



**NATIONAL OCCUPATIONAL STANDARD**

**RAIL SYSTEM VEHICLES MECHANICAL MAINTENANCE AND  
REPAIR WORKER  
LEVEL 4**

**REFERENCE CODE / 12UMS0281-4**

**OFFICIAL JOURNAL DATE-ISSUE / JANUARY 29, 2013 - 28543  
(Duplicated)**

<b>Occupation:</b>	<b>RAIL SYSTEM MECHANICAL MAINTENANCE AND REPAIR WORKER</b>
<b>Level:</b>	<b>4<sup>I</sup></b>
<b>Reference Code:</b>	<b>12UMS0281-4</b>
<b>Standard Developed by:</b>	<b>Turkish State Railways (TCDD) Development &amp; TCDD Personnel Solidarity and Assistance Foundation</b>
<b>Standard Verified By:</b>	<b>VQA Transportation, Logistics and Communication Sector Committee</b>
<b>Approval Date/Number by VQA Executive Board:</b>	<b>Decision dated December 26, 2012 and No. 2012/97</b>
<b>Official Journal Date / Issue:</b>	<b>January 29, 2013 - 28543 (Duplicated)</b>
<b>Revision Number:</b>	<b>00</b>

<sup>1</sup> Vocational Qualification Level is determined as Level 4 in the octal (8) level matrix.

## TERMS, SYMBOLS AND ABBREVIATIONS

**ACKERMAN:** Air cock,

**AXLE:** Axle shaft,

**COUPLING:** Special electric connector,

**DAMPER:** Spiral or lubricated component minimizing the shock in vehicles,

**MAIN RESERVOIR PRESSURE:** Air pressure required for brakes and auxiliary systems,

**ANTIFREEZE:** Liquid mixture which lowers the freezing point, increases the boiling temperature of the cooling liquid in the radiator and protects against corrosions,

**FLAT WHEEL:** Flattening on the wheel's bearing surface,

**ATS (Automatic Train Stop):** Automatic Train Stopping System,

**SETTING BOX:** Mechanism for balancing air pressure,

**BRAKE LINING:** The part for slowing down by frictioning to the brake disc,

**CONNECTING ROD:** Fitting,

**FLANGE PROFILE:** Dimensions of a flange required for a safe drive,

**FLANGE LUBRICATING UNIT:** The system for decreasing the friction between the wheel's bearing surface and flange profile and rail in the rail system vehicles,

**FLANGE:** Rail guide on wheel,

**BOGIE:** The system which is capable of carrying multi-axle wheel set (comprising of sets), can be located on the brake and driving system and carrying the vehicle,

**BRAGA:** Axle guard fitting,

**AXLE BOX:** Axle box,

**TRACTION VEHICLE (TRACTIVE VEHICLE):** Locomotive and rail-car operated by driving power of in-built motor,

**TRACTION DRAW HOOK:** Vehicle connector and traction part,

**TRACTION MOTOR:** Electric motor driving the vehicle,

**TRACTION PACK:** Suspension part, to which coupling sets are connected,

**TRACTION:** Traction,

**CHECK VALVE:** The component allowing flow of liquids in one direction in the

**CIRCULATION:** The component enabling full and continuous circulation,

**AXLE:** Part of wheel set connecting two wheels, carrying loads like a beam and transmitting torque to wheel,

**DIRECT ACTING BRAKE:** The system in which the compressed air is directly transmitted to the brake cylinders and braking is provided,

**EXHAUST:** A mechanism for venting exhaust gases from an internal combustion engine,

**INDIRECT BRAKE:** The system in which braking is provided by an adjusting valve instead of the compressed air being directly transmitted to the brake cylinders,

**INJECTION PUMP:** Pressure fuel regulator required for combustion in diesel engines,

**INJECTOR:** The component injecting fuel to the cylinders in diesel engines,

**FAN:** Air condition unit,

**BRAKE DISC:** Circular brake linings friction component mounted on the wheel or axle,

**BRAKE:** The mechanism for decelerating, stopping or maintaining the existing speed of vehicle,

**HYDRAULIC:** The mechanism driven by liquid pressure,

**ISCO:** International Standard Classification of Occupations,

**AIR CONDITIONING:** The system for heating, cooling and ventilation processes,

**INTERCOOLER:** Air and oil cooler,

**ISG (WHS):** Occupational Health & Safety,

**COUPLING:** Connector transmitting one motion to other equipment,

**CRANKCASE:** Engine axle-box,

**CATENARY:** Electrification (high-tension) line,

**CLUTCH:** The part connecting two components,

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** All kinds of tools, instruments, appliances and devices which are worn, put on or hold by the worker and which protect the worker from one or more hazards arising from the work and effect the health and safety of the worker, and which are designed to suit such purpose,

**COMPRESSOR:** The unit pressurizing air and gases,

**COMPRESSION:** Compressing,

**AUXILIARY RESERVOIR PRESSURE:** Brake control air pressure,

**AUXILIARY RESERVOIR LINE:** The pipe line through which regulating compressed air is passed for brake control and circulating across the vehicle,

**CORROSION:** Metal or metal alloys being corroded by oxidation or other chemical factors,

**COUPLING SET:** Screw mechanism for connecting two vehicles to each other,

**CRANKSHAFT:** The shaft converting piston's linear movement to circular movement,

**CRANK:** The axle converting linear movement of piston rods to circular movement in an engine,

**COUPLER:** Connector (mechanical, electrical, pneumatic),

**VALVE ROCKER:** The mechanism used for opening and closing valves,

**LOCOMOTIVE:** Rail system vehicle driven by mechanical power applied on its wheels and moving hauled vehicles attached to its front or back by this movement,

**MANIFOLD:** Pipes transmitting air or air-fuel mixture to the cylinders and exhaust gases to the outlet,

**PRESSURE GAUGE:** Pressure gauge,

**DRIVER CAB:** Driver's cockpit,

**SELF-STARTER:** The mechanism for starting the engine,

**MEMBRANE:** Diaphragm gasket,

**SUSPENSION:** The connector between spring suspension and sport,

**JOURNAL:** The section of the shaft enabling the shaft to rotate in its bearing,

**AUTOMATIC COUPLING SET:** Automatic coupling set connecting train sets to each other, enabling mechanical, brake and energy transmission,

**SHUTTER:** Cellular vehicle body,

**SKATE:** Connecting wear part,

**WHEEL SLIP:** The wheel running idle on the rail,

**PIVOT PIN:** Fitting,

**PINION:** Traction motor gear,

**PISTON ROD:** The component transmitting the linear movement from the piston to the crankshaft,

**PISTON:** Cylinder-piston with a smaller diameter moving regularly in a cylinder in the engines,

**AXLE GUARD:** Axle guard,

**PNEUMATIC:** Compressed air,

**PT (PANTOGRAPH):** In the electrical traction systems, the equipment transmitting the electric energy required by the traction vehicle from the power line (catenary) to the traction vehicle,

**AIR RELIEF COCK:** The mechanism for air discharge,

**RADIATOR:** Cooling component,

**RAIL SYSTEM VEHICLE:** General term for all the vehicles (train, metro, tram, maglev etc.) moving on railway,

**ADJUSTOR:** Adjusting component,

**REGULATOR:** Regulating component,

**RISK:** Potential of loss, injury or other damages to arise from hazards,

**BRAKE SHOE:** Brake shoe,

**PISTON RING:** Sealing equipment placed on motor pistons to prevent leak of oil, fuel, and gas,

**SENSOR:** Electronic flow, weight, speed and capacity sensor,

**HOT:** Traction vehicle's operative / active mode,

**CYLINDER:** The part in which air-fuel mixture is combusted and energy is generated in the engine,

**COOL:** Traction vehicle's inoperative / inactive mode,

**SPORT:** Connected fitting,

**VALVE:** The component controlling air or fuel-air mixture inlet and exhaust gas outlet in the cylinder,

**SUSPENSION:** The system absorbing the vertical and horizontal forces to the vehicle,

**SPRING:** Suspension spring,

**SURCHARGE:** Over charge,

**SHAFT:** The shaft transmitting the machine's rotation to other components,

**GEARBOX:** A set of gears transmitting the movement from the engine to the power train

and enabling the vehicle to drive at the required speed or reroutes the movement,

**FRAME:** Vehicle body,

**COWCATCHER:** The component which is mounted on the front and rear frame of locomotives and used for plowing foreign substances and snow which may be available on route,

**DRIVE:** Driving,

**BUFFER STOP:** The equipment used for absorbing the movement in the direction of rail axis and their soft transmission to the frame in the vehicles,

**BASEBOARD:** The equipment which is used for disposing of unwanted objects on the rail head bearing surface and mounted on the frame or bogie to be located on the front side of wheel according to the driving direction,

**DANGER:** Potential of damage or injury likely to affect the worker or work place and likely to exist in the workplace or to be caused externally,

**THERMOSTAT:** The component controlling the temperature at the requested values in a system,

**TORQUE:** The rotation effect of a force on a point or an axis,

**SLUDGE:** Deposit,

**DRIVER EMERGENCY BRAKE:** The train security system which is automatically activated and drives the train's brake system in case the driver becomes incapable of driving the train for any reason,

**TURBOCOMPRESSOR:** The unit injecting compressed air to the cylinders by using the energy of exhaust gas,

**TURBOCHARGER:** Excessive air generating unit,

**ULTRASONIC MEASUREMENT:** Measurement made by using sound waves,

**RAILWAY CAR (HAULED VEHICLE):** The rail system vehicle without its own driving power, moved by tracking or pushing by a traction vehicle, suitable for carrying load or passenger,

**VALVE:** The system controlling liquid pass,

**COCK:** The device used for stopping or releasing the liquid in the pipe,

**FLYWHEEL:** Gear or disk used for starting the engine and dynamic balancing of the engine,

**OIL PUMP:** The component pumping the oil in the crankcase to the lubricating system,

**FUEL PUMP:** The component pumping fuel in the fuel tank to the fuel system,

**SEMI-AUTOMATIC COUPLING SET:** The mechanism used for connecting the vehicle to each other, hauling and buffering.

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## 1. INTRODUCTION

National occupational standard titled Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) was issued by the Turkish State Railways (TCDD) Development & TCDD Personnel Solidarity and Assistance Foundation assigned as per the provisions of Vocational Qualifications Authority (VQA) Law No. 5544 and “Bylaw on Drawing up National Occupational Standards” and “Regulation on the Establishment, Duties and Operation Procedures and Principles of the Sector Committees of Vocational Qualification Authority” introduced pursuant to the aforementioned Law.

National occupational standard titled Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) was assessed upon receiving the opinions of the related institutions and organizations in the sector, and approved by VQA Board of Directors upon examination of the VQA Transportation, Logistics and Communication Sector Committee.

## **2. INTRODUCTION TO THE OCCUPATION**

### **2.1. Description of the Occupation**

Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) is the qualified person in terms of knowledge and experience who is able to do service maintenance and periodical maintenance of rail system vehicles in order them to be ready to use and who is able to detect and repair breakdowns on his own or in a team in certain period of time in the framework of Occupational Health & Safety, environmental protection, quality rules and methods.

Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4), is responsible for the accuracy, timing and quality of the control, maintenance, assembly and disassembly works carried out under his supervision. In the performance of works, he works in accordance with the work instructions and informs the failures and defects outside his area of responsibility to the relevant persons in charge.

### **2.2. Occupational Reference in the International Classification System**

**ISCO 08:** 7233 (Agricultural and industrial machinery mechanics and repairers)

### **2.3. Regulations on Health, Safety and Environment**

Environmental Law No. 2872

Labour Law No. 4857

Social Security and General Health Insurance Law No. 5510

Energy Efficiency Law No. 5627

Occupational Health & Safety Law No. 6331

Regulation on Heavy and Dangerous Works

Notification on Vocational Education of Workers in Heavy and Dangerous Work

Regulation on Packaging Waste Control

Regulation on Waste Oils Control

Regulation on the General Principles of Waste Management

Regulation on Procedures and Principles of Occupational Health and Safety Trainings of the Employees

Regulation on Authorities, Duties and Responsibilities of Electrical Engineers

Regulation on Electrically Powered Current Facilities

Regulation on Manual Handling Works

Regulation on Noise

Regulation on Safety and Health Signs

Regulation on Preparation, Completion and Cleaning Works

Furthermore, it is essential to obey laws, statutory rules and regulations on occupational health and safety and environment; and to perform risk analysis regarding this issue.

#### **2.4. Other Occupation Related Legislation**

Decree Law Concerning Regulation of State Economic Enterprises Personnel System Law No. 399 and Repealing Some Articles of Decree Law No. 233

Government Employee Unions and Collective Bargaining Law No. 4688

Law on Trade Unions and Collective Bargaining Agreements No. 6356

Public Servants Law No. 657

And it is essential to obey other current legislations, laws, statutory rules and by-laws related to occupation.

#### **2.5. Working Environment and Conditions**

Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) has risk to pick up occupational diseases arising from work environment and working conditions. Working in every hour of the day and in the bank holidays is in the question. It is an occupation requiring an intensive care and it is necessary to show awareness and pay attention to obey the occupational health and security rules without exception. Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) cooperates with the employees carrying out different works and uses the appropriate personal protective equipment during his operations.

#### **2.6. Other Occupation Related Requirements**

Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) shall have a medical certificate on physical qualifications necessary for his duty and “Form of Initial Entrance and Periodical Medical Examination for Workers in Heavy and Dangerous Work”.

### 3. OCCUPATIONAL PROFILE

#### 3.1. Duties, Tasks and Performance Criteria

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
A	To apply occupational health and safety, fire and emergency rules	A.1	To apply legal and workplace rules regarding occupational health and safety	A.1.1	Gets information from authorised occupational health and safety personnel on regulations and instructions about workplace, occupational health and security.
				A.1.2	Uses the work clothes and personal protective equipment suitable for the work performed.
				A.1.3	Renders first aid; uses firefighting tools such as use of fire extinguisher.
				A.1.4	Places warning signs and templates related to the work performed in accordance with the instructions and protects such warning signs and templates during the performance of work and contributes to the safety of work area and personnel.
				A.1.5	Takes and applies the measures for keeping the work area and equipment used in order and clean.
		A.2	To decrease risk factors	A.2.1	Contributes to the activities related to determination of risks.
				A.2.2	Prepares report to relevant personnel about the risk factors he encounters or possibly encounters during the work.
				A.2.3	Contributes to the activities for decreasing risk factors.
		A.3	To apply emergency procedures in case of emergency	A.3.1	Coordinates the activities of taking measures to determine the cases of emergency and eliminate them rapidly.
				A.3.2	Informs the cases of emergency which are impossible to eliminate instantly to the authorities.
				A.3.3	Carries out the works described in the emergency procedure.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>B</b>	To fulfil the provisions of environmental protection legislation	<b>B.1</b>	To assess environmental hazards	<b>B.1.1</b>	Carries out environmental impact assessment related to the performed activities and assesses potential risks.
				<b>B.1.2</b>	Participates in periodic trainings for environmental protection requirements and practices.
				<b>B.1.3</b>	Carries out the activities related to elimination of determined environmental hazard sources and risk factors.
		<b>B.2</b>	To take environmental protection measures	<b>B.2.1</b>	Takes the measures for the environmental impacts to occur during the performance of work processes in accordance with the company's instructions.
				<b>B.2.2</b>	Ensures that the wastes occurred during the performance of work processes are disposed in accordance with the company's instructions.
				<b>B.2.3</b>	Takes measures related to safe and healthy operation of device, equipment and tools used against negative environmental impacts to occur.
		<b>B.3</b>	To save on the consumption of operating assets	<b>B.3.1</b>	Uses the operating assets economically and efficiently.
				<b>B.3.2</b>	Conducts detection and planning work in order to using the operating assets efficiently.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
C	To work in accordance with the quality management system regulations	C.1	To control the quality of works performed	C.1.1	Applies the quality assurance principles and methods in accordance with the company's instructions stated in the task forms.
				C.1.2	Ensures that the devices and tools used in the work processes are operated in accordance with the conditions described in the quality assurance rules and methods.
				C.1.3	Supervises the conformity of the tasks performed to the standards.
				C.1.4	Fills in the quality management system forms related to the work .
		C.2	To participate in the activities related to prevention of faults and defects determined in the processes	C.2.1	Informs the faults and defects determined during the works to the relevant chief/authority.
				C.2.2	Participates in the research and assessment activities related to determination of reasons for faults and defects.
				C.2.3	Submits his and his team's observations, ideas and suggestions for improvement of work processes and elimination of faults to the relevant authority in accordance with the company's rules and methods.
				C.2.4	Applies and ensures the application of the company's rules and methods related to the fault and defect repairs.
				C.2.5	Informs the faults and defects outside his authority or he fails to repair to the relevant authority.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
D	To make pre-work preparations (to be continued)	D.1	To make personal preparations	D.1.1	Carries out his personal care and cleaning
				D.1.2	Is present in the workplace at the time stated in the work legislation before the work starts.
				D.1.3	Carries out the tasks related to the control documents of work attendance
				D.1.4	Wears appropriate attire according to the work rules, puts identification symbols and signs on his work clothes, is equipped with protective material.
		D.2	To start working	D.2.1	Receives work schedule
				D.2.2	Gathers information from the person who has assigned him in case of on-going works.
				D.2.3	Discusses the work schedule with the other employees included in the team in case of tea works.
		D.3	To determine characteristics of the work area	D.3.1	Inspects work area for continuous and proper work
				D.3.2	Contributes to recovery of negative aspects of work area.
				D.3.3	Ensures the order with regard to type and method of work.
				D.3.4	Keeps under control of the non-conforming tool and material area and ensure its order.
		D.4	To prepare the tool, equipment and material for work	D.4.1	Prepares the proper material and equipment for work.
				D.4.2	Checks the operating state of material and equipment.
D.4.3	Adjusts the equipment before work according to related work.				

				<b>D.4.4</b>	Uses the control and examination tools and devices according to determined operation.
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<b>Duties</b>		<b>Tasks</b>		<b>Performance Criteria</b>	
<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Description</b>
<b>D</b>	To make pre-work preparations	<b>D.5</b>	To inspect the workableness status of the equipment	<b>D.5.1</b>	Inspects the status of working equipment and operability of security mechanisms on a periodic basis according to the instructions.
				<b>D.5.2</b>	Stops working in the event that there is an inappropriate situation or when foresees that there will be an inappropriate situation during the work
				<b>D.5.3</b>	Informs relevant personnel for replacement or repairing the malfunctioning equipment and tools.
				<b>D.5.4</b>	Fixes the problems and failures of tools and equipment in his authority.
		<b>D.6</b>	To conduct work organization	<b>D.6.1</b>	Also taking into consideration the forms filled by relevant personnel, checks the vehicle.
				<b>D.6.2</b>	Assesses existing problems and complaints.
				<b>D.6.3</b>	Determines completion duration of work.
				<b>D.6.4</b>	Determines the parts the maintenance and repair of which is not possible and need to be replaced.
				<b>D.6.5</b>	Gives information about work flow.
		<b>D.7</b>	To determine the vehicle's maintenance/repair procedures and techniques.	<b>D.7.1</b>	Determines the type of the maintenance on the basis of vehicle's total km/examination date.
				<b>D.7.2</b>	Controls the vehicle's failure/damage status and keeps records about the failures/damages in relevant form.
				<b>D.7.3</b>	Determines maintenance/repair order



Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
E	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	E.1	To carry out periodical maintenance of diesel engine exhaust equipment	E.1.1	Disassembles the exhaust manifolds, mufflers, shafts from the vehicle.
				E.1.2	Disassembles the insulations from the exhaust manifolds.
				E.1.3	Inspects the exhaust manifolds, mufflers, shafts and controls that they're damage free and in sound condition and does their cleaning.
				E.1.4	Coats exhaust manifolds with their new insulations.
				E.1.5	Assembles exhaust manifolds, mufflers, shafts on the vehicle.
				E.1.6	Starts the vehicle and performs the exhaust leakage control.
				E.1.7	Controls the conformity of the exhaust gas with reference values according to vehicle maintenance guide.
		E.2	To carry out periodical maintenance of diesel engine suction equipment (to be continued)	E.2.1	Disassembles suction manifolds, supercharge installation (turbocharger, blower), intake air cooling installation (intercooler),supercharge pressure gauges from the vehicle.
				E.2.2	Inspects them and controls that they're damage free and in sound condition.
				E.2.3	Tests the supercharge pressure gauges at the test stand.
				E.2.4	Cleans the suction manifolds.
				E.2.5	Controls the supercharge system (turbocharger, blower) fans.
				E.2.6	Cleans the air cooling channels of intake air cooling installation (intercooler).
				E.2.7	Cleans the on-board air suction channels.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
E	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	E.2	To carry out periodical maintenance of diesel engine suction equipment	E.2.8	Replaces the air filters.
				E.2.9	Assembles the suction manifolds, supercharge installation (turbocharger, blower), intake air cooling installation (intercooler), supercharge pressure gauges on the vehicle.
				E.2.10	Starts the vehicle and performs the intake air leakage control.
				E.2.11	Compares the supercharge pressure gauges with the reference values.
		E.3	To carry out periodical maintenance of diesel engine fuel equipment (to be continued)	E.3.1	Disassembles the fuel installation pipes and equipment, low pressure fuel pump, fuel injection pump, injectors, fuel filters, fuel pressure gauges from the vehicle.
				E.3.2	Inspects them and controls that they're damage free and in sound condition.
				E.3.3	Does the overall cleaning of the parts.
				E.3.4	Replaces the internal filter elements of fuel filters.
				E.3.5	Tests the settings of injection pump (the setting of fuel amount transmitted to injectors) by connecting to the setting device.
				E.3.6	Tests the pressure springs.
				E.3.7	Tests the injectors by using the injector function test device.
				E.3.8	Tests the low pressure fuel pump at the test stand.
				E.3.9	Inspects the fuel tank and controls that it's damage free condition.
				E.3.10	Visually inspects the retaining straps of oil tanks; controls that they're damage free and in complete condition.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
E	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	E.3	To carry out periodical maintenance of diesel engine fuel equipment	E.3.11	Inspects the fuel supply cap, cap filters and fuel tank gauges; controls that they're damage free.
				E.3.12	Cleans the cap filters and fuel tank gauges.
				E.3.13	Tests fuel pressure gauge at the test stand.
				E.3.14	Assembles the fuel equipment elements on the vehicle.
				E.3.15	Starts the vehicle and visually performs the fuel leakage control.
				E.3.16	Compares the fuel pressure gauge value with the reference values.
				E.3.17	Cleans the fuel tank conforming to the vehicle maintenance catalogue.
		E.4	To carry out periodical maintenance of diesel engine cooling equipment (to be continued)	E.4.1	Drains the vehicle's cooling water.
				E.4.2	Disassembles the cooling installation pipes and hoses, water pumps, radiators, thermostatic valve.
				E.4.3	Inspects them and controls that they're damage free and in sound condition.
				E.4.4	Does the overall cleaning of the parts.
				E.4.5	Visually inspects the water tanks and controls that they're damage free and in sound condition.
				E.4.6	Visually inspects the retaining straps of water tanks; controls that they're damage free and in sound condition.
				E.4.7	Inspects the cooling fans, fan shrouds, fittings, shafts, gear system; controls that they're damage free and in sound condition.

				<b>E.4.8</b>	Measures the run out in fan shafts.
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Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.4</b>	To carry out periodical maintenance of diesel engine cooling equipment	<b>E.4.9</b>	Lubricates the fan gear with the oil conforming to the catalogue values.
				<b>E.4.10</b>	Tests water pumps, water temperature and thermostatic valve at the test stand.
				<b>E.4.11</b>	Assembles the cooling installation equipment on the vehicle.
				<b>E.4.12</b>	Supplies cooling water to the diesel engine in accordance with the catalogue values.
				<b>E.4.13</b>	Starts the vehicle and visually performs the water leakage control.
		<b>E.5</b>	To carry out periodical maintenance of diesel engine lubrication equipment	<b>E.5.1</b>	Pours the diesel engine oil into the waste oil barrels.
				<b>E.5.2</b>	Disassembles the lubricating installation pipes and hoses, oil filters, lubricating oil pumps, oil cooler, oil pressure gauge.
				<b>E.5.3</b>	Visually inspects them; controls that they are damage free and in sound condition and does overall cleaning of the parts.
				<b>E.5.4</b>	Replaces the oil filters, internal filter elements of fuel filters.
				<b>E.5.5</b>	Tests the oil pressure gauge at the test stand.
				<b>E.5.6</b>	Visually inspects the internal elements of oil cooler and controls that they're damage free and in sound condition.
				<b>E.5.7</b>	Assembles the lubricating installation equipment on the vehicle.
				<b>E.5.8</b>	Supplies oil compatible with the engine.

				<b>E.5.9</b>	Starts the vehicle and visually performs oil leakage control.
				<b>E.5.10</b>	Measures the pressure of oil pumps and compares such value with the catalogue values of the related vehicle.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.6</b>	To carry out periodical maintenance of diesel engine parts.	<b>E.6.1</b>	Disassembles the engine parts.
				<b>E.6.2</b>	Visually inspects them; controls that they are damage free and does overall cleaning of the parts.
				<b>E.6.3</b>	Visually inspects the engine block and controls that it's damage free and in sound condition.
				<b>E.6.4</b>	Performs the surface flatness, cracking, raking, scratching and wear control of the cylinder jackets and liners, pistons, piston rods and cylinder head (cylinder cover) of piston rings, valves, valve seats, valve springs, valve rockers and shifters by visual inspection.
				<b>E.6.5</b>	Performs the conicity, ovality, wear and clearance control of the cylinder jackets and liners, pistons, piston rods and rings, cylinder head (cylinder cover), valves, valve seats, valve springs, valve rockers and shifters by measuring.
				<b>E.6.6</b>	Controls piston cracks with ultraviolet devices.
				<b>E.6.7</b>	Performs the conicity, ovality, wear and clearance control of the main journals and pins, main and rod bearings of crankshaft and bearing pins by measuring.
				<b>E.6.8</b>	Measures the crankshaft, camshaft and flywheel run out.
				<b>E.6.9</b>	Performs the flywheel wear control by visual inspection and measurement.
				<b>E.6.10</b>	Visually inspects the timing mechanism gears and controls that they're damage free and in sound condition.
				<b>E.6.11</b>	Assembles the engine parts with appropriate torque.

				<b>E.6.12</b>	Adjusts the valve settings.
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Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.7</b>	To carry out periodical maintenance of diesel engine driving-command system.	<b>E.7.1</b>	Disassembles the pipes and hoses, gas piston, membrane and throttle lever in the system.
				<b>E.7.2</b>	Visually inspects them; controls that they are damage free and in sound condition and does overall cleaning of the parts.
				<b>E.7.3</b>	Assembles the parts on the vehicle.
				<b>E.7.4</b>	Visually inspects the diesel engine regulator and controls that it's damage free and in sound condition.
				<b>E.7.5</b>	Changes the regulator's oil.
				<b>E.7.6</b>	Tests the operation of gassing and gas cutting electromagnetic valves.
				<b>E.7.7</b>	Starts the vehicle and tests the diesel engine control system.
				<b>E.7.8</b>	Performs the diesel engine control engine leakage control.
				<b>E.7.9</b>	Notes down the idle rpm and full speed, oil and oil pressure values by engine speed by looking at the gauges; compares such values with the catalogue values of the related vehicle.
		<b>E.8</b>	To carry out the periodic maintenance of the wheel sets	<b>E.8.1</b>	Visually inspects the wheel sets; control that they are damage free and in sound condition.
				<b>E.8.2</b>	Takes wheel set's measurement, compares them to the catalogue values of the related vehicle.
				<b>E.8.3</b>	Visually inspects axle housing, oil boxes and bearings and controls that they are damage free and in sound condition.
<b>E.8.4</b>	Changes bearing oil.				

				<b>E.8.5</b>	Visually inspects the parts connecting between axle and frame, controls that they are damage free and in sound condition.
				<b>E.8.6</b>	Visually inspects the gears of the power transmitting elements on the axle, controls that they are damage free and in sound condition.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.9</b>	To carry out the periodic maintenance of the bogie systems	<b>E.9.1</b>	Does the overall cleaning of the bogie.
				<b>E.9.2</b>	Visually inspects the bogie body and fittings and controls that they're damage free and in sound condition.
				<b>E.9.3</b>	Visually inspects wear plates and rubber bump stops and controls that they're damage free and in sound condition.
				<b>E.9.4</b>	Visually inspects pivot plates and dust protection seals and controls that they're damage free and in sound condition.
				<b>E.9.5</b>	Takes measurements of wear plates, rubber bump stops and pivot plates.
				<b>E.9.6</b>	Adds to the oils of pivot hub casings.
		<b>E.10</b>	To carry out the periodic maintenance of the suspension system	<b>E.10.1</b>	Disassembles suspension system elements from the vehicle and does their overall cleaning.
				<b>E.10.2</b>	Visually inspects horizontal and vertical dampers, spiral and leaf springs, rubber-metal suspensions and controls that they are damage free and in sound condition.
				<b>E.10.3</b>	Takes measurements of springs and spring bearings and compares them to catalogue values of the related vehicle.
				<b>E.10.4</b>	Visually inspects the frame fittings of the suspension system and controls that they are damage free and in sound condition.
				<b>E.10.5</b>	Tests the dampers with test device.
				<b>E.10.6</b>	Assembles suspension system parts on the vehicle.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
E	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	E.11	To carry out the periodical maintenance of the electrical system power trains	E.11.1	Disassembles traction motor journal bearings.
				E.11.2	Visually inspects the journal bearings and journal bearing lubricators and controls that they're damage free and in sound condition.
				E.11.3	Cleans the journal bearings and journal bearing lubricators.
				E.11.4	Takes measurements of the journal bearings and compares them to the catalogue values of the related vehicle.
				E.11.5	Inspects the traction motor suspensions, traction motor bearing rubber pads, traction motor gearboxes and controls that they're damage free and in sound condition.
				E.11.6	Dissembles the gearbox.
				E.11.7	Visually inspects traction gear and pinion gear and controls that they're damage free and in sound condition.
				E.11.8	Takes measurements of the traction gear and pinion gear and compares them to the catalogue values of the related vehicle.
				E.11.9	Assembles journal bearings.
				E.11.10	Replaces the journal bearing oil with appropriate oil to the catalogue values of the related vehicle.
				E.11.11	Assembles the gearbox.
				E.11.12	Lubricates the gearbox in accordance with the catalogue values of the related vehicle.



Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
E	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	E.12	To carry out periodic maintenance of mechanical and hydraulic power trains	E.12.1	Visually inspects the gearbox, transmission clutch and shafts, axle gearboxes, cardan shafts and their fittings and controls that they're damage free and in sound condition.
				E.12.2	Measures the axis run out in shafts and compares them to the catalogue values of the related vehicle.
				E.12.3	Replaces the oil and oil filter of the gearbox.
				E.12.4	Tests and controls the gearbox speed and level settings.
				E.12.5	Tests and controls the inlet and outlet to hydraulic speed variation circuit.
				E.12.6	Controls whether there are any sounds other than its regular operating sound by listening.
		E.13	To carry out periodic maintenance of hydraulic system	E.13.1	Visually inspects the hydraulic pipes and hoses, hydraulic pumps, hydraulic motors, hydraulic oil guards, pressure gauges and controls that they're damage free and in sound condition.
				E.13.2	Visually inspects the hydraulic pipes and hoses, hydraulic pumps, hydraulic motors, hydraulic oil guards, pressure gauges and fittings; controls that they're damage free and in sound condition.
				E.13.3	Controls whether there are any crushing or scrape, high sounds other than its regular operating sound in the hydraulic pump by listening.
				E.13.4	Measures and controls whether the hydraulic pump overheats other than its regular operating temperature.
				E.13.5	Controls the pressure of the hydraulic pump and compares it to the catalogue values of the related vehicle.

			<b>E.13.6</b>	Changes the hydraulic oil.
			<b>E.13.7</b>	Tests the oil pressure gauge at the test stand.
			<b>E.13.8</b>	Tests the operation of hydraulic motors.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.14</b>	To carry out the periodic maintenance of air generation system	<b>E.14.1</b>	Visually inspects the compressor, clutches or shafts and belts in the compressor drive system, main compressed air cooler, air conditioner system, main air reservoirs, pressure relief valves and air pressure gauges and controls that they're damage free and in sound condition.
				<b>E.14.2</b>	Does the overall cleaning of the compressor.
				<b>E.14.3</b>	Measures the shaft runout and compares it to the catalogue values of the related vehicle.
				<b>E.14.4</b>	Changes the compressor oil and air filter.
				<b>E.14.5</b>	Cleans the oil trap.
				<b>E.14.6</b>	Controls the air conditioner's liquid level.
				<b>E.14.7</b>	Opens the main air reservoir outlets and cleans the water and debris in the reservoir.
				<b>E.14.8</b>	Tests the main reservoir pressure gauges at the test stand.
				<b>E.14.9</b>	Cancel the freewheeling system and tests the pressure relief valves.
				<b>E.14.10</b>	Controls the compressor operating sound and intake sound by listening.
				<b>E.14.11</b>	Controls the efficiency of compressor by monitoring via the air pressure gauge.

				<b>E.14.12</b>	Tests the freewheeling system.
				<b>E.14.13</b>	Controls the operation of automatic relief valves.
				<b>E.14.14</b>	Performs the air leakage in the system with appropriate method and device.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.15</b>	To carry out the periodic maintenance of compressed air brake system	<b>E.15.1</b>	Visually inspects indirect brake cock, direct brake cock, auxiliary reservoir monitor and main reservoir monitor, auxiliary reservoir and brake cylinder air pressure gauges and controls that they are damage free and in sound condition.
				<b>E.15.2</b>	Visually inspects the Auxiliary air reservoirs, Dual valve, Triple valve, Air filter, Brake regulator, Brake cylinders and controls that they are damage free and in sound condition.
				<b>E.15.3</b>	Visually inspects cut-off control lever, load-passenger changeover lever, automatic empty-load changeover lever, empty-load changeover box and empty-load control lever, emergency valve, emergency brake assembly and controls that they are damage free and in sound condition.
				<b>E.15.4</b>	Visually inspects the brake gears, drag, brake shoe, brake discs, drums and linings and controls that they are damage free and in sound condition.
				<b>E.15.5</b>	Visually inspects air isolation (ackerman) valves and connection hoses and controls that they are damage free and in sound condition.
				<b>E.15.6</b>	Visually inspects the spring loaded parking brake and hand brake assembly and controls that they are damage free and in sound condition.
				<b>E.15.7</b>	Visually inspects pneumatic fittings, check valve, electro-valve, cocks, pipes, flashes and sealing elements and controls that they are damage free and in sound condition.
				<b>E.15.8</b>	Measures the pressure in the auxiliary reservoir line and performs leakage control.
				<b>E.15.9</b>	Measures the brake cylinder control setting (sia size) and compares it to the catalogue values of the related vehicle.
				<b>E.15.10</b>	Increases-decreases the auxiliary reservoir pressure by the Setting Box and controls the operation of setting box.

				<b>E.15.11</b>	Tests the transition of vehicle and set to braking and releasing when the indirect brake cock is switched.
				<b>E.15.12</b>	Tests the transition of vehicle and set to braking and releasing when the direct brake cock is switched.
				<b>E.15.13</b>	Tests the operation of brake release valve system.
				<b>E.15.14</b>	Tests emergency valve, emergency brake assembly and transition of vehicle to braking when auxiliary reservoir air discharges.
				<b>E.15.15</b>	Carries out periodic maintenance of the rail brake.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.16</b>	To carry out the periodic maintenance of auxiliary circuits air system	<b>E.16.1</b>	Visually inspects the wiper arms, windscreen wiper motor, wiper arm blades and controls that they are damage free and in sound condition.
				<b>E.16.2</b>	Tests and controls operation of the windscreen wipers and anti-fog system.
				<b>E.16.3</b>	Tests and controls operation of the Dead Man System (Totman System).
				<b>E.16.4</b>	Tests and controls operation of the ATS system.
				<b>E.16.5</b>	Tests the anti-skid (anti-wheel spin) system and controls whether it sandblasts and isolates the air to the brake cylinders.
				<b>E.16.6</b>	Visually inspects sand reservoirs and injectors and controls that they are damage free and in sound condition.
				<b>E.16.7</b>	Cleans sand reservoirs and injectors.
				<b>E.16.8</b>	Tests and controls the operation of the sandblasting system.
				<b>E.16.9</b>	Visually inspects the air horn and controls that it is damage free and in sound condition.
				<b>E.16.10</b>	Tests and controls operation of the air horn, cool propulsion cock, backward-forward mechanism, radiator shutter control, flange greasing system and transmission actuator.

				<b>E.16.11</b>	Visually inspects the auxiliary circuit pneumatic fittings and controls that they are damage free and in sound condition.
				<b>E.16.12</b>	Controls the air bags and reservoirs of passenger's doors, automatic coupling set pistons, rear-view window pistons and repairs the required parts or replaces them with the brand new ones.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.17</b>	To carry out the periodic maintenance of vehicle's body	<b>E.17.1</b>	Visually inspects the frame and controls that it is damage free and in sound condition.
				<b>E.17.2</b>	Visually inspects the frame plate covers and controls that they are damage free and in sound condition.
				<b>E.17.3</b>	Visually inspects body plate parts, pillars and vehicle bodies and controls that they are damage free and in sound condition.
				<b>E.17.4</b>	Visually inspects the paint of the vehicle and controls that it is in good condition.
				<b>E.17.5</b>	Visually inspects the coverings on floor, ceiling, side door, door and walls of control cabinet (driver cab) and controls that they are damage free and in sound condition.
				<b>E.17.6</b>	Visually inspects driver's seats and controls that they are damage free and in sound condition.
				<b>E.17.7</b>	Visually inspects window frames, screens, glass run channel, window winders and controls that they're damage free and in sound condition and measures with vacuum force measuring device and controls that the connection is sound.
				<b>E.17.8</b>	Visually inspects the vertical rod, side walls, ceilings, floors, doors and gates, interior coatings of hauled vehicles and controls that they are damage free and in sound condition.
				<b>E.17.9</b>	Visually inspects interior and exterior doors, door seals, hinges and handles and controls that they are damage free and in sound condition.

				<b>E.17.10</b>	Visually inspects passenger beds, chairs and seats, passenger hand-holds and controls that they are damage free and in sound condition.
				<b>E.17.11</b>	Visually inspects and examines offloading equipment and controls that they are damage free, in sound condition and in operating state.
				<b>E.17.12</b>	Visually inspects boots and transition plates and controls that they are damage free and in sound condition.
				<b>E.17.13</b>	Visually inspects the fittings of all the equipment on the body and controls that they are damage free and in sound condition.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems (to be continued)	<b>E.18</b>	To carry out the periodic maintenance of auxiliary equipment built in the frame	<b>E.18.1</b>	Visually inspects the traction draw hook, drag bar, draw spring, coupling link, coupling screw, trunnion and looped coupling link of hook clutch vehicle connection system and controls that they are damage free and in sound condition.
				<b>E.18.2</b>	Lubricates the coupling screw with the oil compatible with the catalogue values.
				<b>E.18.3</b>	Visually inspects the automatic and semi-automatic coupling vehicle fittings (clutch shaft, release arm, springs) and controls that they are damage free and in sound condition.
				<b>E.18.4</b>	Visually inspects the buffer stops and controls that they are damage free and in sound condition.
				<b>E.18.5</b>	Visually inspects the vehicle front protection (cowcatcher) and controls that they are damage free and in sound condition.
				<b>E.18.6</b>	Measures the altitude of cowcatchers above the rail level and compares such values to the catalogue values of the related vehicle.
				<b>E.18.7</b>	Visually inspects the washboards and controls that they are damage free and in sound condition.
				<b>E.18.8</b>	Measures the altitude of washboards above the rail level and compares such values to the catalogue values of the related vehicle.
				<b>E.18.9</b>	Visually inspects the steps and guardrails and controls that they are damage free and in sound condition.

				<b>E.18.10</b>	Visually inspects the balancing balls and controls that they are damage free and in sound condition.
				<b>E.18.11</b>	Visually inspects the coupler suspensions, shunter handle, rope catch hooks and controls that they are damage free and in sound condition.
				<b>E.18.12</b>	Visually inspects the auxiliary equipment fittings built in the frame and controls that they are damage free and in sound condition.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>E</b>	To carry out periodic maintenance of rail system vehicles' mechanical systems	<b>E.19</b>	To carry out the periodic maintenance of sanitary system of rail system vehicles carrying passenger	<b>E.19.1</b>	Visually inspects the water reservoirs, water pumps and membranes and controls that they are damage free and in sound condition.
				<b>E.19.2</b>	Replaces the insulations of water installation, water reservoirs and channels from under frame heating packages.
				<b>E.19.3</b>	Visually inspects the gas heater, hydrophore, armatures and faucets within the installation and controls that they are damage free and in sound condition.
				<b>E.19.4</b>	Replaces the filters in the installation.
				<b>E.19.5</b>	Visually inspects the pipe, valve and fittings in the installation and controls that they are damage free and in sound condition.
		<b>E.20</b>	To carry out the periodic maintenance of air conditioning	<b>E.20.1</b>	Visually inspects the boiler, pipes, valves and radiators of catalytic heating system and controls that they are damage free and in sound condition.
				<b>E.20.2</b>	Operates and tests catalytic heating system.
				<b>E.20.3</b>	Visually inspects the fresh air induction damper and controls that it damage free and in sound condition.
				<b>E.20.4</b>	Visually inspects the shutters, shutter electro-valves, shutter airline and controls that they are damage free and in sound condition.
				<b>E.20.5</b>	Visually inspects the air conditioning compressor, evaporator unit, heating unit, condenser unit and controls that they're damage free and in sound condition.

				<b>E.20.6</b>	Replaces the air filters of air conditioning evaporator and heating units.
				<b>E.20.7</b>	Visually inspects the coolant via liquid line monitoring glass; performs loss sign (bubble) and moisture (discoloration) sign check.
				<b>E.20.8</b>	Performs coolant leak check by using the gas leak detector in the air conditioning system.
				<b>E.20.9</b>	Replaces the air conditioning lubricating oil.
		<b>E.21</b>	To replace the parts in the periodic maintenance of all systems	<b>E.21.1</b>	Replaces the sealing elements with the brand new ones.
				<b>E.21.2</b>	Replaces the parts which expired their catalogue lives.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.1</b>	To detect and repair diesel engine exhaust equipment failures	<b>F.1.1</b>	Visually controls the exhaust installation and detects the damaged parts causing exhaust losses.
				<b>F.1.2</b>	Replaces the damaged exhaust manifolds, shafts, sealing elements and insulations.
				<b>F.1.3</b>	Visually inspects the exhaust installation and detects the deficient, damaged, loose fittings.
				<b>F.1.4</b>	Disassembles the broken exhaust pivots by using appropriate methods.
				<b>F.1.5</b>	Detects and replaces the inoperative exhaust mufflers.
		<b>F.2</b>	To detect and repair diesel engine suction installation failures	<b>F.2.1</b>	Visually inspects the suction installation; detects the damaged parts causing intake air losses.
				<b>F.2.2</b>	Replaces the damaged suction manifolds and sealing elements.
				<b>F.2.3</b>	Detects the oil thrown, damaged, rattling turbochargers and blowers by inspecting and listening to the supercharge system (turbocharger, blower); replaces such items with the brand new ones.
				<b>F.2.4</b>	Replaces oil thrown, damaged, rattling turbochargers and blowers.
				<b>F.2.5</b>	Visually inspects the intake air cooling installation (Intercooler); detects the perforated, clogged, damaged intercoolers.



				<b>F.2.6</b>	Replaces perforated, clogged, damaged intercoolers.
				<b>F.2.7</b>	Visually inspects the supercharge pressure gauges and detects the damaged and inoperative pressure gauges.
				<b>F.2.8</b>	Replaces the damaged and inoperative pressure gauges.
				<b>F.2.9</b>	Visually inspects the suction installation and detects the deficient, damaged, loose fittings.
				<b>F.2.10</b>	Detects and replaces the contaminated air filters.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.3</b>	To detect and repair diesel engine fuel equipment failures (to be continued)	<b>F.3.1</b>	Detects the damaged parts causing fuel loss by visually controlling the fuel installation.
				<b>F.3.2</b>	Replaces the damaged fuel line and hoses, sealing elements and fuel tank.
				<b>F.3.3</b>	Visually inspects the fuel pressure gauge; detects the damaged and inoperative pressure gauge and replaces it with the brand new one.
				<b>F.3.4</b>	Controls the fuel pressure from the fuel pressure gauge and compares it to the catalogue values of the related vehicle.
				<b>F.3.5</b>	Replaces the fuel filters in case of low fuel pressure.
				<b>F.3.6</b>	Tests the low pressure fuel pump at the test stand.
				<b>F.3.7</b>	Replaces the fuel pump failing to comply with the catalogue value of the related vehicle.
				<b>F.3.8</b>	Adjusts the adjusting calve to the pressure complying with the catalogue value in case of high fuel pressure.
				<b>F.3.9</b>	Deflates the system via the fuel pump.

				<b>F.3.10</b>	Detects the fuel injection pump and injection failures by listening to the engine and visually inspecting the exhaust fumes.
				<b>F.3.11</b>	Adjusts the injection pump by connecting it to the setting device.
				<b>F.3.12</b>	Tests the injectors by using the injector function testing device; adjusts them.
				<b>F.3.13</b>	Replaces the inoperative injector nozzles.
				<b>F.3.14</b>	Detects the inoperative valves and check valves; replaces them with the brand new ones.
				<b>F.3.15</b>	Detects the damaged and contaminated parts by visually inspecting the fuel supply cover, cover filters and fuel tank gauges.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.3</b>	To detect and repair diesel engine fuel equipment failures	<b>F.3.16</b>	Replaces damaged fuel supply cover, cover filters and fuel tank gauges.
				<b>F.3.17</b>	Cleans the contaminated fuel supply cover filters and tank gauges.
				<b>F.3.18</b>	Detects the deficient, damaged, loose fittings by visually inspecting the fuel installation.
		<b>F.4</b>	To detect and repair diesel engine cooling equipment failures	<b>F.4.1</b>	Detects the damaged parts causing cooling water losses by controlling the cooling installation.
				<b>F.4.2</b>	Replaces the damaged pipe and hoses, radiators, water tanks and sealing elements.
				<b>F.4.3</b>	Measures the cooling water pressure and temperature and compares such values with the reference values.
				<b>F.4.4</b>	Controls the thermostat and radiators by disassembling them in case of high water temperature.
				<b>F.4.5</b>	Detects and replaces the inoperative thermostat by testing it at the test stand.
				<b>F.4.6</b>	Detects the water pumps failing to comply with the catalogue pressure values by measuring the pump pressure.

				<b>F.4.7</b>	Replaces the water pumps failing to comply with the catalogue pressure values.
				<b>F.4.8</b>	Detects the clogged radiators by visually inspecting and controls the holes with metal bar; unclogs the clogged radiators by using the mechanical or chemical methods.
				<b>F.4.9</b>	Detects the inoperative valves and check valves; replaces them with the brand new ones.
				<b>F.4.10</b>	Adds to the engine cooling water; applies antifreeze if required.
				<b>F.4.11</b>	Detects and replaces the cooling fans and shafts by visual inspection.
				<b>F.4.12</b>	Detects and replaces wound shafts.
				<b>F.4.13</b>	Detects the deficient, damaged, loose fittings by inspecting the cooling installation.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.5</b>	To detect and repair diesel engine lubrication equipment failures	<b>F.5.1</b>	Controls the oil level by drawing the oil dipstick and adds oil in case of short oil supplies.
				<b>F.5.2</b>	Detects the damaged parts causing oil losses by visually controlling the lubricating installation.
				<b>F.5.3</b>	Replaces damaged pipe and hoses and sealing elements.
				<b>F.5.4</b>	Performs the control of water leakage to the lubricating installation as a result of oil analyses made by spectral analysis.
				<b>F.5.5</b>	Replaces the installation equipment (cylinder cover gaskets, perforated liner, perforated heat exchanger and etc.) mixing water to the oil by controlling the cooling and lubricating installation.
				<b>F.5.6</b>	Changes the oil in case the oil is thinner or thicker by the oil comparison test.
				<b>F.5.7</b>	Replaces the installation equipment (cylinder cover gaskets, perforated liner, perforated heat exchanger, dripping injector and etc.) mixing oil to water or water to oil by controlling the cooling and fuel installation.

				<b>F.5.8</b>	Changes the oil according to the result of sediment test.
				<b>F.5.9</b>	Replaces the damaged and broken pressure gauge.
				<b>F.5.10</b>	Controls the oil pressure via the pressure gauge and compares such value with the related vehicle's catalogue values.
				<b>F.5.11</b>	Controls the oil filters and replaces the contaminated items in case of low oil pressure.
				<b>F.5.12</b>	Measures the outlet pressure of oil pumps and replaces the oil pumps failing to comply with the catalogue pressure value.
				<b>F.5.13</b>	Adjusts to the pressure complying with the catalogue values via the adjusting valve in case of high oil pressure.
				<b>F.5.14</b>	Assesses the cost of damage by visually inspecting the oil cooler and internal elements; replaces the damaged item.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.6</b>	To detect and repair diesel engine part failures (to be continued)	<b>F.6.1</b>	Controls whether there is sound other than regular operating sound by listening to the engine's sound.
				<b>F.6.2</b>	Detects the damaged cylinder by measuring the compressions in case of available ping.
				<b>F.6.3</b>	Controls the valves, piston and liner by disassembling the cylinder head (cylinder cover).
				<b>F.6.4</b>	Performs the cylinder leakage test and measures the compressions.
				<b>F.6.5</b>	Assesses the cost of damage by visually inspecting the engine block.
				<b>F.6.6</b>	Replaces the damaged engine block by disassembling the engine parts.
				<b>F.6.7</b>	Performs the surface flatness, cracking, raking, scratching and wear control of the pistons, piston rods, cylinder, jackets, liners and piston rings by visual inspection.
				<b>F.6.8</b>	Visually inspects the cylinder head (cylinder cover), valves, valve seats, valve springs, valve rockers and shifters; detects the damaged items.

				<b>F.6.9</b>	Performs the surface flatness, cracking, raking, scratching and wear control of the main journals and pins, main and rod bearings of crankshaft and bearing pins by visual inspection.
				<b>F.6.10</b>	Detects the damaged timing mechanism gears, camshafts and journals and rocker covers by visual inspection.
				<b>F.6.11</b>	Replaces the damaged (cracked, inclined, scratched, worn, uneven) parts.
				<b>F.6.12</b>	Determines the states of conicity, ovality, wear and clearance by measuring the piston, piston rods, cylinder, jackets, liners and piston rings and detects.
				<b>F.6.13</b>	Determines the states of conicity, ovality, wear and clearance by measuring the cylinder head (cylinder cover), valves, valve seats, valve springs, valve rockers and shifters.
				<b>F.6.14</b>	Determines the states of conicity, ovality, wear and clearance by measuring the the main journals and pins, main and rod bearings of crankshaft and bearing pins.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.6</b>	To detect and repair diesel engine part failures	<b>F.6.15</b>	Measures the crankshaft runout.
				<b>F.6.16</b>	Determines the states of wear and clearance by measuring the timing mechanism gears.
				<b>F.6.17</b>	Determines the states of wear and clearance of crankshaft and journals.
				<b>F.6.18</b>	Determines the state of runout and wear by measuring the flywheel.
				<b>F.6.19</b>	Compares the measurement values with the catalogue values, replaces the parts with measurements non-complying with the catalogue values.
				<b>F.6.20</b>	Controls piston cracks with ultraviolet devices, drops the cracked pistons out of use.
		<b>F.6.21</b>	Assembles the engine, by assembling the engine parts with the torque complying with the catalogue values.		
		<b>F.7</b>	To detect and repair diesel engine command system	<b>F.7.1</b>	Detects the damaged pipe and hoses causing air, water and oil losses by visually inspecting and listening to the engine control system.

			failures	<b>F.7.2</b>	Replaces damaged pipe and hoses and sealing elements.
				<b>F.7.3</b>	Detects the damaged regulator, gassing and gas cutting valves , gas piston and throttle lever by visual inspection.
				<b>F.7.4</b>	Tests the fixing of idle rpm and engine's full speeds at the required speed by controlling via the gauge.
				<b>F.7.5</b>	Changes the membrane if the engine speed doesn't accelerate and maintain fixed.
				<b>F.7.6</b>	Adjusts settings to the catalogue values if the idle rpm and full speeds do not comply with the catalogue values.
				<b>F.7.7</b>	Measures and compares the engine control air with the related vehicle's catalogue values, replaces the hood if the engine control air do not comply with the catalogue values.
				<b>F.7.8</b>	Tests the operation of gassing and gas cutting electromagnetic valves, replaces inoperative electromagnetic valves.
				<b>F.7.9</b>	Controls and compares the gas control with the related vehicle's catalogue values.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.8</b>	To detect and repair failures in wheel sets	<b>F.8.1</b>	Visually inspects the wheels sets and detects deformities (flattening, flashing, peeling) on the wheel bearing surface.
				<b>F.8.2</b>	Sends to the wheel turning units for lathing and repairing the defect.
				<b>F.8.3</b>	Make wheel sets examined by non-destructive testing methods, replaces the cracked wheel sets.
				<b>F.8.4</b>	Measures the all sizes of the wheel set and compares them to the catalogue values of the related vehicle, replaces the wheel set if required.
				<b>F.8.5</b>	Measures the temperatures of side bearings and detects overheated bearings, replaces the wheel sets with overheated bearings.
				<b>F.8.6</b>	Visually inspects the axle housing and oil boxes; detects the damaged parts, replaces the damaged axle housing and oil boxes.

		<b>F.9</b>	To detect and repair failures in bogie systems	<b>F.8.7</b>	Visually inspects the components enabling the connection between the axle and frame; detects the damaged items.
				<b>F.9.1</b>	Visually inspects the bogie body and fittings and assesses the cost of damage.
				<b>F.9.2</b>	Repairs damaged bogies and their fittings by welding, replaces the irreparable bogies.
				<b>F.9.3</b>	Visually inspects the wear plates, rubber bump stops, pivot hub plates and dust protection seals and detects the damaged items.
				<b>F.9.4</b>	Visually inspects the pivot hub oil tank, oil channels, side pads parts and balls and detects the damaged items.
				<b>F.9.5</b>	Replaces damaged pivot hub parts.
		<b>F.10</b>	To detect and repair failures in suspension system	<b>F.10.1</b>	Visually inspects horizontal and vertical dampers, spiral and leaf springs and detects and replaces the damaged items.
				<b>F.10.2</b>	Visually inspects the frame fittings of the suspension system, detects and replaces the damaged items.

<b>Duties</b>		<b>Tasks</b>		<b>Performance Criteria</b>	
<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Description</b>
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.11</b>	To detect and repair failures in electrical system power and motion transmission systems	<b>F.11.1</b>	Measures the temperature of traction motor journal bearings; compares such value with the catalogue values of the related vehicle, replaces overheating journal bearings.
				<b>F.11.2</b>	Visually inspects the journal bearing lubricators; detects and replaces the contaminated and damaged items.
				<b>F.11.3</b>	Controls the oil (contaminated and discoloured) and oil level of the journal bearings and gearboxes; adds oil in case of short oil supplies or changes the oil.
				<b>F.11.4</b>	Replaces contaminated and discoloured oil.
				<b>F.11.5</b>	Visually inspects the traction motor gearboxes and detects the damaged items, repairs the damaged ones by welding and replaces the irreparable ones.
				<b>F.11.6</b>	Controls the oil level of gearbox, completes it if it is deficient.

				<b>F.11.7</b>	Visually inspects the gearbox and controls its sealing, if there is a leakage replaces the sealing elements.
				<b>F.11.8</b>	Visually inspects the traction motor bearing rubber pads, traction motor suspensions; detects and replaces the damaged items.
				<b>F.11.9</b>	Visually inspects the traction gear in the wheel set and assesses the cost of damage, if the traction gear is damaged, replaces the wheel set.
				<b>F.11.10</b>	Visually inspects the pinion gear in the traction motor and assesses the cost of damage. If it is damaged, replaces the traction motor.
		<b>F.12</b>	To detect and repair failures in mechanical and hydraulic power-train elements	<b>F.12.1</b>	Visually inspects the gearbox, transmission clutch and shafts, axle gearboxes and cardan shafts, replaces the damaged items.
				<b>F.12.2</b>	Visually inspects the gearbox, transmission clutch and shafts, axle gearboxes, cardan shafts and fittings; detects the deficient, damaged, loose fittings, replaces the damaged items.
				<b>F.12.3</b>	Measures the shaft runout and compares it to the catalogue values of the related vehicle and replaces the running out shafts.
				<b>F.12.4</b>	Controls the gearbox oil level and adds oil in case of short oil supplies.
				<b>F.12.5</b>	Tests and controls the gearbox speed and level settings.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.13</b>	To detect and repair failures of hydraulic system	<b>F.13.1</b>	Visually inspects the hydraulic pipes and hoses, hydraulic pumps, hydraulic motors, hydraulic oil guards, pressure gauges and detects the damaged items.
				<b>F.13.2</b>	Visually inspects the hydraulic pipes and hoses, hydraulic pumps, hydraulic motors, hydraulic oil guards, pressure gauges, fittings and detects the deficient, damaged, loose fittings.
				<b>F.13.3</b>	Controls whether there are any crushing or scrape, high sounds other than its regular operating sound in the hydraulic pump by listening, replaces the hydraulic pump making sound other than its regular operating sound.
				<b>F.13.4</b>	Controls whether hydraulic pump overheats by measuring, replaces the hydraulic pump overheating than its catalogue heating values.
				<b>F.13.5</b>	Controls the hydraulic pump pressure and compares it to the catalogue values of the related vehicle, replaces the hydraulic pump with pressure non-complying



					with the catalogue values.
				<b>F.13.6</b>	Controls the hydraulic oil level and adds in case of short oil supplies.
				<b>F.13.7</b>	Tests the operation of hydraulic motors and replaces the inoperative hydraulic motors.
		<b>F.14</b>	To detect and repair failures in air generation system (to be continued)	<b>F.14.1</b>	Visually inspects the compressor, clutches or shafts and belts in the compressor drive system, main compressed air cooler, air conditioner system, main air reservoirs, pressure relief valves and air pressure gauges; detects and replaces the damaged items.
				<b>F.14.2</b>	Measures the shaft run out, compares such values to the catalogue values of the related vehicle.
				<b>F.14.3</b>	Controls the compressor oil level, adds oil if it's deficient.
				<b>F.14.4</b>	Controls the air conditioner's liquid level, adds air conditioner liquid in case of short supplies.
				<b>F.14.5</b>	Opens the main air reservoir outlets and cleans the water and debris in the reservoir.
				<b>F.14.6</b>	Cleans the oil trap.
				<b>F.14.7</b>	Controls the main reservoir pressure gauges.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.14</b>	To detect and repair failures in air generation system	<b>F.14.8</b>	Replaces the pressure gauges failing to display any values.
				<b>F.14.9</b>	Cancels the freewheeling system and tests the pressure relief valves, replaces the non-conforming pressure relief valves.
				<b>F.14.10</b>	Controls the compressor operating sound and intake sound by listening.
				<b>F.14.11</b>	Controls the efficiency of compressor by monitoring via the air pressure gauge.

				<b>F.14.12</b>	Replaces the compressor making any sounds other than the regular operating sound and with low efficiency.	
				<b>F.14.13</b>	Tests the freewheeling system, if it does not become active in the catalogue values, adjusts it.	
				<b>F.14.14</b>	Controls the operation of automatic relief valves, replaces the inoperative items.	
				<b>F.14.15</b>	Detects and replaces the damaged pipe and hoses causing air leak in the system.	
				<b>F.14.16</b>	Visually inspects the fittings of air generation system and detects the deficient, damaged, loose fittings.	
	<b>F.15</b>			To detect and repair failures in pressurized air brake system (to be continued)	<b>F.15.1</b>	Visually inspects indirect brake cock, direct brake cock, auxiliary reservoir monitor and main reservoir monitor, auxiliary reservoir and brake cylinder air pressure gauges; detects the damaged items.
					<b>F.15.2</b>	Visually inspects the auxiliary air reservoirs, dual valve, triple valve, air filter, brake regulator, brake cylinders and detects the damaged items.
					<b>F.15.3</b>	Visually inspects cut-off control lever, load-passenger changeover lever, automatic empty-load changeover lever, empty-load changeover box and empty-load control lever, emergency valve, brake assembly; detects the damaged items.
					<b>F.15.4</b>	Visually inspects the brake gears, drag, brake shoe, brake discs, drums and linings; detects the damaged items.
					<b>F.15.5</b>	Visually inspects air isolation (ackerman) valves and connection hoses; detects the damaged items.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.15</b>	To detect and repair failures in pressurized air brake system	<b>F.15.6</b>	Visually inspects the spring loaded parking brake and hand brake assembly; detects the damaged items.
				<b>F.15.7</b>	Measures the pressure in the auxiliary reservoir line and performs leakage control.
				<b>F.15.8</b>	Visually inspects and detects the damaged pneumatic fittings, check valve, electro-valve, cocks, pipes, flashes and sealing elements causing leakage.
				<b>F.15.9</b>	Replaces the damaged installation equipment.

				<b>F.15.10</b>	Measures the brake cylinder control setting (sia size) and compares it with the catalogue values of the related vehicle, adjusts brake cylinder control setting (sia size) in accordance with the catalogue values.
				<b>F.15.11</b>	Increases-decreases the auxiliary reservoir pressure by the Setting Box and controls the operation of setting box.
				<b>F.15.12</b>	Repairs the failures in the rail brake.
				<b>F.15.13</b>	Tests the transition of vehicle and set to braking and releasing when the indirect brake cock is switched, replaces the inoperative indirect brake cock.
				<b>F.15.14</b>	Tests the transition of vehicle and set to braking and releasing when the direct brake cock is switched. Replaces the inoperative direct brake cock.
				<b>F.15.15</b>	Tests the operation of brake release valve system, replaces the electro-valve if the brake release valve fails to operate.
				<b>F.15.16</b>	Tests the transition of vehicle to braking when auxiliary reservoir air discharges.
				<b>F.15.17</b>	Replaces inoperative emergency valve and emergency brake assembly.
				<b>F.15.18</b>	Visually inspects the fittings of pressurized air brake system and detects the deficient, damaged, loose fittings.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.16</b>	To detect and repair failures in auxiliary circuits air system	<b>F.16.1</b>	Inspects the wiper arms, wiper arm blades and detects the damaged items, replaces the damaged items.
				<b>F.16.2</b>	Tests and controls operation of the windscreen wiper motor and anti-fog system, replaces the inoperative items.
				<b>F.16.3</b>	Tests and controls operation of the Dead Man System (Totman System) and ATS System.
				<b>F.16.4</b>	Replaces the inoperative electro-valve and relief valves of Dead Man System (Totman System) and ATS System.

				<b>F.16.5</b>	Tests and controls whether the anti-skid (anti-wheel spin) system sandblasts and isolates the air to the brake cylinders.
				<b>F.16.6</b>	Replaces the electro-valves unless they sandblast and isolate the air to the brake cylinders.
				<b>F.16.7</b>	Tests and controls the operating of the sandblasting system.
				<b>F.16.8</b>	Visually inspects the sand tanks and injectors and detects and replaces the damaged items.
				<b>F.16.9</b>	Visually inspects the air horn and assesses the cost of damage, replaces the damaged horn.
				<b>F.16.10</b>	Tests and controls the operating of the air horn, replaces the diaphragm of the horn making inappropriate sound.
				<b>F.16.11</b>	Tests and controls operation of the cool propulsion cock, replaces the inoperative cool propulsion cock.
				<b>F.16.12</b>	Tests and controls operation of the backward-forward mechanism, radiator shutter control, flange greasing system and transmission actuator.
				<b>F.16.13</b>	Replaces the inoperative backward-forward mechanism, radiator shutter control, flange greasing system and transmission actuator electro-valves.
				<b>F.16.14</b>	Visually inspects the auxiliary circuit pneumatic fittings and detects the deficient, damaged, loose fittings.

<b>Duties</b>		<b>Tasks</b>		<b>Performance Criteria</b>	
<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Description</b>
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.17</b>	To detect and repair failures on car body	<b>F.17.1</b>	Visually inspects the frame and detects the damaged parts, repairs damaged parts by welding, replaces the irreparable frame.
				<b>F.17.2</b>	Visually inspects the frame plate covers and detects the damaged parts, repairs damaged parts by welding, replaces the irreparable frame plate covers.
				<b>F.17.3</b>	Inspects and detects the damaged body plate parts, pillars and covers and detects the damaged items, repairs body plate assembly by welding, replaces the irreparable body plate assembly.
				<b>F.17.4</b>	Inspects the coverings on floor, ceiling, side door, door and walls, detects and replaces the damaged items.

				<b>F.17.5</b>	Inspects the driver's seats, detects and replaces the damaged items.
				<b>F.17.6</b>	Inspects window frames, screens, glass run channels, window winders, detects and replaces the damaged items.
				<b>F.17.7</b>	Inspects the vertical rod, side walls, ceilings, floors, doors and gates of hauled vehicles, detects the damaged items.
				<b>F.17.8</b>	Repairs the damaged assembly by welding and replaces the irreparable assembly.
				<b>F.17.9</b>	Inspects the interior coatings of hauled vehicles, detects and replaces the damaged items.
				<b>F.17.10</b>	Inspects the interior and exterior doors, door seals, hinges and handles, detects and replaces the damaged items.
				<b>F.17.11</b>	Inspects the beds, chairs and seats, passenger hand-holds, detects and replaces the damaged items.
				<b>F.17.12</b>	Visually inspects and examines the offloading equipments, detects and replaces the damaged items.
				<b>F.17.13</b>	Visually inspects boots and transition plates, detects and replaces the damaged items.
				<b>F.17.14</b>	Repairs the damaged transition plates by welding, replaces the irreparable transition plates.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
				<b>F.18.1</b>	Visually inspects the traction draw hook, drag bar, draw spring, coupling link, coupling screw, trunnion and looped coupling link of hook clutch vehicle connection system; detects and replaces the damaged items.
				<b>F.18.2</b>	Lubricates the coupling screw with the oil compatible with the catalogue values.
				<b>F.18.3</b>	Visually inspects the automatic and semi-automatic coupling vehicle fittings (clutch shaft, release arm, springs); detects and replaces the damaged items.
				<b>F.18.4</b>	Visually inspects the buffer stops, detects and replaces the damaged items.

<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.18</b>	To detect and repair failures in auxiliary equipment on the chassis	<b>F.18.5</b>	Visually inspects the vehicle front protection (cowcatcher), detects and replaces the damaged items, repairs the damaged items by welding, replaces the irreparable items.
				<b>F.18.6</b>	Measures the altitude of cowcatchers above the rail level and compares such values to the catalogue values of the related vehicle.
				<b>F.18.7</b>	Adjusts the altitude of vehicle front protection (cowcatcher) above the rail level in accordance with the catalogue values.
				<b>F.18.8</b>	Inspects the washboards, detects and replaces the damaged items.
				<b>F.18.9</b>	Measures the altitude of washboards above the rail level and compares such values to the catalogue values of the related vehicle.
				<b>F.18.10</b>	Adjusts the altitude of washboards above the rail level in accordance with the catalogue values.
				<b>F.18.11</b>	Inspects the steps and guardrails; detects the damaged items, repairs the damaged steps and guardrails by welding, replaces the irreparable steps and guardrails.
				<b>F.18.12</b>	Visually inspects the coupler suspensions, shunter handle, rope catch hooks; detects the damaged items.
				<b>F.18.13</b>	Repairs the damaged coupler suspensions, shunter handle, rope catch hooks by welding.
				<b>F.18.14</b>	Replaces the irreparable coupler suspensions, shunter handle, rope catch hooks.
<b>F.18.15</b>	Inspects the auxiliary equipment fittings built in the frame; detects the deficient, damaged, loose fittings.				

<b>Duties</b>		<b>Tasks</b>		<b>Performance Criteria</b>	
<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Title</b>	<b>Code</b>	<b>Description</b>
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles (to be continued)	<b>F.19</b>	To detect and repair failures in sanitary installation in the rail system vehicles carrying passengers	<b>F.19.1</b>	Visually inspects the water reservoirs, water pumps and membranes; detects and replaces the damaged items.
				<b>F.19.2</b>	Visually inspects the insulations of water installation, water reservoirs and channels from under frame heating packages; detects and replaces the damaged items.
				<b>F.19.3</b>	Visually inspects the gas heater, hydrophore, armatures and faucets within the installation and controls that they are damage free and in sound condition.

				<b>F.19.4</b>	Inspects the gas heater, hydrophore, armatures and faucets built in the installation; detects and replaces the damaged items.		
				<b>F.19.5</b>	Visually inspects the filters in the installation, detects and replaces the damaged items.		
				<b>F.19.6</b>	Visually inspects the sinks, detects and replaces the damaged items.		
				<b>F.19.7</b>	Visually inspects the pipe, valve and fittings causing water loss in the installation; detects and replaces the damaged and loose items.		
		<b>F.20</b>	To detect and repair failures in air-conditioning system (to be continued)			<b>F.20.1</b>	Visually inspects the boiler, pipes, valves and radiators of catalytic heating system; detects the damaged items.
						<b>F.20.2</b>	Detects and replaces the damaged and contaminated fresh air induction damper.
						<b>F.20.3</b>	Visually inspects the shutters, shutter electro-valves, shutter airline; detects and replaces the damaged items.
						<b>F.20.4</b>	Tests the electro-valves, replaces the irreparable electro-valves.
						<b>F.20.5</b>	Visually inspects the air conditioning compressor, evaporator unit, heating unit, condenser unit; detects and replaces the damaged items.
						<b>F.20.6</b>	Visually inspects the air filters of air conditioning evaporator and heating units, detects and replaces the contaminated filters.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>F</b>	To detect and repair mechanical system failures in rail system vehicles	<b>F.20</b>	To detect and repair failures in air-conditioning system	<b>F.20.7</b>	Replaces the air filters of air conditioning evaporator and heating units.
				<b>F.20.8</b>	Visually inspects the coolant via liquid line monitoring glass; performs loss sign (bubble) and moisture (discoloration) sign check.
				<b>F.20.9</b>	Adds cooling liquid to the system in case of loss sign (bubble).
				<b>F.20.10</b>	Replaces the coolant in case of moisture sign (discoloration).

				<b>F.20.11</b>	Performs coolant leak check by using the gas leak detector in the air conditioning system, detects damaged pipes and fittings causing gas leak.
				<b>F.20.12</b>	Controls the air conditioning compressor oil level and adds oil in case of short oil supplies.
		<b>F.21</b>	To do routine works in the course of failure detection and repair	<b>F.21.1</b>	Makes adjustments in accordance with catalogue values.
				<b>F.21.2</b>	Completes the deficient fittings.
				<b>F.21.3</b>	Replaces the damaged items.
				<b>F.21.4</b>	Tightens loose fittings in accordance with the torque values stated in instructions.
				<b>F.21.5</b>	Controls the operating of the equipment after the repair.

Duties		Tasks		Performance Criteria	
Code	Title	Code	Title	Code	Description
<b>G</b>	To carry out the completion processes	<b>G.1</b>	To control the performance of daily work schedule	<b>G.1.1</b>	Reviews his daily work schedule.
				<b>G.1.2</b>	Controls whether missing works remain in accordance with his daily work schedule.
				<b>G.1.3</b>	Determines reasons why the duty is uncompleted.
				<b>G.1.4</b>	Informs his superiors on uncompleted duties.



		<b>G.2</b>	To carry out the cleaning of equipment and work area at the end of work	<b>G.2.1</b>	Leaves working area tidy and clean.
				<b>G.2.2</b>	Maintains devices and tools he used by the end of work.
				<b>G.2.3</b>	Replaces materials, devices and tools he used.
				<b>G.2.4</b>	Pays attention to the use of materials that may damage occupational safety and stores them in predetermined places accordingly.
		<b>G.3</b>	To keep record of works performed	<b>G.3.1</b>	Keeps records of works done in relevant forms.
				<b>G.3.2</b>	Keeps records of consumable materials in relevant forms.
		<b>G.4</b>	To provide information about works done	<b>G.4.1</b>	Prepares report about works done.
				<b>G.4.2</b>	Informs his superior about works he did.
				<b>G.4.3</b>	Informs personnel to whom he will hand in the work about on-going works.
<b>H</b>	To participate in occupational development activities	<b>H.1</b>	To carry out activities regarding individual occupational development	<b>H.1.1</b>	Carries out due research activities regarding occupational and individual development.
				<b>H.1.2</b>	Follows up new technologies and developments related to rail system vehicles Mechanical Maintenance and Repair Worker
		<b>H.2</b>	To provide occupational training to professional training students and other personnel	<b>H.2.1</b>	Shares his knowledge and experiences with his colleagues.
				<b>H.2.2</b>	Gets restricted level of information and training about rail system vehicles Mechanical Maintenance and Repair Worker

### **3.2. Tools, Appliances and Equipment Used**

1. Damper tester
2. Antifreeze
3. Intra/extravehicular protective covers
4. Vehicle service book
5. Argon welding device and toolset
6. Waste oil disposal and collecting unit
7. Fasteners (bolt, nut, screw, rivet, etc.)
8. Maintenance channels and stands
9. Biological and chemical water treatment systems
10. Hydrometer
11. Trolley hoist
12. Puller types
13. Various wrench sets (open-end wrench, cross-recess, allen, socket set, etc.)
14. Various machinery (drill, grinder, saw, pile driver, pressing machine, etc.)
15. Types of drawing pen and drawing table
16. Axle and bogie lifting down units
17. Electric welding machine
18. Types of safety stand and chock
19. Injection pump adjustment device
20. Injector cleaning device
21. Injector test device
22. Gas metal arc welding device and toolset
23. Grease pump and lubrication units
24. Safety instruction information and warning writings
25. Hydraulic, electric and pneumatic hand tools
26. Communication devices (radio, telephone, mobile phone)
27. Denatured alcohol
28. Types of lifting rope and slingshot
29. Types of solid and liquid fuel (coal, diesel fuel, gasoline, kerosene)
30. Chemical cleaning agents
31. Personal protective equipment (helmet, protective toe boots, working gloves, gas mask, ear plugs, visors, safety glasses, dust mask, protective clothing, welding goggles, welding gloves, etc.)
32. Compressor and air distribution unit
33. Types of lifting jack
34. Sand
35. Types of material (steel, iron, brass, copper, aluminium, plastic, rubber, polyamide sheet, pipe, rod, etc.)
36. Material handling cart
37. Types of pressure gauge
38. Methyl alcohol

39. UV testers
40. Engine compression tester
41. Various installation materials (nipple, fitting, sleeve, etc.)
42. Various spare parts
43. Oxy-gas welding and toolset
44. Special type analogue and digital measurement instruments and devices
45. Spot welding machine
46. Portable lamp and flashlight
47. Sealing elements
48. Cooling radiator maintenance unit
49. Water conditioning systems
50. Valve adjusting tools
51. Repair, maintenance and parts catalogue/data programmes
52. Diagnostic tester
53. Portable analogue and digital measurement instruments and devices
54. Annealing furnace
55. Rag
56. Stand-type analogue and digital measurement instruments and devices
57. Torque wrench and torque booster
58. Ultrasonic testers
59. Types of oils
60. Fuel filling and draining unit
61. Fire extinguishing equipment and materials
62. Washing machine and units (water, air and chemical)

### **3.3. Knowledge & Skills**

1. Knowledge of emergency
2. Analytical thinking skills
3. Tools, appliances and equipment knowledge
4. Basic first-aid knowledge
5. Knowledge of filling information and evaluation forms
6. Knowledge of environmental protection methods
7. Team working skills
8. Manual skill
9. Knowledge of manual and visual inspection principles
10. General knowledge of occupational health and safety
11. Knowledge of recyclable wastes
12. Knowledge and skill of running in moving parts
13. Knowledge of hydraulic principles and systems
14. Knowledge of workplace procedures
15. Decision making skills
16. Knowledge of catalogue using
17. Record keeping and reporting skills

18. Knowledge of mineral and synthetic oils
19. Knowledge of machinery
20. Knowledge of materials
21. Knowledge of using occupational computer programmes
22. Knowledge of mathematics, terminology and foreign language at occupational level
23. Knowledge of occupational technological developments
24. Knowledge of engine thermodynamics
25. Knowledge of application order of repair works
26. Skill of learning and being able to share what s/he learned
27. Knowledge of measuring and control
28. Knowledge and skills of disassembling methods
29. Knowledge of pneumatic principles and systems
30. Problem solving skills
31. Knowledge of rails system vehicles
32. General mechanical knowledge of rail system vehicles mechanical maintenance and repair works
33. Oral and verbal communications skills
34. Knowledge of standard measurements
35. Stress and crisis management skills
36. Skills of safely use of handling and immobilization installation
37. Knowledge of hazardous waste and hazardous waste triage skills
38. Knowledge of technical drawing
39. Basic knowledge of working legislation
40. Knowledge of basic geometry
41. Knowledge of use and interpretation of testers
42. Knowledge of fuels and combustion
43. Knowledge of fire prevention and fire fighting
44. Knowledge of spare parts
45. Good time management skills

### **3.4. Attitudes and Behaviours**

1. Being cold blooded and calm under emergency and stressful situations
2. Informing superiors properly and in time
3. Making decisions within knowledge and experience
4. Using her/his time effectively and efficiently in accordance with work orders
5. Adopting regulations set forth in environmental, quality, and OHS legislation
6. Sharing experience with associates
7. Being sensitive on possible changes which may arise during operation
8. Being sensitive on use and recovery of resources
9. Behaving in accordance with hierarchical structure of workplace
10. Ensuring his/her own safety and safety of other people
11. Be willing to research for professional development
12. Working planned and systematically

13. Being sensitive on risk factors
14. Knowing his/her responsibilities and fulfilling the same
15. Obeying instructions and guidelines accordingly
16. Informing relevant people of dangerous situations
17. Taking care of cleanness, tidiness, and order of workplace
18. Sharing information effectively, clearly and accurately during shift changes
19. Being open to innovations and adapting to changing conditions
20. Informing concerned people about the malfunctions which are not under his/her authority

#### **4. TESTING, ASSESSMENT AND CERTIFICATION**

Testing and assessment for certification with respect to national qualifications based on Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) Occupational Standard shall be held in written and/or oral forms, theoretically and practically, in testing and assessment centres where required conditions are met.

Testing and assessment method and practice principles shall be detailed with national qualifications to be drawn up pursuant to this occupational standard. Activities regarding testing, assessment and certification shall be conducted within the framework of Vocational Qualification Authority, Testing and Certification Regulation.

**Annex: Institutions that participated in the Occupational Standard Preparation Process**

**1. Occupational Standard Team of the Institution Developing Occupational Standard:**

İsa APAYDIN	Deputy General Manager, TCDD
Murat ŞENEKEN	Education and Training Department Head, TCDD
Yavuz KIRAN	General Manager of TCDD Foundation
Fatma Ülker YETGİN	Project Coordinator
Pınar DEMİREKLER	Quality Process Manager
Mehmet EKTAŞ	Branch Manager (Education and Training Department, TCDD)
Feyzi SIVACI	Branch Manager (Education and Training Department, TCDD)
Ekrem ARSLAN	Office Chief (Education and Training Department, TCDD)
Kenan KÜTÜKDE Vocational High School)	Moderator (MoNE, Teacher at Gazi Technical and Industrial

**2. Technical Work Group Members:**

Emrullah ÖZKALDI	Occupation Group Coordinator (Deputy Head of Traction Dept., TCDD)
M. Fahri GÜL	Wagon Maintenance and Repair Atelier Manager, TCDD
Hami KARPUZCU	Wagon Maintenance and Repair Atelier Manager, TCDD
Raif CÜCER	Deputy Manager of Traction Receiving Directorate, TCDD
Ahmet ÇİYİLTEPE	Depot Chief, TCDD
Nuri ÇANKIR	Technician, TCDD

**3. People, Institutions, and Organisations Asked for Opinion:**

Ministry of Labour and Social Security

MoNE Occupational and Technical Education Directorate General

MoNE Life-long Learning Directorate General

MoNE Innovation and Education Technologies Directorate General

Ministry of Transportation, Maritime Affairs and Communications

Turkish Labour Institution (İŞKUR)

Turkish Statistical Institute (TÜİK)

Council of Higher Education (CoHE)

State Personnel Administration

Small and Medium Enterprises Development Organization (KOSGEB)

Confederation of Revolutionary Trade Unions of Turkey (DİSK)

HAK-İŞ Trade Union Confederation

Confederation of Turkish Tradesmen and Craftsmen (TESK)

Confederation of Turkish Trade Unions (TÜRK-İŞ)

Turkish Confederation of Employer Associations (TİSK)

Turkish Union of Chambers and Exchange Commodities (TOBB)

Turkish Exporters Assembly (TİM)

Ankara Chamber of Industry (ASO)

Ankara Chamber of Trade (ATO)

Istanbul Chamber of Trade (İTO)

Aegean Region Chamber of Industry (EBSO)

Istanbul Transportation Inc.

Bursa Rail Operation Centre (BURULAŞ)

Eskişehir Light Rail System Enterprise (ESTRAM)

Ankaray

İzmir Metro Inc.

Antalya Metropolitan Municipality

Konya Metropolitan Municipality

The Turkish Employers Association of Construction Industries (İNTES)

Yapıray



Alarko Group of Companies

Yüksel Project Corporation

Olmuksa

Petkim

Tüpraş

Eti Mining Enterprise

İskenderun Steel & Iron Plant Enterprise (ISDEMİR)

Ereğli Steel & Iron Plant Enterprise (ERDEMİR)

Mechanical and Chemical Industry Corporation (MKE)

Sümer Holding (Iron&Steel)

Yıldız Entegre (Tügsaş)

Demiryolu Lojistik Müh.San.Tic.Ltd.Şti.

Kayseray

Turkish Transportation Sector Public Workers Trade Union (TUS)

United Transportation Workers Trade Union (BTS)

Transportation Sector Public Servants Trade Union (UÇMS)

Transportation Active Public Servants Trade Union Faal-Sen (UFS)

Independent Transportation Services Public Workers Trade Union (BUS)

Transportation Workers Right Trade Union (Ulaşım-Hak-Sen)

Transportation Workers Trade Union (Ulaşım-Bir-Sen)

Transportation and Railway Workers Right Trade Union (Udem-Hak-Sen)

Association of Railway Vocational School Graduates

Association of Railway Machinists and Wagon Technicians

Association of Railway Train Professionals

Association of Railway Transportation

Association of Rail Transportation Systems

Turkish State Railways (TCDD) Railway Department

Turkish State Railways (TCDD) Traction Department

Turkish State Railways (TCDD) Premises Department

Turkish State Railways (TCDD) Personnel and Administrative Affairs Department

Turkish State Railways (TCDD) Traffic Department

Turkish State Railways (TCDD) Ankara Training Centre

Turkish State Railways (TCDD) Eskişehir Training Centre

Turkish State Railways (TCDD) Sivas Training Centre

Turkish Locomotive and Motor Industry Corporation

Turkey Railway Machinery Industry Corporation

Turkish Railway Car Industry Corporation

Central Technical and Industrial Vocational High School

Anatolian Technical Vocational High School

Atatürk Anatolian Industrial Vocational High School

Haydarpaşa Anatolian Technical Vocational High School

Fatih Anatolian Vocational High School

Gazi Anatolian Vocational High School

Şehit Kemal Özalper Anatolian Vocational High School

Anadolu University Porsuk Vocational School

Erzincan University Refahiye Vocational High School Rail Systems Programme

#### **4. VQA Sector Committee Members and Experts**

Prof. Dr. Mustafa KARAŞAHİN, President (Council of Higher Education)

Şeyhamit Ünal SARIBAŞ, Vice President (Ministry of National Education)

Aykut KARAKAVAK, Member (Ministry of Labour and Social Security)

Edip TÜRKAY, Member (Ministry of Energy and Natural Resources)

Damla Ebru ESEN, Member (Ministry of Industry and Trade)

Burak ERDEM, Member (Turkish Confederation of Employer Associations)

Rail System Vehicles Mechanical Maintenance and Repair Worker (Level 4) 12UMS0281-4 / 26.12.2012 / 00

National Occupational Standard  
Mehmet KARABÜBER,

Reference Code / Approval Date / Rev. No  
Member (HAK Trade Unions Confederation)

Hakan BEZGİNLİ,  
Commodities - TOBB)

Member (Turkish Union of Chambers and Exchange

Nizamettin ATEŞ,  
Craftsmen - TESK)

Member (Confederation of Turkish Tradesmen and

Dilek TORUN,

Member (Vocational Qualifications Authority)

Firuzan SİLAHŞÖR,

Department Head (Vocational Qualifications Authority)

Fatma GÖKMEN,  
for Persons with Disabilities and Elderly Services)

Sector Committee Representative (Directorate General

## **5. VQA Executive Board**

Bayram AKBAS

Representative of Ministry of Labour and Social Security

Assoc. Prof. Ömer AÇIKGÖZ

Representative of Ministry of National Education

Prof. Dr. Mahmut ÖZER

Representative of Council of Higher Education, Member

Bendevi PALANDÖKEN

Representative of Professional Organizations, Member

Mustafa DEMİR  
Associations, Member

Representative of Confederation of Employer

Dr. Osman YILDIZ

Representative of Trade Union Confederations, Member