



**BRICS**  
2022 CHINA

# 2022 BRICS Skills Competition



## Test Project Sample

**BRICS-FS-03\_Rail Vehicle Technology**

## Contents

1. Test Project Introduction .....	1
2. Modules of the Test Project .....	1
3. Task Description .....	1
3.1. Module A: Maintenance and Control of Pantograph .....	1
3.2. Module B: Installation and Commissioning of Passenger Compartment Door 3	
3.3. Module C: Maintenance of Vehicle Air Conditioner .....	4
3.4. Module D – Electrical Commissioning of Vehicle .....	7
4. Notes to Competitors .....	8
5. Test Project Time Allocation and Weighting .....	8
6. Reference Documents .....	8
7. Operation Record Sheet .....	10
7.1. Module A Operation Record Sheet .....	10
A1 Pantograph Mechanical Parts Maintenance Operation Record Sheet ...	10
A2 Pantograph Pneumatic Circuit Maintenance Operation Record Sheet ..	27
A3 Pantograph Motion Parameters Adjustment and Setting Operation Record Sheet .....	30
A4 Pantograph Electrical Wiring and Inspection Operation Record Sheet.	33
7.2. Module B Operation Record Sheet .....	38
B1 Passenger Compartment Door Installation and Adjustment Record Sheet .....	38
B2 Passenger Compartment Door Electrical Function Test Operation Record Sheet .....	42
7.3. Module C Operation Record Sheet .....	47
C1 Air Conditioning Unit Routine Inspection and Maintenance Operation Record Sheet .....	47

## 2022 BRICS Skills Competition

C2 Air Conditioning Unit Parts Cleaning and Replacement Operation Record Sheet.....	51
C3 Air Conditioner System Test and Troubleshooting Operation Record Sheet.....	54
7.4. Module D Operation Record Sheet.....	63
D1 Vehicle Electrical Test and Fault Finding Operation Record Sheet.....	63
D2 Vehicle Train Control and Management System (TCMS) Commissioning Operation Record Sheet.....	67
D3 Vehicle Fire Alarm Operation Record Sheet.....	69

## **1. Test Project Introduction**

The job of rail vehicle technicians covers vehicle manufacture, inspection, operation and maintenance, disassembly, assembly, repair, commissioning, troubleshooting, etc. To secure the safe operation of the whole system of the vehicle or its sub-systems, the rail vehicle technicians are required to work efficiently, solve problems within given time and provide preventive measures to ensure the continuous service of vehicle.

The Skill Competition site is provided with the equipment of the vehicle system and its sub-systems. Competitors are required to complete the commissioning of these systems within specified time to make them meet the requirements for normal use.

## **2. Modules of the Test Project**

The Test Project is a series of four (4) standalone modules.

Module A: Maintenance and Control of Pantograph

Module B: Installation and Commissioning of Passenger Compartment Door

Module C: Maintenance of Vehicle Air Conditioner

Module D: Electrical Commissioning of Vehicle

## **3. Task Description**

### **3.1. Module A: Maintenance and Control of Pantograph**

The time allocated to the Maintenance and Control of Pantograph Test Project is 90 minutes.

Module A requires Competitors to complete the 4 tasks listed below:

- A1 Pantograph Parts Appearance Inspection and Maintenance
- A2 Pantograph Pneumatic Circuit Maintenance
- A3 Pantograph Motion Parameters Adjustment and Setting
- A4 Pantograph Electrical Function Test

Competitors should complete all tasks on an uninterrupted basis in order of A1, A2, A3 and A4, either independently or in collaboration with each other within the time allocated to the module. The pointing and calling method should be adopted where required by the operation items in the Operation Record Sheet.

After completing all tasks of the module, Competitors should clean the site and submit relevant documents and Operation Record Sheets to the Judge.

The operation requirements for the module are:

- (1) Conduct pantograph mechanical parts inspection and maintenance, pneumatic circuit maintenance, motion parameter adjustment and setting, electrical tests and fault handling according to the process standards set out in the Rail Vehicle Technology - Maintenance and Control of Pantograph - Technical Regulation. Detailed operation items are subject to the corresponding Operation Record Sheet.
- (2) Report to the Judge if a part needs to be replaced and get the materials to replace the part only with consent of the Judge.
- (3) During the parts replacement, select and apply tools and torque as specified. After setting the torque, request the Judge to check the value, and incorrect torque will lead to deduction of scores. If the torque spanner is being used without the Judge's approval, the Judge has the right to stop the torque application and deduct the scores accordingly. Set the torque to 0 when returning the spanner, otherwise the score will be deducted accordingly. In the event of any equipment damage or personal injury caused by the direct use of the torque spanner without the Judge's approval, the score for the module will be zero.
- (4) Fill the inspection and maintenance results (including defects and their repair status) in the corresponding Operation Record Sheet.
- (5) Apply to the Judge before conducting power-on or power-off operation. If a Competitor conducts such operation without the Judge's approval, the Judge has the right to stop the operation and deduct the scores accordingly. In the event of any equipment damage or personal injury caused by the power-on or power-off operation without the Judge's approval, the score for the module will be zero.
- (6) During each task, report the inspection, replacement, measurement, electrical test and recording status to the Judge. After completing all operation items listed in the task, proceed with the next task after obtaining the consent of the Judge.

### **3.2. Module B: Installation and Commissioning of Passenger Compartment Door**

The time allocated to the Installation and Commissioning of Passenger Compartment Door Test Project is 90 minutes.

Module B requires Competitors to complete the 2 tasks listed below:

- B1 Passenger Compartment Door Installation and Adjustment
- B2 Passenger Compartment Door Electrical Function Test

Competitors should complete all tasks on an uninterrupted basis in order of B1 and B2, either independently or in collaboration with each other within the time allocated to the module. The pointing and calling method should be adopted where required by the operation items in the Operation Record Sheet.

After completing all tasks of the module, Competitors should clean the site and submit relevant documents and Operation Record Sheets to the Judge

The operation requirements for the module are:

- (1) Conduct passenger compartment door mechanical parts installation and inspection, including portal dimensions measurement, door leaves installation, vertical cover plates installation, roller swing arms installation and installation of other accessories according to the process standards set out in the Rail Vehicle Technology- Installation and Commissioning of Passenger Compartment Door - Technical Regulation. Detailed operation items are subject to the corresponding Operation Record Sheet.
- (2) Conduct passenger compartment door control and monitoring circuit electrical tests according to the process standards set out in the Rail Vehicle Technology- Installation and Commissioning of Passenger Compartment Door - Technical Regulation. Detailed operation items are subject to the corresponding Operation Record Sheet.
- (3) During the installation and mechanical parameters adjustment, report the adjustment and recording status to the Judge.

- (4) During the parts installation and mechanical parameters adjustment, select and apply tools and torque as specified. After setting the torque, request the Judge to verify the value, and incorrect torque will lead to deduction of scores. If the torque spanner is being used without the Judge's approval, the Judge has the right to stop the torque application and deduct the scores accordingly. Set the torque to 0 when returning the spanner, otherwise the score will be deducted accordingly. In the event of any equipment damage or personal injury caused by the direct use of the spanner without the Judge's approval, the score for the module will be zero.
- (5) Fill the inspection and maintenance results (including defects and their repair status) in the corresponding Operation Record Sheet.
- (6) Apply to the Judge before conducting power-on or power-off operation. If a Competitor conducts such operation without the Judge's approval, the Judge has the right to stop the operation and deduct the scores accordingly. In the event of any equipment damage or personal injury caused by the power-on or power-off operation without the Judge's approval, the score for the module will be zero.
- (7) During each task, report the inspection, installation, adjustment, electrical test and recording status to the Judge. After completing all operation items listed in the task, proceed with the next task after obtaining the consent of the Judge.

### **3.3. Module C: Maintenance of Vehicle Air Conditioner**

The time allocated to the Maintenance of Vehicle Air Conditioner Test Project is 60 minutes.

Module C requires Competitors to complete the 3 tasks listed below:

- C1 Air Conditioning Unit Routine Inspection and Maintenance
- C2 Air Conditioning Unit Parts Cleaning and Replacement
- C3 Air Conditioning System Test and Troubleshooting

Competitors should complete all tasks on an uninterrupted basis in order of C1, C2 and C3, either independently or in collaboration with each other within the time allocated to the module. The pointing and calling method should be adopted where required by the

operation items in the Operation Record Sheet.

After completing all tasks of the module, Competitors should clean the site and submit relevant documents and Operation Record Sheets to the Judge.

The operation requirements for the module are:

- (1) Conduct vehicle air conditioner mechanical parts inspection and replacement and cleaning, system tests and troubleshooting according to the process standards set out in the Rail Vehicle Technology - Maintenance of Vehicle Air Conditioner - Technical Regulation. Detailed operation items are subject to the corresponding Operation Record Sheet.
- (2) Report to the Judge if a part needs to be replaced and get the materials to replace the part only with consent of the Judge.
- (3) During the parts replacement, select and apply tools and torque as specified. After setting the torque, request the Judge to verify the value, and incorrect torque will lead to deduction of scores. If the torque spanner is being used without the Judge's approval, the Judge has the right to stop the torque application and deduct the scores accordingly. Set the torque to 0 when returning the spanner, otherwise the score will be deducted accordingly. In the event of any equipment damage or personal injury caused by the direct use of the spanner without the Judge's approval, the score for the module will be zero.
- (4) Fill the inspection and maintenance results (including defects and their repair status) in the corresponding Operation Record Sheet.
- (5) Apply to the Judge before conducting power-on or power-off operation. If a Competitor conducts such operation without the Judge's approval, the Judge has the right to stop the operation and deduct the scores accordingly. In the event of any equipment damage or personal injury caused by the power-on or power-off operation without the Judge's approval, the score for the module will be zero.
- (6) During each task, report the inspection, replacement, cleaning, electrical test and recording status to the Judge. After completing all operation items listed in the task,



proceed with the next task after obtaining the consent of the Judge.

### **3.4. Module D – Electrical Commissioning of Vehicle**

The time allocated to the Electrical Commissioning of Vehicle Test Project is 25 minutes.

Module D requires Competitors to complete the 3 tasks listed below:

- D1 Vehicle Electrical Fault Finding and Recording
- D2 Vehicle TCMS Test
- D3 Vehicle Fire Alarm System Test

Competitors should complete all tasks on an uninterrupted basis in order of D1, D2 and D3, either independently or in collaboration with each other within the time allocated to the module. The pointing and calling method should be adopted where required by the operation items in the Operation Record Sheet.

After completing all tasks of the module, Competitors should clean the site and submit relevant documents and Operation Record Sheets to the Judge.

The operation requirements for the module are:

- (1) Conduct vehicle electrical tests and sub-system tests according to the process standards set out in the Rail Vehicle Technology - Electrical Commissioning of Vehicle - Technical Regulation. Detailed operation items are subject to the corresponding Operation Record Sheet.
- (2) Fill the test and troubleshooting results (including defects and their troubleshooting status) in the corresponding Operation Record Sheet.
- (3) Apply to the Judge before conducting power-on or power-off operation. If a Competitor conducts such operation without the Judge's approval, the Judge has the right to stop the operation and deduct the scores accordingly. In the event of any equipment damage or personal injury caused by the power-on or power-off operation without the Judge's approval, the score for the module will be zero.
- (4) During each task, report the troubleshooting, test and recording status to the Judge.
- (5) After completing all operation items listed in the task, proceed with the next task after obtaining the consent of the Judge.

#### 4. Notes to Competitors

- 1) Competitors should not bring any device that is irrelevant to the Competition to the Skill Competition site.
- 2) Tools, electrical components and materials for the Test Project are all provided at the Skill Competition site for Competitors' free access.
- 3) If a Competitor is considered to have operated in a dangerous manner or have caused a safety hazard in the workplace, marks will be deducted until his/her right to participate in the Competition is cancelled. Dangerous operations contain but are not limited to:
  - not wearing proper personal protective equipment;
  - not taking or confirming site safety protection measures;
  - operating in a violent or an unsafe manner;
  - performing power-on or power-off operations without application;
  - causing harm to equipment, others or the Competitor himself/herself.
- 4) During the Competition, for matters irrelevant to the Competition contents, such as use of the washroom, or report of equipment, facilities, tooling, or tool fault, Competitors can seek help from the Judge.
- 5) Competitors may refer to the reference documents for the Skill provided.

#### 5. Test Project Time Allocation and Weighting

The time allocated to each module of the Test project and the weightings:

Module	Module Name	Time (min)	Weighting (%)
A	Maintenance and Control of Pantograph	90	25
B	Installation and Commissioning of Passenger Compartment Door	90	25
C	Maintenance of Vehicle Air Conditioner	60	15
D	Electrical Commissioning of Vehicle	25	35
Total	/	265	100

#### 6. Reference Documents

## 2022 BRICS Skills Competition

- Rail Vehicle Technology - Maintenance and Control of Pantograph - Technical Regulation
- Rail Vehicle Technology - Installation and Commissioning of Passenger Compartment Door - Technical Regulation
- Rail Vehicle Technology - Maintenance of Vehicle Air Conditioner - Technical Regulation
- Rail Vehicle Technology - Electrical Commissioning of Vehicle - Technical Regulation

## 7. Operation Record Sheet

### 7.1. Module A Operation Record Sheet

#### A1 Pantograph Mechanical Parts Maintenance Operation Record Sheet

<b>A1 Pantograph Mechanical Parts Maintenance Operation Record Sheet</b>	
Workstation Number: _____	Competitors Number: _____

**Instructions:**

1. If the inspection result is a value by measurement, fill in the exact figure.
2. If the inspection result is not a value by measurement and no defect is found, mark after “Yes” in the “Normal or Not” option with a cross (as “→”), and you are not required to fill in the Phenomena Description column.
3. If the inspection result is not a value by measurement and defects are found, mark after “No” in the “Normal or Not” option with a cross (as “→”), fill in the defect type, position and provide details in the Additional Description column if necessary.
4. If an operation sub-item is marked with a slash “/” in the Maintenance Status column, you are not required to carry out maintenance.
5. If an operation sub-item is not marked with a slash “/” in the Maintenance Status column, conduct corresponding maintenance according to the defect and make a record in the Maintenance Status column: a) if no defect is found, skip this column; b) if a defect is found and repaired, select “Repaired”; c) if a defect is found but is not yet repaired, select “Not repaired”.

No.	Maintenance Parts	Maintenance Item	Normal or Not	Phenomena Description and Results Record	Maintenance Status
1	Pantograph head assembly	Inspect the appearance of the pantograph head assembly. Check whether it has collision or scratch marks, cracks, or missing parts.	Yes <input type="checkbox"/>		/
		Check whether the	No <input type="checkbox"/>		/
		Check whether the	Yes <input type="checkbox"/>		/

## 2022 BRICS Skills Competition

	<p>pantograph head assembly has stains or foreign matter on the surface.</p>	<p>No <input type="checkbox"/></p>		
	<p>Check whether there are gaps between the carbon layers near to the airbag and the aluminum carriers of the carbon contact strips.</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>		/
	<p>Shake the carbon contact strips by hand, and check whether the carbon strips and the aluminum carriers are loosely connected.</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>		/
	<p>Check whether the pantograph head assembly and the upper frame top tube are loosely connected.</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>		/
	<p>Check whether fasteners are loose.</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>		/

		<p>Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>		<p>/</p>
<p>2</p>	<p>Carbon contact strips</p>	<p>Measure the thickness of the middle part and two ends (within the operation area) of each carbon contact strip near to the airbag, and then calculate the average value. Standing on one end of the bow head and facing the airbag, the left-hand side is the left side, and the right-hand side is the right side.  *The measurement</p>	<p>Measurement value: Middle part mm Left end mm Right end mm  Average value: _____ mm</p>		

2022 BRICS Skills Competition

		values are accurate to 0.5mm and the average values should be rounded up to one decimal place.			
		Check whether the fasteners of the carbon slide plate near the airbag side are loose	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		As the carbon contact strip further from the airbag has defects, please replace it.	/	/	
3	Pantograph horns and carbon	Measure the 4 gaps between the pantograph horns and the carbon	/	The standard gap is mm to ____mm Whether the measurement	/



	<p>contact strips</p>	<p>contact strips, and record the results.</p> <p>Standing on one end of the bow head and facing the airbag, the left side of the carbon contact strip near the airbag side is gap 1, the right side is gap 2; the left side of the carbon contact strip far from the airbag side is gap 3, and the right side is gap 4.</p>		<p>value of gap 1 meets the standard</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Whether the measurement value of gap 2 meets the standard</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Whether the measurement value of gap 3 meets the standard</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Whether the measurement value of gap 4 meets the standard</p> <p>Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p>/</p>
<p>4</p>	<p>Conducting wires</p>	<p>Inspect all the conducting wires. Check whether they are stretched or in contact with other parts, whether they have loose strands, and whether broken strands exceed 1/10 of the total strands.</p> <p>*Defective conducting wires must be replaced.</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>		

					/
5	Airbag	Check whether the rubbers have aging, damaged, cracked or missing parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the airbag has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		
		Check whether the split pins are missing or bend at angles smaller than 60°.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the fasteners of airbag mounting base are loose	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just	Yes <input type="checkbox"/> No <input type="checkbox"/>		/

2022 BRICS Skills Competition

		make a judgment)			
6	Steel wire rope	Inspect the appearance of the steel wire rope. Check if it has broken strands, and if the end joints are not properly crimped, the rope cannot be seen clearly from either end.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the steel wire rope has stains or foreign matter on its surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
7	Damper	Check whether the	Yes <input type="checkbox"/>		/

2022 BRICS Skills Competition

		damper is damaged or leaks oil.	No <input type="checkbox"/>		
		Check whether the damper has aging parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check if the nameplate indicates illegible words, is not on the upper surface of the metal part, or is damaged or missing.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
8	Base	Inspect the appearance of the base. Check whether it has collision or scratch marks, cracks, or missing	Yes <input type="checkbox"/> No <input type="checkbox"/>		/

2022 BRICS Skills Competition

		parts.			
		Check whether the base has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
9	Lower arm	Inspect the appearance of the lower arm. Check whether it has collision or scratch marks, cracks, or missing parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the lower arm has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the lower	Yes <input type="checkbox"/>		

2022 BRICS Skills Competition

		arm has pores or sand holes.	No <input type="checkbox"/>		
		Check whether weld seams fall off.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the rubber components have aging parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		
10	Upper frame	Inspect the appearance of the upper frame. Check whether it has collision or scratch marks, cracks, or missing parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the upper	Yes <input type="checkbox"/>		/

2022 BRICS Skills Competition

		frame has stains or foreign matter on the surface.	No <input type="checkbox"/>		
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
11	Coupling rod	Inspect the appearance of the coupling rod. Check whether it has collision or scratch marks, cracks, or missing parts.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the coupling rod has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		

		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		
12	Balance rod	Inspect the appearance of the balance rod. Check whether it has collision or scratch marks, cracks, or missing parts	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the balance rod has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near	Yes <input type="checkbox"/> No <input type="checkbox"/>		/



		the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)			
13	Air valve box and pneumatic hoses	Check whether the air valve box appears abnormal or is loosely installed.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the pneumatic hoses are damaged, ruptured, bumped or burned, or have large cracks.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check if the pneumatic hoses are not properly fastened or tied in different directions.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near	Yes <input type="checkbox"/> No <input type="checkbox"/>		/

		the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)			
14	Electrical control box and the pantograph down position sensor	Check if the electrical control box appears abnormal or is loosely installed, and if the bolts are not properly fastened.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Measure the gap between the pantograph down position sensor and the aluminum induction plate and record the value.  *The measurement value is accurate to 0.5mm.	/	The distance between the pantograph down position and the aluminum induction plate is _____ mm	/
		Check whether the pantograph down position sensor and the aluminum induction plate have stains or foreign matter	Yes <input type="checkbox"/> No <input type="checkbox"/>		

2022 BRICS Skills Competition

		on their surfaces.			
15	Insulators ( air valve box No.1, the clockwise orders are2.3.4)	Inspect the appearance of the insulators. Check whether they are cracked or damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/
		Check whether the insulators have stains or foreign matter on their surfaces.	Yes <input type="checkbox"/> No <input type="checkbox"/>		
		Check whether fasteners are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>		
		Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)	Yes <input type="checkbox"/> No <input type="checkbox"/>		
16	Lightning arrester	Inspect the appearance of the lightning arrester. Check whether it is cracked or damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/>		/

## 2022 BRICS Skills Competition

		<p>Check whether the lightning arrester has stains or foreign matter on the surface.</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>		/
		<p>Check whether fasteners are loose.</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>		
		<p>Check whether the anti-loosening marks of each fastener of the carbon contact strip near the airbag side are standard (if the defect position of the anti-loosening mark is the same as the loosening of the fasteners, there is no need to repeat the record, just make a judgment)</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p>		/

**Additional Description (filled out if necessary):**

**A2 Pantograph Pneumatic Circuit Maintenance Operation Record Sheet**

A2 Pantograph Pneumatic Circuit Maintenance Operation Record Sheet
Workstation Number: _____ Competitors Number: _____

Instructions:

1. The test and adjustment results are filled in according to the requirements in the form
2. The result description can be filled with "Normal" for normal conditions, and fill in according to the actual phenomenon if necessary
3. If the pressure-maintaining test fails, the pressure-maintaining test needs to be performed again after the air-tightness test and repair. The "Test and Adjustment Results" needs to be filled in again. If the pressure-maintaining test is qualified, it is not necessary to fill in

No.	Maintenance Parts	Maintenance Item	Test and Judgement
1	Pressure-maintaining test	1) After taking proper safety protection measures, switch on the U03 cutout cock in the panto up control box and U7 cutout cock of the pantograph.	/
		2) Confirm that the reading of the U04 pressure gauge is within the required range, and turn the forced conduction switch of the panto up solenoid valve to the Panto Up position to lift the pantograph.	U04 pressure gauge pressure value: 1 <sup>st</sup> time _____ MPa 2 <sup>nd</sup> time _____ MPa 3 <sup>rd</sup> time _____ MPa

## 2022 BRICS Skills Competition

		<p>3) When the air bag is fully inflated and in the moment of the pantograph lifts, cut off the U03 cutout cock. After the air pressure of the pressure gauge is stable, record the current wind pressure value and start timing.</p>	<p>U04 pressure gauge pressure value after cutting off U03 cutout cock:</p> <p>1<sup>st</sup> time _____ MPa</p> <p>2<sup>nd</sup> time _____ MPa</p> <p>3<sup>rd</sup> time _____ MPa</p>
		<p>4) Record the air pressure value after 5 minutes, and the pressure leakage is less than 0.03MPa, which is qualified. If the air pressure leakage is too large, it is necessary to find the problem point through the air tightness test.</p>	<p>U04 pressure gauge pressure value after 5 min:</p> <p>1<sup>st</sup> time _____ MPa</p> <p>2<sup>nd</sup> time _____ MPa</p> <p>3<sup>rd</sup> time _____ Mpa</p> <p>When the test is qualified, air pressure leakage value is: _____ Mpa</p>
		<p>5) The pantograph lifting solenoid valve is forced to turn on the switch to the pantograph-lowering position, and then reset the U03 cutout cock after the pantograph-lowering.</p>	<p>Test result description:</p> <p>1<sup>st</sup> time _____</p> <p>2<sup>nd</sup> time _____</p> <p>3<sup>rd</sup> time _____</p>
		<p>If the pressure-holding test fails, you need to perform this step to find the problem. If the pressure holding test is qualified, the link can be ended directly.</p>	<p>Air leakage positions:</p>

		<p>1) Inflate the air bag with rated compressed air.</p> <p>2) Apply soapy water/washing liquid to each joint and surface of the air pipeline. If there is continuous bubbling, it is an air leakage point. Accurately record the problem point and repair it according to the regulations.</p>	<p>Results descriptions:</p>
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**A3 Pantograph Motion Parameters Adjustment and Setting Operation Record Sheet**

<b>A3 Pantograph Motion Parameters Adjustment and Setting Operation Record Sheet</b>		
Workstation Number: _____ Competitors Number: _____		
Instruction:  1. The test and adjustment results are filled in according to the requirements in the form  2. The result description can be filled with "Normal" for normal conditions, and fill in according to the actual phenomenon if necessary		
No.	Maintenance Items	Test and Adjustment Result
1	Adjustment of pantograph lifting duration	1) After taking proper safety protection measures, switch on the U03 cutout cock in the panto up control box and U7 cutout cock of the pantograph.
		2) Confirm that the reading of the U04 pressure gauge is within the required range, and turn the forced conduction switch of the panto up solenoid valve to the Panto Up position to lift the pantograph.
		3) If the initial pantograph lifting duration does not meet the standard, adjust the panto up throttle valve in the air valve box until the duration meets the
		Initial pantograph lifting duration:
		Pantograph lifting duration after adjustment:
		Result description:

		standard and record the final value.		
2	Adjustment of pantograph lowering duration	4) Turn the forced conduction switch of the panto up solenoid valve to the Panto Down position to lower the pantograph.	Initial pantograph lowering duration:	
		5) If the initial pantograph lowering duration does not meet the standard, adjust the panto down throttle valve in the air valve box until the duration meets the standard and record the final value.	Pantograph lowering duration after adjustment:	
			Result description:	
3	Pantograph static contact force measurement	1) When the air pressure is between 0.6–0.7Mpa, turn the forced conduction switch of the panto up solenoid valve to the Panto Up position to lift the pantograph. 2) Hang the tension meter in the middle of the panto head cross rod. 3) Pull the tension meter vertically downward at a constant speed, observe and	Measurement at the first position	Pulling position:
				Standard pressure value:
				Test pressure value:
				Result description:
		Measurement at the second position	Pulling position:	
			Standard pressure value:	
	Test pressure value:			

		<p>record the tensile force values when the carbon contact strips reach the two measurement positions.</p> <p>4) The tensile forces at both positions should be within the required range. If they are not, make adjustment until the tensile forces meet the requirement and record the corresponding tensile forces.</p>		<p>Result description:</p>
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**A4 Pantograph Electrical Wiring and Inspection Operation Record Sheet**

A4 Pantograph Electrical Wiring and Inspection Operation Record Sheet

Workstation Number: \_\_\_\_\_ Competitors Number: \_\_\_\_\_

Instructions:

1. Fill in the inspection results according to requirements. If status selection is involved, mark the selected option with a cross (as “→”).
2. Fill in the test results based on the specific figures or phenomena.

No.	Test Items		Test Result
1	Train A1 activation and cab occupation	Switch on the U03 cutout cock, Turn the Master Key 24-A01 of Car A1 to the On position.	\
2	Panto 1 Lifting and Lowering	1) Turn the Panto Up Selection knob 22-S05 of Car A1 to the Panto 1 position. 2) Press the Panto Up button 22-S02 of Car A1.	1) The pantograph of Car B1 is lifted up normally? (Yes <input type="checkbox"/> / No <input type="checkbox"/> ). 2) The Panto Up indicator of Car A1_____. 3) The Panto Down indicator of Car A1_____.
3	Tests from Car A1	Press the Panto Down button 22-S01 of Car A1.	1) The pantograph of Car B1 is lowered normally? (Yes <input type="checkbox"/> / No <input type="checkbox"/> ). 2) The Panto Up indicator of Car A1_____. 3) The Panto Down indicator of Car A1_____.
4	Panto 2 Lifting and Lowering Tests from Car	1) Turn the Panto Up Selection knob 22-S05 of Car A1 to the Panto 2 position.	1) The Panto Up indicator of Car A2 _____. 2) The Panto Down indicator of Car A2_____.

## 2022 BRICS Skills Competition

	A1	2) Press the Panto Up button 22-S02 of Car A1.	
5		Press the Panto Down button 22-S01 of Car A1.	1) The Panto Up indicator of Car A2_____. 2) The Panto Down indicator of Car A2_____.
6	Panto 1 & 2 Lifting Test from Car A1	1) Turn the Panto Up Selection knob 22-S05 of Car A1 to the Panto 1 & 2 position. 2) Press the Panto Up button 22-S02 of Car A1.	1) The pantograph of Car B1 is lifted up normally? (Yes <input type="checkbox"/> / No <input type="checkbox"/> ). 3) The Panto Up indicator of Car A1_____. 4) The Panto Down indicator of Car A1_____. 5) The Panto Up indicator of Car A2 _____. 6) The Panto Down indicator of Car A2_____.
7	Emergency	Press the Emergency button 26-S02 of Car A1.	1) The pantograph of Car B1 is lowered? (Yes <input type="checkbox"/> / No <input type="checkbox"/> ). 2) The Panto Up indicator of Car A1_____. 3) The Panto Down indicator of Car A1_____. 4) The Panto Up indicator of Car A2 _____. 5) The Panto Down indicator of Car A2 _____. 6) The Panto Down indicator of Car A2_____.
8	Panto Lowering Test from Car A1	Press the Panto Up button 22-S02 of Car A1.	1) The pantograph of Car B1 is lifted up. (Yes <input type="checkbox"/> /No <input type="checkbox"/> ) 2) The panto status indicators of Car A1 and of Car A2 change. (Yes <input type="checkbox"/> /No <input type="checkbox"/> )
9		1) Turn the Emergency button 26-S02 of Car A1 to get the button popped up. 2) Press the Panto Down button	1) The pantograph of Car B1 is lifted up. (Yes <input type="checkbox"/> /No <input type="checkbox"/> ) 2) The panto status indicators of Car A1 and of Car A2 change. (Yes <input type="checkbox"/> /No <input type="checkbox"/> )

## 2022 BRICS Skills Competition

		22-S01 and the Panto Up button 22-S02 of Car A1 at the same time.	
10	Switch the activation and occupation	Turn the Master Key 24-A01 of Car A1 to the Off position. Turn the Train Activation knob 32-S01 of Car A2 to the On position.	/
11	Panto 1 Lifting and Lowering Tests from Car A2	1) Turn the Panto Up Selection knob 22-S05 of Car A2 to the Panto 1 position. 2) Press the Panto Up button 22-S02 of Car A2.	1) The Panto Up indicator of Car A2 _____. 2) The Panto Down indicator of Car A2 _____.
12		Press the Panto Down button 22-S01 of Car A2.	1) The Panto Up indicator of Car A2 _____. 2) The Panto Down indicator of Car A2 _____.
13	Panto 2 Lifting and Lowering Tests from Car A2	1) Turn the Panto Up Selection knob 22-S05 of Car A2 to the Panto 2 position. 2) Press the Panto Up button 22-S02 of Car A2.	1) The pantograph of Car B1 is lifted up? (Yes <input type="checkbox"/> /No <input type="checkbox"/> ) 2) The Panto Up indicator of Car A1 _____. 3) The Panto Down indicator of Car A1 _____.
14		Press the Panto Down button 22-S01 of Car A2.	1) The pantograph of Car B1 is lowered? (Yes <input type="checkbox"/> /No <input type="checkbox"/> ) 2) The Panto Up indicator of Car A1 _____. 3) The Panto Down indicator of Car A1 _____.
15	Panto 1 & 2 Lifting Test from Car A2	1) Turn the Panto Up Selection knob 22-S05 of Car A2 to the Panto 1&2 position. 2) Press the Panto Up button	1) The pantograph of Car B1 is lifted up normally? (Yes <input type="checkbox"/> /No <input type="checkbox"/> ) 2) The Panto Up indicator of Car A1 _____.

## 2022 BRICS Skills Competition

		22-S02 of Car A2.	<p>3) The Panto Down indicator of Car A1 _____.</p> <p>4) The Panto Up indicator of Car A2 _____.</p> <p>5) The Panto Down indicator of Car A2 _____.</p>
16		Press the Emergency button 26-S02 of Car A2.	<p>1) The pantograph of Car B1 is lowered normally? (Yes<input type="checkbox"/>/No<input type="checkbox"/>)</p> <p>2) The Panto Up indicator of Car A1 _____.</p> <p>3) The Panto Down indicator of Car A1 _____.</p> <p>4) The Panto Up indicator of Car A2 _____.</p> <p>5) The Panto Down indicator of Car A2 _____.</p>
17	Emergency Panto Lowering Test from Car A2	Press the Panto Up button 22-S02 of Car A2.	<p>1) The pantograph of Car B1 is lifted up normally. (Yes<input type="checkbox"/>/No<input type="checkbox"/>)</p> <p>2) The panto status indicators of Car A1 and of Car A2 change. (Yes<input type="checkbox"/>/No<input type="checkbox"/>)</p>
18		<p>1) Turn the Emergency button 26-S02 of Car A2 to get the button popped up.</p> <p>2) Press the Panto Down button 22-S01 and the Panto Up button 22-S02 of Car A2 at the same time.</p>	<p>1) The pantograph of Car B1 is lifted up normally. (Yes<input type="checkbox"/>/No<input type="checkbox"/>)</p> <p>2) The panto status indicators of Car A1 and of Car A2 change. (Yes<input type="checkbox"/>/No<input type="checkbox"/>)</p>
19	Turning off Train Activation and Getting the Cab Unoccupied	1) Turn the Train Activation knob 32-S01 of Car A2 to the Off position. After hearing the action of relays, release the knob to the “0” position.	/

	from Car A2	2) Turn the Master Key 24-A01 of Car A2 to the Off position.	
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Fault phenomena and causes:



## 7.2. Module B Operation Record Sheet

## B1 Passenger Compartment Door Installation and Adjustment Record Sheet

## B2 Passenger Compartment Door Installation and Adjustment Record Sheet

Workstation Number: \_\_\_\_\_ Competitors Number: \_\_\_\_\_

Instructions:

1. If the inspection result is a value by measurement, fill in the exact figure.
2. Fill in test result according to actual operation states

No.	Operation Items	Operation Sub-items	Test results
1	Passenger Compartment Installation	Inspection of the portal height	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
2		Inspection of the portal width	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
3		Inspection of the portal diagonals	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
4		Inspection of portal inclination	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
5		Inspection of parallelism of portal frame seal areas	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
6		Inspection of chutes	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
7		Installation of the portal frame seal angles	Completed <input type="checkbox"/>

## 2022 BRICS Skills Competition

			Uncompleted <input type="checkbox"/>
8		Installation of the portal angles	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
9		Installation of the center portal angle adjusting bolt	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
10		Connection of the door control unit wire and of the earthing wire	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
11		Installation of the drive unit (door mechanism)	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
12		Inspection of the guide rods rotation	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
13		Inspection of the spindle bending	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
14		Fastening of the guide rails of the drive unit	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
15		Drive unit guide rails levelling	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
16		Assembly of roller swing arms	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
17		Installation of roller swing arms	Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>
18		Installation of door leaves	Completed <input type="checkbox"/>

## 2022 BRICS Skills Competition

19			Uncompleted <input type="checkbox"/>	
20				
21				
22	Adjustment of door leaves parallelism		Completed <input type="checkbox"/> Uncompleted <input type="checkbox"/>	
23	<p style="text-align: center;">Adjustment of door leaves pre-load</p> <p style="text-align: center;">Measurement positions</p> <p style="text-align: center;">Lower measurement position: 150mm above the threshold</p> <p style="text-align: center;">Upper measurement position: 1800mm above the threshold</p>		<p style="text-align: center;">Left:</p> <p>Y1 _____ mm (upper measurement position)</p> <p>Y2 _____ mm (lower measurement position)</p> <p>Y3 _____ mm (Y2-Y1)</p>	<p style="text-align: center;">Right:</p> <p>Y1' _____ mm (upper measurement position)</p> <p>Y2' _____ mm (lower measurement position)</p> <p>Y3' _____ mm (Y2'-Y1')</p>
24			<p>X1 _____ mm (lower measurement position)</p> <p>X2 _____ mm (upper measurement position)</p> <p>X3 _____ mm (X2-X1)</p>	
25	Adjustment of door leaves centring within the portal frame		Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	
26	Adjustment of the upper swing out movement		<p>Left door leaf _____ mm</p> <p>Right door leaf _____ mm</p>	
27	Adjustment of the lower swing out movement		<p>Left door leaf _____ mm</p> <p>Right door leaf _____ mm</p>	
28	Adjustment of door leaves height		<p>Top gap _____ - _____ mm</p> <p>Bottom gap _____ - _____ mm</p>	
29	Adjustment of roller swing arms		Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	

## 2022 BRICS Skills Competition

30	Adjustment of the seal pressing at the upper area	Left door leaf _____ mm Right door leaf _____ mm	
31	Measurement of the width of closely joined finger protection rubbers	Top width _____ mm Bottom width _____ mm	
32	Adjustment of the seal pressing at the lower area	Left door leaf _____ mm Right door leaf _____ mm	
33	Inspection of whether the four corners of the door leaves are obviously beyond the car body plane	Left door leaf top left corner: Yes <input type="checkbox"/> No <input type="checkbox"/>  Left door leaf bottom left corner: Yes <input type="checkbox"/> No <input type="checkbox"/>	Right door leaf top right corner: Yes <input type="checkbox"/> No <input type="checkbox"/>  Right door leaf bottom right corner: Yes <input type="checkbox"/> No <input type="checkbox"/>
34	Installation and adjustment of support rollers	Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	
35	Adjustment of the door opening width Measuring points are 1800mm above the threshold	Door opening width _____ mm	
36	Adjustment of the limit switch S1	Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	
37	Installation, adjustment and wiring of the isolating lock mechanism	Isolating lock operates smoothly <input type="checkbox"/>  Isolating lock gets stuck <input type="checkbox"/>  Isolating lock doesn't work <input type="checkbox"/>	
38	Fixing of the wire bundle of the isolating lock mechanism and the steel wire rope	Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	
39	Wiring of door status indicators and installation of the cover plates in the door area	Completed <input type="checkbox"/> Not completed <input type="checkbox"/>	

**B2 Passenger Compartment Door Electrical Function Test Operation Record Sheet**

<b>B2 Passenger Compartment Door Electrical Function Test Operation Record Sheet</b>				
Workstation No.: _____		Competitor No.: _____		
<p>Instructions:</p> <ol style="list-style-type: none"> <li>1. If the inspection result is a value by measurement, fill in the exact figure.</li> <li>2. If the inspection result is not a value by measurement, mark the proper box with a cross (as “→”).</li> <li>3. Make detailed records of the abnormal phenomena/defects found during the tests and describe the specific defect positions.</li> </ol>				
No.	Operation Item	Operation Steps	Test Phenomena	Test Result
	Preparations	Inspect the physical status of the ground test bench, relay cabinet and door.	/	Equipment is normal <input type="checkbox"/> Equipment is Abnormal <input type="checkbox"/>
		Turn on the power supply circuit breakers in the distribution box.	Check the power supply status.	Power supply is normal <input type="checkbox"/> Power supply is abnormal <input type="checkbox"/>
		Conduct short circuit tests at the output side of the DC 110V power supply switch in the relay cabinet.	Check whether short circuit occurs.	Short circuit occurs <input type="checkbox"/> No short circuit occurs <input type="checkbox"/>
		After confirming that no short circuit occurs, switch on the power supply switches in the relay cabinet.	After the switches are turned on, check the power supply status.	Activated <input type="checkbox"/> Not activated <input type="checkbox"/>
		Make sure all circuit breakers on the relay cabinet front panel are turned on.	Check whether the train is activated not.	Activated <input type="checkbox"/> Not activated <input type="checkbox"/>
		Turn the Train Activation knob to the On position and confirm that the train is activated.	Check whether the ground test bench is occupied or not.	Occupied <input type="checkbox"/> Not occupied <input type="checkbox"/>

## 2022 BRICS Skills Competition

		Turn the master key on the ground test bench to the On position, and confirm that the ground test bench is occupied.		
		Turn the Door Mode switch to the MM position; Turn the ATP Cutout knob and the ATC Door Bypass knob to On positions.	/	/
The door opening and closing basic function test		Press the Open Lt Doors button on the ground test bench to open the door. After the door opens fully, press the Close Lt Doors button on the ground test bench to close the door.	Check whether the door opens/closes normally Check whether the door gets stuck or interferes with other parts when moving Check whether the door leaves make abnormal noise or shake when moving	Door opens/closes normally <input type="checkbox"/> Door opens/closes abnormally <input type="checkbox"/>
		Check the door zero speed protection function.	When ATP is cut out and the door is open, switch off the Door Control circuit breaker.	Door closes <input type="checkbox"/> Door opens <input type="checkbox"/>
		Turn on the Door Control circuit breaker and check the status of the door indicators and the alarm function.	Observe the status of the yellow door status indicator when the door opens.	On <input type="checkbox"/> Flashes <input type="checkbox"/> Off <input type="checkbox"/>
			Observe the status of the yellow door status indicator and the buzzer when the door closes.	On <input type="checkbox"/> Flashes <input type="checkbox"/> Off <input type="checkbox"/> Buzzer sounds an alarm <input type="checkbox"/> Buzzer does not sound an alarm <input type="checkbox"/>
		Check the anti-pinch function of the door.	When the door is being closed, place an anti-pinch obstacle between the two door leaves (place the obstacle in the upper, medium and lower positions in turns). The door opens automatically upon touching	The door opens fully <input type="checkbox"/> The door closes as normal <input type="checkbox"/>

## 2022 BRICS Skills Competition

			the obstacle.	
		Check the door reclosing function.	After the door opens as a result of its anti-pinch function, press the Close Lt Doors button again.	The door opens <input type="checkbox"/> The door closes <input type="checkbox"/>
		Check the door cutout function.	When the door is closed and locked, cut out the door and the red indicator is on.  Press the Open Lt Doors button.	The door opens <input type="checkbox"/> The door does not open <input type="checkbox"/>
			Reset the door isolation device and perform again the door opening and closing operation.	Door opens/closes normally <input type="checkbox"/> Door opens/closes abnormally <input type="checkbox"/>
	Door opening and closing durations test	After the door is closed, press the Open Lt Doors button on the ground test bench.	Start timing when the passenger compartment door begins to move.  Stop timing when the door is fully opened.	Door opening duration: ____s
		When the doors is open, press the Close Lt Doors button on the ground test bench.	Start timing when the passenger compartment door begins to move.  Stop timing when the door is fully closed.	Door closing duration: ____s
	Door enable function test	When the door is closed, confirm that the red indicator of the Open Lt Doors button on the ground test bench is on.  Turn the ATC Door Bypass knob to the Off position.	The red indicator of the Open Lt Doors button on the ground test bench is off.  Press the Open Lt Doors button.	The door opens <input type="checkbox"/> The door does not open <input type="checkbox"/>
		Turn the ATC Door Bypass knob to the On position.  Turn the ATP Cutout knob to the Off position.	The red indicator of the Open Lt Doors button on the ground test bench is off  Press the Open Lt Doors	The door opens <input type="checkbox"/> The door does not open <input type="checkbox"/>

## 2022 BRICS Skills Competition

			button.	
		Press the RM button to activate the RM mode.	Observe the status of the indicator of the Open Lt Doors button on the ground test bench.	On <input type="checkbox"/> Off <input type="checkbox"/>
		Turn the ATP Cutout knob to the On position.	/	/
Cab occupation function test		Turn the master key on the ground test bench to the Off position. Press the Open Lt Doors button.	Observe the status of the red indicator of the Open Lt Doors button on the ground test bench.	On <input type="checkbox"/> Off <input type="checkbox"/>
			Press the Open Lt Doors button.	The door opens <input type="checkbox"/> The door does not open <input type="checkbox"/>
			Observe the status of the green indicator of the Close Lt Doors button on the ground test bench.	On <input type="checkbox"/> Off <input type="checkbox"/>
Door mode function test		Turn the master key on the ground test bench to the On position. Turn the Door Mode knob to the AM position. Press the Open Lt Doors button.	Observe the status of the green indicator of the Close Lt Doors button on the ground test bench.	On <input type="checkbox"/> Off <input type="checkbox"/>
			Observe the status of the door.	The door opens <input type="checkbox"/> The door does not open <input type="checkbox"/>
		Turn the Door Mode knob to the MM position. Press the Open Lt Doors button.	Observe the status of the green indicator of the Close Lt Doors button on the ground test bench.	On <input type="checkbox"/> Off <input type="checkbox"/>
			Observe the status of the door.	The door opens <input type="checkbox"/> The door closes <input type="checkbox"/>
		Turn the Door Mode knob to the	Observe the status of the green indicator of the Close	On <input type="checkbox"/> Off <input type="checkbox"/>



## 2022 BRICS Skills Competition

		AM position. Press the Close Lt Doors button.	Lt Doors button on the ground test bench.	
			Observe the status of the door.	The door opens <input type="checkbox"/> The door closes <input type="checkbox"/>
		Turn the Door Mode knob to the MM position.	/	/
	Door unlocking test	When the door is closed and locked, pull down the handle of the emergency egress device.	After the emergency unlocking, observe the status of the yellow door status indicator.	On <input type="checkbox"/> Off <input type="checkbox"/>
			After the emergency unlocking, test whether the door can be opened manually.	The door can be opened manually <input type="checkbox"/> The door cannot be opened manually <input type="checkbox"/>
			Send a door opening or closing instruction from the ground test bench, and observe whether the door opens or closes as instructed.	The door opens or closes as instructed <input type="checkbox"/> The door does not open or close as instructed <input type="checkbox"/>
	Resetting	Reset the handle of the emergency egress device and close the door. Reset all switches and knobs.	/	/
		Turn off all the power supply circuit breakers in the distribution box.	/	/

**Additional Description:**

### 7.3. Module C Operation Record Sheet

#### C1 Air Conditioning Unit Routine Inspection and Maintenance Operation Record Sheet

C1 Air Conditioning Unit Routine Inspection and Maintenance Operation Record Sheet				
Workstation No.:		Competitor No.:		
<p>Instructions:</p> <ol style="list-style-type: none"> <li>If the inspection result is a value by measurement, fill in the exact figure.</li> <li>If the inspection result is not a value by measurement and no defect is found, mark after “Yes” in the “Normal or Not” option with a cross (as “→”), and you are not required to fill in the Phenomena Description column.</li> <li>If the inspection result is not a value by measurement and defects are found, mark after “No” in the “Normal or Not” option with a cross (as “→”), fill in the defect type, position and provide details in the Additional Description column if necessary.</li> <li>If an operation sub-item is marked with a slash “/” in the Maintenance Status column, you are not required to carry out maintenance.</li> <li>If an operation sub-item is not marked with a slash “/” in the Maintenance Status column, conduct corresponding maintenance according to the defect and make a record in the Maintenance Status column: a) if no defect is found, skip this column; b) if a defect is found and repaired, select “Repaired”; c) if a defect is found but is not yet repaired, select “Not repaired”.</li> </ol>				
No.	Inspection Item	Inspection Sub-item	Normal Or Not	Phenomena Description and Result Recording
1	Inspection of the safety of the air conditioning unit	Check whether the connectors of the main loop and control loop of the evaporation chamber are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the equipment is properly connected to the ground.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the bolts on the surface of the air conditioning unit are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the air conditioning unit has obvious defects.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
2	Compressor inspection	Check whether the bolts are loose or missing.	Yes <input type="checkbox"/> No <input type="checkbox"/>	

## 2022 BRICS Skills Competition

		Check whether the compressor has stains or foreign matter on its surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
3	Inspection of the compressor cavity pipe holder	Check whether the fixing screws of the pipe holder are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the anti-loose marks of the fasteners meet requirements (if the anti-loose mark that does not meet the requirements is at the same position as the loosen fastener, make judgement only without keeping records.)	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the rubber washers are damaged or fall off.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
4	Inspection of the condenser	Check whether the fixing bolts of the condenser are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the motor shaft of the condenser is bent or deformed.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Turn the fan blades with a hand, and check whether they can move smoothly.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the split pins of the cover are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the condenser has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
5	Inspection of the evaporation chamber cover	Check whether the cover is obviously damaged, deformed or rusted.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the antiskid strip of the cover peels off or is damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
6	Appearance inspection of the insulation materials of the evaporation chamber	Check whether the insulation cotton inside the evaporation chamber cover appears normal, and whether its surface is cracked or damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the insulation cotton has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
7	Inspection of the inverter electric control box	Check whether the inverter electric control box appears normal, whether it is firmly installed, and whether the bolts are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the circuit board and the components in the inverter electric control box are burned.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the connectors are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	

8	Inspection of the insulation resistance	Connect one end of the 500V megger to the power supply input side of the compressor filter circuit board and the other end connected to train body and the ground.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Use the 500V megger to test the insulation resistance at the power supply input side and check whether the insulation resistance is greater than 2MΩ.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
9	Inspection of the contactor of the inverter electric control box	Use the multimeter to test the open contactor and check whether short circuit occurs at the output end of the contactor.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Use the screwdriver to forcibly close the contactor, and check whether the input end is connected to the output end with the multimeter.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
10	Inspection of the terminals of the inverter electric control box	Check whether the wire terminals of the electrical components in the inverter electric control box are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether wires of the terminals are discolored due to overheating or are damaged.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the marks of the wires fall off and whether the components are loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the bolts are loose and whether their anti-loose marks do not meet requirements. Reset the covers of the air conditioning unit after the inspection is completed.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
11	Ventilator appearance inspection	Check whether the ventilator appears normal and whether it is securely fixed.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the motor bearing is deformed or loose.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Check whether the ventilator has stains or foreign matter on the surface.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Turn the fan blades with a hand, and check whether they can move smoothly.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
12	Inspection of	Check whether the bolts on the left/right	Yes <input type="checkbox"/>	

13	bolts	cover of the ventilation chamber, evaporation chamber cover, compression chamber cover, and the left/right cover of the condensation chamber are loose and whether their anti-loose marks meet the requirements.	No <input type="checkbox"/>	
		Check whether the square drive cam lock is properly locked.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Inspection of the electrical connectors in the air conditioner cabinet	Check whether the wires of the main loop and control loop are loose, damaged, or come off.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
14	Inspection of the power supply	Check whether the voltages of the incoming wires at the top of the Main Power Supply QF1 are normal. A-phase voltage: between U and V B-phase voltage: between U and W C-phase voltage: between V and W	Yes <input type="checkbox"/> No <input type="checkbox"/>	A-phase voltage: _____ V B-phase voltage: _____ V C-phase voltage: _____ V
		When power is on, test whether the input and output voltages of the DC 110V power supply are normal. Input voltage: between X1-5 and X1-6 Output voltage: between X2-1 and X2-2	Yes <input type="checkbox"/> No <input type="checkbox"/>	Input voltage: _____ V Output voltage: _____ V
		When power is on, test whether the input and output voltages of the DC 24V power supply are normal. Input voltage: between X1-5 and X1-6 Output voltage: between X3-1 and X3-2	Yes <input type="checkbox"/> No <input type="checkbox"/>	Input voltage: _____ V Output voltage: _____ V

**Additional Description (filled out if necessary):**

**C2 Air Conditioning Unit Parts Cleaning and Replacement Operation Record Sheet**

**C2 Air Conditioning Unit Parts Cleaning and Replacement Operation Record Sheet**

Workstation No.: \_\_\_\_\_

Competitor No.: \_\_\_\_\_

**Instructions:**

1. Replace the parts at the designated position as specified in the Operation Record Sheet. If application of tightening torque and drawing of anti-loose marks are required during the replacement, record the torque at the corresponding position of the Operation Record Sheet.
2. If a part removed has defects, describe the defects in the Defect Description and Result Recording column; skip the column if no defects are found.
3. If an operation item applies to two or more parts, operate the first part only. For example, for the operation item of “replacement of the fresh air filter”, replace the fresh air filter No. 1.
4. For torque application during cover disassembly and installation, apply torque before the start and after the completion of all operations according to specific operation contents.

No.	Operation Item	Operation Step	Completed or Not	Defect Description and Result Recording
	Cleaning of the fresh air filter	Pull out the dirty fresh air filter from the rainwater separator, open the filter frame, and take out the filter.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Clean the air inlet and outlet surfaces with clear water.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Use a soft brush to wash the filter and make sure it is clean.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		After the filter is dried in the air or with the consent of the Judge, install the filter onto the air conditioning unit to reset the unit.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Replacement of the fresh air filter cotton	Pull out the dirty fresh air filter cotton from the rainwater separator.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Pull out the filter frame and put in the new filter cotton.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Reset the air conditioning unit.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Cleaning of	Open the cover of the evaporator	Yes <input type="checkbox"/>	

the mixed air filter	chamber.	No <input type="checkbox"/>	
	Take out the filter, open the filter frame and take out the filter cotton.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Place the filter frame in clear water, wash the air inlet and outlet surfaces, and use the brush to clean the surfaces.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Install the filter onto the air conditioning unit after it is dried in the air and reset the unit.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Replacement of the mixed air filter cotton	Open the evaporator chamber cover and pull out the dirty mixed air filter.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Open the filter frame, take out the dirty filter cotton, and put in new filter cotton.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Place the removed dirty mixed air filter in the store area.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Reset the cover and make sure the protective lock is locked.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Cleaning of the condenser	Open the condenser cover.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Remove the dirt and foreign matter on the surface of the condenser.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Use the fin comb to straighten bent fins.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Draw anti-loose marks and reset the air conditioning unit.	Yes <input type="checkbox"/> No <input type="checkbox"/>	Torque spanner application scope: ____ - ____ N·m Tightening torque: ____ N·m
Cleaning of the evaporator	Open the cover of the evaporator chamber.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Remove the dirt and foreign matter on the surface of the evaporator.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Use the fin comb to straighten bent fins.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
	Draw anti-loose marks and reset the	Yes <input type="checkbox"/>	

		air conditioning unit.	No <input type="checkbox"/>	
	Replacement of electrical terminals	Open the cover of the evaporator chamber and the cover of the inverter electric control box.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Remove the wires of terminals XT1/1-XT1/4, remove the wires to be replaced, and note the positions of the terminals.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Install new terminals, terminal partition plates, stick labels on the terminals, connect wire according to wire markers as indicated on the drawing, and test whether the terminals are connected.	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Put on the cover and reset the air conditioning unit.	Yes <input type="checkbox"/> No <input type="checkbox"/>	



**C3 Air Conditioner System Test and Troubleshooting Operation Record Sheet**

<b>C3 Air Conditioner System Test and Troubleshooting Operation Record Sheet</b>				
Workstation No.: _____		Competitor No.: _____		
<p>Instructions:</p> <p>1. If the inspection result is a value by measurement, fill in the exact figure.</p> <p>2. If the inspection result is not a value by measurement, mark the proper box with a cross (as “→”).</p> <p>3. Make detailed records of the abnormal phenomena/defects found during the tests and describe the specific defect positions.</p>				
No.	Operation Item	Operation Step	Operation Standard	Test Result
1	Preparations	Check the physical condition of the working status cabinet, air conditioner cabinet, and air conditioning unit.	Appear normal	Working status cabinet <input type="checkbox"/> Air conditioner cabinet <input type="checkbox"/> Air conditioning unit <input type="checkbox"/>
		Measure the voltages between U/V/W at the top of the Main Power Supply QF1 in the working status cabinet.	AC323V–437V	Voltage between U/V: _____ V Voltage between U/W: _____ V Voltage between V/W: _____ V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between U1/V1/W1 at the bottom of the Main Power Supply QF1 working status cabinet.	Infinite	Resistance between U1/V1: _____ Ω Resistance between U1/W1: _____ Ω Resistance between V1/W1: _____ Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Main Power Supply QF1 in the working status cabinet.	/	/
		Measure the voltages between U1/V1/W1 at the top of the Air Conditioner Main Power Supply QF2 in the working status cabinet.	AC323V–437V	Voltage between U1/V1: _____ V Voltage between U1/W1: _____ V Voltage between

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			V1/W1: ____ V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistances between U3/V3/W3 at the bottom of the Air Conditioner Main Power Supply QF2 in the working status cabinet.	Infinite	Resistance between U1/V1: ____ Ω Resistance between U1/W1: ____ Ω Resistance between V1/W1: ____ Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Air Conditioner Main Power Supply QF2 in the working status cabinet.	/	/
	Measure the voltage between U1/N at the top of the 220V Control Power Supply QF3 in the working status cabinet.	AC187V–255V	Voltage between U1/N: ____ V
	Measure the resistance between L1/N1 at the bottom of the 220V Control Power Supply QF3 in the working status cabinet.	Infinite	Resistance between U1/N1: ____ Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the 220V Control Power Supply QF3 in the working status cabinet.	/	/
	Measure the voltage between V1/N at the top of the 220V Control Power Supply QF4.	AC187V–255V	Voltage between V1/N: ____ V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between L2/N2 at the bottom of PLC Power Supply QF4 in the working status cabinet.	Infinite	Resistance between L2/N2: ____ Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the PLC Power Supply QF4 in the working status cabinet.	/	/
	Measure the voltage between W1/N at the top of the DC Power Supply QF5 in the working status cabinet.	AC187V–255V	Voltage between W1/N: ____ V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between L3/N3 at the top of the DC Power Supply QF5 in the working status cabinet.	Infinite	Resistance between L3/N3: ____ Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between 110+/COM1 at the outlet of the V1	Not lower than 2KΩ	Resistance between 110+/COM1: ____ Ω

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	Switch Mode Power Supply in the working status cabinet.		Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between 24V+/COM2 at the outlet of the V2 Switch Mode Power Supply in the working status cabinet.	Not lower than 1K $\Omega$	Resistance between 24V+/COM2: _____ $\Omega$ Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the DC Power Supply QF5 in the working status cabinet.	/	/
	Measure the voltage between 110V+/COM1 at the top of the Battery Power Supply =32-F02 in the working status cabinet.	DC85V–125V	Voltage between 110V+/COM1 : _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between 300/317 (X4:2) at the bottom of the Battery Power Supply =32-F02 in the working status cabinet.	Infinite	Resistance between 300/317: _____ $\Omega$ Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Battery Power Supply =32-F02 in the working status cabinet.	/	/
	Measure the voltage between 300/317 (X4:2) at the top of the Train Activation =32-F01 in the working status cabinet.	DC85V–125V	Voltage between 300/317: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between 301/317 (X4:2) at the bottom of the Train Activation switch =32-F01 in the working status cabinet.	Infinite	Resistance between 301/317: _____ $\Omega$ Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Train Activation =32-F01 in the working status cabinet.	/	/
	Turn the Train Activation switch =32-S01 to the On position.	=32-K02 and =32-K02 are closed upon .	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the voltage between 309/317 (X4:2) at the top of the Cab Activation =21-F01 in the working status cabinet.	DC85V–125V	Voltage between 309/317: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistance between 310/317 (X4:2) at the bottom of the Cab Activation =21-F01 in the working status cabinet.	Infinite	Resistance between 310/317: _____ $\Omega$ Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Cab Activation	/	/

## 2022 BRICS Skills Competition

		=21-F01 in the working status cabinet.		
		Turn on the Cab Occupation =24-A01 master key in the working status cabinet.	=21-K01, =21-K02 and =21-K11 are closed upon energization.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the voltage between 320/321 at the top of F01/TC1 Emergency Ventilation in the working status cabinet.	DC85V–125V	Voltage between 320/321: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistance between 322/321 (X5:4) at the bottom of F01/TC1 Emergency Ventilation in the working status cabinet.	Infinite	Resistance between 322/321: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on F01/TC1 Emergency Ventilation in the working status cabinet.	/	/
		Measure the voltage between 320/321 at the top of F02/TC1 Air Conditioner Control in the working status cabinet	DC85V–125V	Voltage between 320/321: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistance between 323/321 (X5:6) at the bottom of F02/TC1 Air Conditioner Control in the working status cabinet.	Infinite	Resistance between 323/321: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on F02/TC1 Air Conditioner Control in the working status cabinet.	/	/
		Check whether F03, F04, F05, F06, F07, F08, F09, F10, F11, F12 and F13 are all turned on.	/	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
2	Ventilator function test	Measure the voltages between 1/3/5 at the top of the Air Conditioner 1 Main Loop circuit breaker Q61.	AC323V–437V	Voltage between 1/3: _____V Voltage between 1/5: _____V Voltage between 3/5: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between 2/4/6 at the bottom of the Air Conditioner 1 Main Loop circuit	Infinite	Resistance between 2/4: _____Ω Resistance between 2/6: _____Ω

## 2022 BRICS Skills Competition

	breaker Q61.		_____Ω Resistance between 4/6:_ _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Air Conditioner 1 Main Loop circuit breaker Q61.	/	/
	Measure the voltages between 1/3/5 at the top of the Air Conditioner 1 Ventilator 1 Thermomagnetic circuit breaker QM111.	AC323V–437V	Voltage between 1/3:_ _____V Voltage between 1/5:_ _____V Voltage between 3/5:_ _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistances between 2/4/6 at the bottom of the Air Conditioner 1 Ventilator 1 Thermomagnetic circuit breaker QM111.	Infinite	Resistance between 2/4:_ _____Ω Resistance between 2/6:_ _____Ω Resistance between 4/6:_ _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Air Conditioner 1 Ventilator 1 Thermomagnetic circuit breaker QM111.	/	/
	Measure the voltages of 1/3/5 at the top of the Air Conditioner 1 Ventilator 2 Thermomagnetic circuit breaker QM112.	AC323V–437V	Voltage between 1/3:_ _____V Voltage between 1/5:_ _____V Voltage between 3/5:_ _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Measure the resistances of 2/4/6 at the bottom of the Air Conditioner 1 Ventilator 2 Thermomagnetic circuit breaker QM112.	Infinite	Resistance between 2/4:_ _____Ω Resistance between 2/6:_ _____Ω Resistance between 4/6:_ _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
	Turn on the Air Conditioner 1 Ventilator 2 Thermomagnetic circuit breaker QM112.	/	/
	Measure the voltages between 1/3 at	DC85V–125V	Voltage between 1/3:_ _____V

## 2022 BRICS Skills Competition

		the top of the Train Controller circuit brake Q85.		_____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between 2/4 at the bottom of the Train Controller circuit brake Q85.	Infinite	Resistance between 2/4: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Train Controller circuit brake Q85.	/	/
		Measure the voltage between 1/3 at the top of the Air Conditioner 1 Control Loop circuit breaker Q81.	DC85V–125V	Voltage between 1/3: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistance between 2/4 at the bottom of the Air Conditioner 1 Control Loop circuit breaker Q81.	Infinite	Resistance between 2/4: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Air Conditioner 1 Control Loop circuit breaker Q81.	/	/
		Touch the Local Control Mode key in the air conditioner cabinet to set the mode to Ventilation, and click OK.	Ventilator 1 and Ventilator 2 of the unit work.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Set the mode to Stop, click OK, and go back to the main interface.	Ventilator 1 and Ventilator 2 of the unit stop working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
3	Condenser function test	Measure the voltages between 1/3/5 at the top of the Air Conditioner 1 condenser 1 Thermomagnetic circuit breaker QM311.	AC323V–437V	Voltage between 1/3: _____V Voltage between 1/5: _____V Voltage between 3/5: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between 2/4/6 at the bottom of the Air Conditioner 1 Condenser 1 Thermomagnetic circuit breaker QM311.	Infinite	Resistance between 2/4: _____Ω Resistance between 2/6: _____Ω Resistance between 4/6: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Air Conditioner 1 Condenser 1 Thermomagnetic circuit breaker QM311.	/	/
		Measure the voltages between 1/3/5	AC323V–437V	Voltage between 1/3: _____V

## 2022 BRICS Skills Competition

		at the top of the Air Conditioner 1 Condenser 2 Thermomagnetic circuit breaker QM312.		Voltage between 1/5: _____V Voltage between 3/5: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between 2/4/6 at the bottom of the Air Conditioner 1 Condenser 2 Thermomagnetic circuit breaker QM312.	Infinite	Resistance between 2/4: _____Ω Resistance between 2/6: _____Ω Resistance between 4/6: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Air Conditioner 1 Condenser 2 Thermomagnetic circuit breaker QM312.	/	/
		Use the screwdriver to press down the Air Conditioner 1 Condenser 1 Contactor KM311.	Condenser 1 works.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Release the Air Conditioner 1 Condenser 1 Contactor KM311.	Condenser 1 stops working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Use the screwdriver to press down the Air Conditioner 1 Condenser 2 Contactor KM312.	Condenser 2 works.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Release the Air Conditioner 1 Condenser 2 Contactor KM312.	Condenser 2 stops working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		4	Compressor function test	Measure the voltages between 1/3/5 at the bottom of the Air Conditioner 1 Compressor 1 circuit brake Q211.
Measure the resistances between 2/4/6 of the Air Conditioner 1 Compressor 1 circuit brake Q211.	Infinite			Resistance between 2/4: _____Ω Resistance between 2/6: _____Ω Resistance between 4/6: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>

## 2022 BRICS Skills Competition

		Turn on the Air Conditioner 1 Compressor 1 circuit brake Q211.	/	/
		Measure the voltages between 1/3/5 at the top of the Air Conditioner 1 Compressor 2 circuit brake Q212.	AC323V-437V	Voltage between 1/3: _____V Voltage between 1/5: _____V Voltage between 3/5: _____V Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Measure the resistances between 2/4/6 at the bottom of the Air Conditioner 1 Compressor 2 circuit breaker Q212.	Infinite	Resistance between 2/4: _____Ω Resistance between 2/6: _____Ω Resistance between 4/6: _____Ω Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Turn on the Air Conditioner 1 Compressor 2 circuit brake Q212.	/	/
		Operate the main interface of the air conditioner controller, touch the Force Mode key to enter the Force Mode interface.	/	/
		Set the mode to Forced Cooling and click OK. Go back to the main interface, check the working status of the compressors at the Status Display.	Compressor 1 and Compressor 2 work.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Enter the Force Mode, set the mode to Turn Off Force Mode, and click Back to go back to the main interface.	Compressor 1 and Compressor 2 stop working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
5	Ventilation mode function test	At the air conditioner controller main interface, touch the Local Control Mode key to enter the Local Control Mode interface.	/	/
		Set the mode to Ventilation, and click OK.	/	/
		Go back to the main interface, enter the Status Display, and check the working status of the ventilators, condensers, and compressors.	Ventilators and condensers work; compressors stop working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>



## 2022 BRICS Skills Competition

		Touch the Local Control Mode key to set the mode to Stop, and click OK.	Ventilators, condensers, and compressors working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
6	Cooling mode function test	At the air conditioner controller main interface, touch the Local Control Mode key to enter the Local Control Mode interface.	/	/
		Set the mode to Manual Cooling and the temperature at 19°C, and click OK. Go back to the main interface, enter Status Display, and check the working status of the ventilators, condensers, and compressors.	Ventilators, condensers, and compressors work.	N Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
		Set the mode to Turn Off Force Mode, and click Back.	Ventilators, condensers, and compressors working.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>
7	Resetting	Stop the unit and turn =32-S01 to the Off position.	=32-K03 is energized; =32-K02, =32-K01, =21-K01, =21-K02 and =21-K11 are de-energized.	Normal <input type="checkbox"/> Abnormal <input type="checkbox"/>

**Abnormality/Fault description:**

Example:

Fault 1: wire marker xxx, the wire from relay xx to terminal xx of terminal strip xx is broken, so that relay xxx cannot be energized.

Fault 2: wire marker xxx, the wire from terminal xx of terminal strip xx to terminal xx of terminal strip xx is broken, so that relay xxx cannot be energized.

Fault 3: the normally closed contact of relay xxx fails, so that relay xxx cannot be energized.

## 7.4. Module D Operation Record Sheet

## D1 Vehicle Electrical Test and Fault Finding Operation Record Sheet

D1 Vehicle Electrical Test and Fault Finding Operation Record Sheet			
Workstation No. : _____ Competitors No. : _____			
<p>Instructions:</p> <ol style="list-style-type: none"> <li>1. Mark the proper option in the Test Result column with a cross (as “✕”) according to the actual test result;</li> <li>2. For the measurement parameters, please fill the specific parameter in the Test Result column;</li> <li>3. During the test, if a fault is found, make a detailed record for the fault in the Test Result column.</li> </ol>			
No.	Operation Item	Operation Sub-item	Test Result
1	Preparations	Inspect the No. 1 end cab electrical cabinet, No. 1 end passenger compartment electrical cabinet, No. 2 end cab electrical cabinet, and No. 2 end passenger compartment electrical cabinet, and check whether the terminal strips in the cabinets are damaged and whether the core wires are obviously exposed.	<p>Normal <input type="checkbox"/></p> <p>Abnormal <input type="checkbox"/></p>
		Check whether both Emergency mushroom head buttons on the console of the No. 1 and the No. 2 end are pressed down.	<p>If the Emergency mushroom head buttons are pressed down:</p> <p>Yes <input type="radio"/> No <input type="radio"/></p>
		Check whether the following circuit breakers are turned on: <b>No. 1 end cab electrical cabinet:</b> Permanent Load circuit breaker =32-F05, Train Control	<p>Breakers are turned on or not:</p> <p>All on <input type="radio"/></p> <p>Not all on <input type="radio"/></p> <p>Note: If there is/are circuit</p>

## 2022 BRICS Skills Competition

		<p>circuit breaker =22-F101, Parking Breaker  circuit breaker =24-F101, Doors Control circuit  breaker =81-F101, Door Control Units 1&amp;2  circuit breaker =82-F101, Door Control Units  3&amp;4 circuit breaker =82-F102, Door Control  Units 5&amp;6 circuit breaker =82-F103 and Door  Control Units 7&amp;8 circuit breaker =82-F104, Lt  Doors Status Monitoring circuit breaker  =84-F101, Rt Doors Status Monitoring circuit  breaker =84-F102; and <b>No. 1 end passenger  compartment electrical cabinet: Compressor  Control circuit breaker =34-F301.</b></p>	<p>breaker/s is/are not turned on,  please describe in detail the off  breaker in the [Abnormal  Phenomena and Reason]</p>
2	<p>Train  activation  and cab  occupation  tests</p>	<p>At the No. 1 end cab, get the train activated.</p>	<p>1) After the train is  activated, the reading of  the voltmeter in the cab  electrical cabinet:  above DC 100V ●  below DC 100V ●</p> <p>2) TCMS displays:  Cab is occupied ●  Cab is not occupied ●</p>
3	<p>Door  opening and  closing tests</p>	<p>Press the Open Lt Doors button (for a period  longer than 2s).</p>	<p>1) Door status  Open <input type="checkbox"/> closed <input type="checkbox"/></p> <p>2) Door red indicator status:  On <input type="checkbox"/> off <input type="checkbox"/>  first flashes, then is on <input type="checkbox"/>  first flashes, then is off <input type="checkbox"/></p> <p>3) Door yellow indicator</p>

## 2022 BRICS Skills Competition

			<p>status:</p> <p>On <input type="checkbox"/> off <input type="checkbox"/></p> <p>first flashes, then is on <input type="checkbox"/></p> <p>first flashes, then is off <input type="checkbox"/></p> <p>4) doors status on TCMS:</p> <p>open <input type="checkbox"/> closed <input type="checkbox"/></p>
		<p>Press the Close Lt Doors button (for a period longer than 2s).</p>	<p>1) doors status</p> <p>open <input type="checkbox"/> closed <input type="checkbox"/></p> <p>2) Door red indicator status:</p> <p>On <input type="checkbox"/> off <input type="checkbox"/></p> <p>first flashes, then is on <input type="checkbox"/></p> <p>first flashes, then is off <input type="checkbox"/></p> <p>3) Door yellow indicator status:</p> <p>On <input type="checkbox"/> off <input type="checkbox"/></p> <p>first flashes, then is on <input type="checkbox"/></p> <p>first flashes, then is off <input type="checkbox"/></p> <p>4) doors status on TCMS:</p> <p>open <input type="checkbox"/> closed <input type="checkbox"/></p>
4	Service breaker test	<p>Turn the traction and breaker handle on the No. 1 end console within the Service Breaker area.</p>	<p>TCMS I/O interface shows:</p> <p>Service Breaker train-line is valid <input type="checkbox"/></p> <p>Service Breaker train-line is invalid <input type="checkbox"/></p>
5	Traction instruction	<p>Press the Parking Breaker Released button on the No. 1 end console;</p> <p>Press the Deadman button of the master controller on the No. 1 end console, and push</p>	<p>1) TCMS I/O interface shows:</p> <p>parking breaker is released <input type="checkbox"/></p> <p>parking breaker is applied <input type="checkbox"/></p>

## 2022 BRICS Skills Competition

		the traction and breaker handle of the master controller to the Traction position.	2) TCMS I/O interface shows: Breaker train-line is valid <input type="checkbox"/> Breaker train-line is invalid <input type="checkbox"/>
Abnormal Phenomena and Reason:			

**D2 Vehicle Train Control and Management System (TCMS) Commissioning  
Operation Record Sheet**

<b>D2 Vehicle Train Control and Management System (TCMS) Commissioning Operation Record Sheet</b>			
Workstation No. : _____ Competitors No. : _____			
<p>Instructions:</p> <p>1 Mark the proper option in the Test Result column with a cross (as “Q”) according to the actual test result;</p> <p>2 For the measurement parameters, please fill the specific parameter in the Test Result column;</p> <p>3 During the test, if a fault is found, make a detailed record for the fault in the Test Result column.</p>			
No.	Operation Item	Operation Sub-item	Test Result
1	Preparation	Check whether the TCMS circuit breaker =41-F104, VCU circuit breaker =41-F106, Remote I/O circuit breaker =41-F101, and Repeater circuit breaker =41-F102 are turned on.	Breakers are turned on or not: All on <input checked="" type="radio"/> Not all on <input type="radio"/> Note: If there is/are circuit breaker/s is/are not turned on, please describe in detail the off breaker in the [Abnormal Phenomena and Reason].
2	Turn on Circuit Breakers	Tap Communication Status on the TCMS interface to enter the Communication Status interface. Check the status of all network devices on the interface (green indicates working and red indicates not working).	Network device status: working <input type="checkbox"/> not working <input type="checkbox"/> If a fault occurs, please record the fault equipment in the [Abnormal Phenomena

## 2022 BRICS Skills Competition

			and Reason].
3	Digital I/O Setting	Tap Maintenance key on the TCMS, enter 2020, and then tap I/O Information to enter the I/O monitoring interface and to access the digital I/O information of each car. A lit icon indicates valid information and an unlit one indicates invalid information.	<p>If you enter the I/o interface:</p> <p style="text-align: center;"><b>Yes</b> <input type="radio"/></p> <p style="text-align: center;"><b>No</b> <input type="radio"/></p>
Abnormal Phenomena and Reason:			

**D3 Vehicle Fire Alarm Operation Record Sheet**

D3 Vehicle Fire Alarm Operation Record Sheet			
Workstation No. : _____ Competitors No. : _____			
<p>Instructions:</p> <p>1 Mark the proper option in the Test Result column with a cross (as “Q”) according to the actual test result;</p> <p>2 For the measurement parameters, please fill the specific parameter in the Test Result column;</p> <p>3 During the test, if a fault is found, make a detailed record for the fault in the Test Result column.</p>			
No.	Operation Item	Operation Sub-item	Test Result
1	Preparation	If fire alarm circuit breaker =42-F101 is turned on	The breaker is turned on or not: On <input type="radio"/> Not on <input type="radio"/> Note: If the circuit breaker is not turned on, please describe in detail in the [Abnormal Phenomena and Reason].
2	Fire Detector Function test	Align the smoke outlet of the smoke detector tester with the smoke inlet of a smoke detector, and start the smoke detector tester (the process should last longer than 15s).	(1) Does the buzzer give fire alarm sounds: Yes <input type="radio"/> No <input type="radio"/> (2) Status of the red Alarm button on the fire alarm control host: Off <input type="radio"/> Flashes <input type="radio"/> On <input type="radio"/> (3) Is the alarm location shown on TCMS consistent with the



			<p>smoke detector location?</p> <p>Yes <input type="radio"/> No <input type="radio"/></p>
3	<p>Fire Alarm Controller Host test</p>	<p>Turn the red Silence button on the fire alarm control host to the OFF position.</p>	<p>Does the buzzer continue to give fire alarm sounds?</p> <p>Yes <input type="radio"/> No <input type="radio"/></p>
4	<p>Fire Alarm Controller Host reset test</p>	<p>Press the Reset button on the fire alarm control host to reset the host.</p>	<p>(1) Check whether the alarm information on the fire alarm control host disappears.</p> <p>Yes <input type="radio"/> No <input type="radio"/></p> <p>(2) Check whether the alarm information on the smoke interface of the TCMS disappears.</p> <p>Yes <input type="radio"/> No <input type="radio"/></p>
<p>Abnormal Phenomena and Reason:</p>			