by customer	Drawing, accompanying document and Measuring and Weld Check Protocol	Measuring and Weld Check Protocol	2 mhpsc	
	Truck				
1	Truck and mounted components assembly check	Drawing, specification, accompanying document	Check report	10 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
2	List of material issuing on necessary truck components	Drawing, accompanying document, list of truck components	List of truck parts	2 mhpsc	
3	Gears run-in according the specified regime described in gear drawings	Drawing, specification, accompanying document	Run-in report	8 mhpsc	
4	Gears run-in mounted in truck frame for both directions of rotation	Drawing, specification, accompanying document	Run-in Protocol		
5	The review of noise-level and oil tightness, axle and gear bearings temperatures, after slowing down in both directions of rotation, measuring of radial and axial rotational accuracy, issuing of run-in protocol	Run-in Protocol			
6	Set up and checking of the temperature and speed sensors functionality for the motors and gear boxes during bogie running test	Drawing,specicification, accompanying document, guide	Check report	2 mhpsc	
7	Gear run-in checked by customer	Drawing, accompanying document Run-in protocol	Run-in Protocol	2 mhpsc	
8	Final paint check	Drawing, specification, accompanying document	Check report	8 mhpsc	
9	Assembly completion check	Drawing	Check report	8 mhpsc	
10	Check of the weight of the truck	Drawing,specicification, accompanying document, guide	Check report	15 mhpsc	
11	Check of the alignment and track-paralleling	Drawing,specicification, accompanying document, guide	Check report	8 mhpsc	
12	The clutch-assembly check between traction motor and gearbox after trucks are mounted under streetcar body shell	Drawing, specification, accompanying document	Check report	1 mhpsc	
13	Side stops adjustment and check, secondary suspension washer check	Drawing, specification, accompanying document	Check report	2 mhpsc	
	Final assembly				
1	Window glazing check	Drawing, specification, accompanying document	Check report	22,5 mhpsc	
2	Cables and wire check – front section	Drawing, specification, accompanying document	Check report	3 x 15 mhpsc	
3	Cables and wire check – central section	Drawing, specification, accompanying document	Check report	3 x 15 mhpsc	

Item	Activity description	Related documents, guides or manuals	Assurance check and Test documents	Time (mhpcs = man-hour per streetcar)	Notes
4	Cables and wire check – rear section	Drawing, specification, accompanying document	Check report	3 x 15 mhpsc	
5	Saloon sidewalls lining check	Drawing, specification, accompanying document	Check report	30 mhpsc	
6	Dashboard bedding check	Drawing, specification, accompanying document	Check report	8 mhpsc	
7	Bellows assembly check	Drawing, specification, accompanying document	Check report	16 mhpsc	
8	Roof equipment check	Drawing, specification, accompanying document	Check report	16 mhpsc	
9	Door bedding check	Drawing, specification, accompanying document	Check report	8 mhpsc	
10	Check of side-stops and their setting	Drawing, specification, accompanying document	Check report	8 mhpsc	
11	Paint wholeness check	Drawing, specification, accompanying document	Check report	16 mhpsc	
12	Vehicle running profile check	Drawing, specification, accompanying document	Check report	8 mhpsc	
13	Weight distribution on wheels check and vertical position of vehicle	Drawing,specicification, accompanying document, guide	Check report		

10T3 Test Matrix

No.	SPECIFICATION SECTION	DESCRIPTION	TESTING METHODS: Cert. Letter - OIW SKODA	Cert. Letter - Supplier	Engineering Documentation	Material Data Sheet/ MSDS	Measurement Verification	Performance Test - OIW.	Performance Test Supplier	Prior Test Report	DESIGN QUALIFICATION TEST	SYSTEM QUALIFICATION TEST	COMPONENT QUALIFICATION TEST	CONFORMANCE TEST	ACCEPTANCE TEST	TEST SITE	NOTES	DURATION
1	2.1.4	Accessibity			✓		✓				✓			✓		OIW	Design Review	2 hours
2	2.2	Operating Environment						✓						✓		Portland	Customer witness	1 day
3	2.3	Vehicle Dimensions and Weights					✓				✓						Customer witness, during customer performance testing	2 days
4	2.3.1	Carbody Dimensions					✓				✓			✓		OIW	Quality Report with variable data	1 day
5	2.3.2	Pantograph			✓		✓						✓			Vendor	Design review	0
6	2.3.3	Wheel Dimensions			✓		✓						✓			Vendor	Design review	0
7	2.3.4	Truck Dimensions			✓		✓						✓	✓		OIW	Design reviews, physical measurement verification	1 hour
8	2.3.5	Clearance Requirements			✓		✓							✓		OIW	Coordinate with section 10	1 day
9	2.3.6.2	Weight Balance			✓		✓							✓		OIW	Customer witness	2 days
10	2.4.1	Low Voltage Power Supply		✓				✓					✓	✓		OIW	Unit testing part of bench test	2 hours
11	2.4.2	AC Power Supply		✓				✓					✓	✓		OIW	Unit testing part of bench test	2 hours
12	2.4.3	Abnormal Electrical Levels		✓				✓					✓	✓		OIW	Unit testing part of bench test	2 hours
13	2.5.1	Propulsion and Braking Requirements					✓							✓		Portland	Part of performance testing with test procedure	1 week
14	2.5.2	Acceleration Requirements					✓							✓		Portland	Part of performance testing with test procedure	with 13
15	2.5.3	Continuous & Balancing Speed Requirements					✓							✓		Portland	Part of performance testing with test procedure	with 13
16	2.5.4	Service Brake Requirements					✓					✓		✓		Portland	Part of performance testing with test procedure	with 13
17	2.5.5	Emergency Braking Requirements					✓							✓		Portland	Part of performance testing with test procedure	with 13
18	2.5.6	Wheel Spin/Slide Correction					✓							✓		Portland	Part of performance testing with test procedure	with 13
19	2.5.7	Jerk Limits					✓							✓		Portland	Part of performance testing with test procedure	with 13
20	2.5.8	Mode Change Dead Times					✓							✓		Portland	Part of performance testing with test procedure	with 13
21	2.5.9	No-Motion Detection					✓							✓		Portland	Part of performance testing with test procedure	with 13
22	2.5.10	Parking Brake					✓							✓		Portland	Part of performance testing with test procedure	with 13
23	2.5.11	Duty Cycle Rating					✓	✓					✓	✓		Portland	Part of performance testing with test procedure plus bench tests	with 13
24	2.6.2	Interior Noise					✓							✓		Portland	Sub-part of performance testing with test procedure	3 days
25	2.6.3	Wayside Noise Limits					✓							✓		Portland	Sub-part of performance testing with test procedure	with 26
26	2.6.4	Vibration Generation					✓							✓		Portland	Sub-part of performance testing with test procedure	2 days
27	2.6.5	Vibration and Impact Loads					✓						✓	✓		Portland	Sub-part of performance testing with test procedure	with 28
28	2.7	Electromagnetic Interference and Compatibility					✓	✓		✓				✓		Portland	Sub-part of performance testing with test procedure plus bench test	2 days
29	2.8.2	General Safety Design Requirements	✓	✓	✓				✓	✓						OIW	Design review with reports of study	0
30	2.8.3	Failure Induced Hazards					✓						✓	✓		OIW	Part of detailed function testing	2 days
31	2.8.4	Fire and Life Safety		✓	✓	✓				✓						OIW	Design review with reports of study	0
32	2.8.5	Safety Under Normal Operating and Maintenance Conditions		✓	✓	✓			✓	✓				✓		OIW	Design review with reports of study, inspection by customer	4 hours
33	3	Car Body each sub-point to be addressed			✓				✓	✓						OIW	Design review of past design, and current design with past report	0
34	4.1	Operator's Controls			✓		✓	✓						✓		OIW	Critical part of detailed Function Testing	3 days
35	5.2.2	Door Strength Requirements		✓				✓					✓			Supplier	Report from supplier test data on file at supplier	0
36	5.2.3	Door Weather Sealing						✓						✓		OIW	Part of water testing	4 hours
37	5.4.2	Bridgeplate Construction		✓				✓					✓			Supplier	Report from supplier test data on file at supplier	0
38	5.6	Door Functional Requirements						✓				✓		✓		OIW	Part of Functional testing with specific test report, safety	4 hours
39	5.7	Door Obstruction Detection						✓				✓		✓		OIW	Part of Functional testing with specific test report, safety	2 hours
40	5.8	Control Switches and Pushbuttons						✓						✓		OIW	Part of Functional testing with specific test report, safety	4 hours
41	5.9	Manual Door Release Mechanism						✓						✓		OIW	Part of Functional testing with specific test report, safety	1 hour
42	5.10.	Interlock Requirements						✓						✓		OIW	Part of Functional testing with specific test report, safety	4 hours
43	5.11	Bypass Devices						✓						✓		OIW	Part of Functional testing with specific test report, safety	4 hours
44	5.12	Annunciations						✓						✓		OIW	Part of Functional testing with specific test report, safety	4 hours

10T3 Test Matrix

No.	SPECIFICATION SECTION	DESCRIPTION	TESTING METHODS: Cert. Letter - OIW SKODA	Cert. Letter - Supplier	Engineering Documentation	Material Data Sheet/ MSDS	Measurement Verification	Performance Test - OIW.	Performance Test. Supplier	Prior Test Report	DESIGN QUALIFICATION TEST	SYSTEM QUALIFICATION TEST	COMPONENT QUALIFICATION TEST	CONFORMANCE TEST	ACCEPTANCE TEST	TEST SITE	NOTES	DURATION
45	7.2	Interior Lighting		✓	✓			✓	✓			✓		✓		OIW	Full car certification test of light intensity by supplier with OIW	1 day
46	7.3	Exterior Lighting		✓	✓			✓						✓		OIW	Part of Functional testing with specific test report, safety	2 hours
47	7.4	Emergency Lighting		✓	✓			✓						✓		OIW	Part of Functional testing with specific test report, safety	1 hour
48	8.2	Primary Power System			✓		✓		✓					✓		OIW	Design review, bench test, part of car system test	4 hours
49	8.2.1	Pantograph						✓						✓		OIW	Pressure measurement	4 hours
50	8.3	AC Power Supply		✓	✓			✓				✓		✓		OIW	Sub-part of performance testing with test procedure plus bench test	4 hours
51	8.4.2	Low Voltage Power Supply		✓	✓			✓				✓		✓		OIW	Sub-part of performance testing with test procedure plus bench test	4 hours
52	8.4.3	Storage Battery		✓				✓					✓	✓		OIW	Part of performance testing with test procedure, with Emergency Power	0
53	8.4.4	Emergency Power						✓						✓		OIW	Part of performance testing with test procedure	4 hours
54	9.2	Propulsion System Requirements			✓						✓					OIW	System Design review with report	0
55	9.3	Propulsion Equipment Thermal Capacities			✓				✓		✓		✓			Skoda	Bench Test to simulate extreme condition with written procedure	0
56	9.4	Switching Line Transients			✓			✓	✓		✓			✓		Skoda	Bench Test to simulate extreme condition with written procedure final acceptance during pilot testing	2 hours
57	9.5	Electromagnetic Interference						✓	✓		✓			✓		Skoda	Part of performance testing with test procedure, with EMI/EMC Tests	0
58	9.6	Performance Characteristics			✓	✓		✓	✓		✓		✓	✓		Skoda	Plan that details all parts provided for review includes bench, static, and performance testing of complete vehicle	
59	9.7.1 / 14.5.3	Traction Motors		✓	✓					✓	✓					Skoda Electric	Engineering report, motor same as in fleet	0
60	9.7.2 / 14.5.4	Gear Drive		✓	✓					✓	✓					Penn Machine	Engineering report, gear drive same as in fleet	0
61	9.7.3	Dynamic Brake Resistors		✓	✓				✓		✓					Skoda Electric	Certificate, proven at bench test	0
62	10 / 14.6.9	Truck Assemblies	✓		✓					✓		✓				Penn Machine	Design review, truck the same design as fleet, NDT Report on each truck	0
63	11	Friction Brake System		✓	✓			✓				✓	✓	✓		Knorr-Bremse	Design review, supplier certification, system test in Portland	1 week
64	12	Communication System						✓						✓		OIW	Design reviews, Part of Function testing	2 days
65	12.5	Passenger Information System						✓						✓		OIW	Design reviews, Part of Function testing	4 hours
66	12.6	Train-To-Wayside Communication System						✓						✓		OIW	Design reviews, Part of Function testing	4 hours
67	13.2.3	Floor Covering		✓									✓			Supplier	Certificate	0
68	13.2.6	Passenger Seats		✓	✓								✓			Supplier	Design review, supplier certification	0
69	13.2.8	Stanchions, Handrails and Windscreens		✓	✓								✓			Supplier	Design review, supplier certification	0
	System Conformance Tests																	
1	14.6.1.1	Wiring Continuity Checks						✓						✓		OIW	On-Going part of production with written process	3 days
2	14.1.2/14.6.1.2	Insulation Testing						✓						✓		OIW	On-Going part of production with written process	4 hours
3	14.1.2.1	Insulation Resistance Testing						✓						✓		OIW	On-Going part of production with written process	2 hours
4	14.1.2.2	High Potential Tests						✓						✓		OIW	On-Going part of production with written process	4 hours
5	14.5.1	Electrical Apparatus						✓						✓		OIW	On-Going part of production with written process, system function process	2 days
6	14.5.2	Air Conditioning Unit						✓	✓					✓		OIW	Run in doors at the OIW facility with supplier support, system function process	2 days
7	14.5.5/14.6.6	Tractive Power Control						✓						✓		Portland	Part of performance testing with formal test plan part of section 2.5	1 week

10T3 Test Matrix

No.	SPECIFICATION SECTION	DESCRIPTION	TESTING METHODS: Cert. Letter - OIW SKODA	Cert. Letter - Supplier	Engineering Documentation	Material Data Sheet/ MSDS	Measurement Verification	Performance Test - OIW	Performance Test Supplier	Prior Test Report	DESIGN QUALIFICATION TEST	SYSTEM QUALIFICATION TEST	COMPONENT QUALIFICATION TEST	CONFORMANCE TEST	ACCEPTANCE TEST	TEST SITE	NOTES	DURATION
8	14.5.6	Inverter						✓						✓		Portland	Part of performance testing with formal test plan part of section 2.5	0
9	14.5.7	Low Voltage Power Supply and Battery Charger						✓						✓		OIW	Part of performance testing with formal test plan part of section 2.4.1	0
10	14.6.7	Friction Brake						✓						✓		OIW	Static Test record pressure	1 day
11	14.6.10	Wheel Back to Back Distance						✓						✓		OIW	Quality report by serial number	0
12	14.6.11	Shunt Resistance						✓						✓		OIW	Quality report by serial number with variable data	1 hour
13	14.7.1	Functional tests						✓							✓	Portland	History Book of all reports, plus system function on customer's rail	3 days
14	14.7.2	Vehicle Performance Test						✓							✓	Portland	History Book of all reports, plus system performance measurement on customer's rail	2 weeks
15	14.7.3	Operational Testing						✓							✓	Portland	History Book of all reports, plus customer operation with support on customer's rail	3 months
	Component Qualification Tests																	
1	14.2.1	Flammability & Smoke Emission		✓	✓	✓					✓	✓	✓			Suppliers	Part of procurement and engineering process, material compliance report with design reviews	0
2	14.2.2	AC Traction Motors		✓						✓			✓			Skoda	Same motor as past supply	0
3	14.2.3	AC Auxiliary Motors		✓					✓				✓			Skoda	Internal engineering review, with test report from Suppliers, and Skoda compliance with 9.7.1	0
4	14.2.4	Traction Gear Unit						✓	✓				✓			Penn Mach	Vendor supply or certification of US supplier with 9.7.2	0
5	14.2.5	Auxiliary Power Supply							✓	✓			✓			Skoda/OIW	Same as past design, part of bench test, record at function test, part of section 8.3	2 days
6	14.2.6	Low Voltage Power Supply and Battery Charger							✓	✓			✓			Skoda/OIW	Same as past design, part of bench test, record at function test, part of section 8.4.2	0
7	14.2.7	Truck							✓	✓			✓			Penn/OIW	Design review, truck the same design as fleet, with section 10	0
8	14.2.8	Structural Tests, work with section 3							✓	✓			✓			Skoda/OIW	Design review with past reports showing compliance to past Portland design	0
9	14.3.3 / 14.6.2	Door and Bridgeplate System		✓	✓				✓				✓			Skoda/OIW	Fixture test at supplier, supplier certification of installation, limited function test, work with section 5	
10	14.3.4/14.6.3/ 14.6.4	Unitized HVAC System						✓						✓		OIW	Local testing planned to demonstrate Compliance in the Portland area	1 week
11	14.6.5	Headlights and Stop Lights						✓						✓		OIW	Part of function testing	1 hour
	System Qualification Tests																	
1	14.3.1	Propulsion System, with section 9						✓	✓					✓	✓	Skoda/OIW	Bench tested system test followed by full car performance testing in Portland	2 weeks
2	14.3.2	Friction Brake System		✓	✓			✓						✓	✓	Knorr/OIW	Knorr to approve installation and support performance testing in Portland past system weights submitted as reference to support shorter test cycle, part of 14.5.9	1 week
3	14.4.1	Water tightness Test						✓						✓		OIW	Ongoing each car set	2 days
4	14.4.2	Air Leakage						✓						✓		OIW	First Car set	2 days
5	14.4.3	Door and Bridgeplate Operation						✓						✓		OIW	Part of whole system function 4 hours	4 hours
6	14.4.4	Light Intensity						✓	✓					✓		OIW	Supplier run test work with section 7.2	1 day
7	14.4.5	Noise and Vibration						✓						✓		OIW	Running test at night with section 2.6.2	3 days
8	14.4.6	Horn and Bell						✓						✓		OIW	Ongoing each car set	1 hour
9	14.4.7	Electromagnetic Compatibility						✓						✓		Portland	Full car test, part of section 9.5	3 days