ISO 19659-4:2026-04 (E)

Railway applications - Heating, ventilation and air conditioning systems for rolling stock - Part 4: Design parameters, and test and inspection items for the HVAC unit

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions and abbreviated terms **2**
3.1 Terms and definitions 2
3.2 Abbreviated terms 2

4 Prerequisites (design parameters) for the HVAC unit **3**
4.1 General 3
4.2 Design parameters to be provided to the HVAC unit manufacturer 3
4.2.1 HVAC unit installation requirements 3
4.2.2 Air flow requirements 3
4.2.3 Cooling and heating performance requirements 5
4.2.4 Electric and electronic requirements 7
4.2.5 Control requirements 9
4.2.6 Structure requirements 11
4.2.7 Strength requirements 11
4.2.8 Component requirements 12
4.2.9 Maintenance requirements 12
4.2.10 Environmental requirements 13
4.2.11 Noise and vibration requirements 13
4.3 Summary of design parameters 13

5 Specification **13**
5.1 General 13
5.2 Test or inspection items and requirement specifications by the HVAC unit manufacturer 13
5.2.1 Air volume flow rate and system pressure drop test 13
5.2.2 Cooling and heating tests 14
5.2.3 Functional test 14
5.2.4 Cooling and heating operation and safety checks 14
5.2.5 Noise test 14
5.2.6 Blocked forces (if applicable) 15
5.2.7 Shock and vibration test 15
5.2.8 Water tightness test 15
5.2.9 Air tightness test (if applicable) 15
5.2.10 Air leakage test (if applicable) 16
5.2.11 Electrical insulation resistance and dielectric test 16
5.2.12 Starting characteristics test 16
5.2.13 Refrigerant circuit tightness test 16
5.2.14 Mass and centre of gravity measurement 16
5.2.15 Visual, dimensional and constructional inspection 16
5.2.16 Maintainability demonstration 16
5.2.17 Marking and labelling inspection 16
5.2.18 EMC test 17
5.2.19 Specific materials and parts tests 17
5.3 Classification of test and inspection items 17

6 Validation and verification **18**
6.1 General 18

6.2 Recording and measuring instruments 19
6.2.1 General 19
6.2.2 Recording 19
6.2.3 Measuring instruments 19
6.3 Test and inspection procedures including test facility and equipment, data to be recorded, position of measuring points and criteria 19
6.3.1 Air volume flow rate and system pressure drop test 19
6.3.2 Cooling and heating tests 22
6.3.3 Functional test 28
6.3.4 Cooling and heating operation and safety checks 30
6.3.5 Noise test 32
6.3.6 Blocked forces test 36
6.3.7 Shock and vibration test 38
6.3.8 Water tightness test 40
6.3.9 Air tightness test 43
6.3.10 Air leakage test 45
6.3.11 Electrical insulation resistance and dielectric test 47
6.3.12 Starting characteristics test (if applicable) 48
6.3.13 Refrigerant circuit tightness test 50
6.3.14 Mass and centre of gravity measurement 52
6.3.15 Visual, dimensional and constructional inspection 53
6.3.16 Maintainability demonstration 55
6.3.17 Marking and labelling inspection 55
6.3.18 EMC test 55
6.3.19 Specified materials and parts tests 58
6.4 Test or inspection report 60
6.4.1 General information 60
6.4.2 Type test report 60
6.4.3 Routine test report 61

Annex A (informative) **List of the design parameters to be provided to the HVAC unit manufacturer** **62**

Bibliography **68**