ISO/TR 6832:2023-10 (E)

Space systems - Development technology of a thermal vacuum chamber

Contents

Page

Foreword ..... **v**

Introduction ..... **vi**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **1**

4 Symbols and abbreviated terms **2**

5 Vacuum and thermal environment simulation **2**
5.1 General 2
5.2 Vacuum environment simulation technology 3
5.3 Cold black environment simulation technology 3
5.4 Space heat flux simulation technology 3
5.4.1 General 3
5.4.2 Incident heat flux simulation technology 3
5.4.3 Absorbed heat flux simulation technology 4

6 Design of TVC **4**
6.1 Configuration of TVC 4
6.2 General design 5

7 Vacuum vessel **6**
7.1 Composition and function 6
7.2 Vessel design 6
7.2.1 Structure shape 6
7.2.2 Material 8
7.2.3 Structure design 9
7.2.4 Design calculation 12
7.2.5 Manufacturing 12

8 Shroud **12**
8.1 Composition and function 12
8.2 Shroud design 13
8.2.1 Material of shroud 13
8.2.2 Structure of shroud 13
8.2.3 Shroud area division and thermal design 14
8.2.4 Decontamination panel design 14
8.2.5 Temperature measurement 15
8.2.6 Inner surface painting 15
8.2.7 Leak testing 15

9 Nitrogen system **15**
9.1 Composition and function 15
9.2 Design of LN_2 subsystem 15
9.2.1 Technical scheme 15
9.2.2 Equipment configuration 18
9.2.3 Piping design 18
9.3 Design of GN_2 subsystem 19
9.3.1 Technical scheme 19
9.3.2 Equipment configuration 20

10 Vacuum system **21**

10.1 Composition and function 21
10.2 Design of vacuum system 21
10.2.1 General 21
10.2.2 Scheme of the vacuum pumping process 21
10.2.3 System design calculations 22
10.2.4 Equipment configuration 23
11 Heat flux simulation system 25
11.1 Solar simulator 25
11.1.1 Composition and function 25
11.1.2 Solar simulator design 26
11.2 Infrared heat flux simulator 31
11.2.1 Composition and function 31
11.2.2 Infrared lamp array 31
11.2.3 Infrared cage 33
11.2.4 Thermal controlled panel 34
12 Specimen support mechanism 34
12.1 General 34
12.2 Motion simulator 35
12.2.1 Composition and function 35
12.2.2 Motion simulator design 35
12.3 Horizontal adjustment mechanism 37
12.3.1 Composition and function 37
12.3.2 Design of horizontal adjustment mechanism 37
12.4 Test specimen support 38
12.4.1 Composition and function 38
12.4.2 Design of test specimen support 38
13 Measurement and control system 39
13.1 Composition and function 39
13.2 Measurement and control system design 39
13.2.1 General 39
13.2.2 Structure of measurement and control system 39
13.2.3 Measurement and control system hardware and software platform 40
13.2.4 Function implementation of measurement and control system 41
14 Logistic support system 42
Bibliography 43