

# ISO 24412:2023-01 (E)

## Space systems - Thermal vacuum environmental testing

---

<b>Contents</b>		<b>Page</b>
	<b>Foreword</b> .....	<b>v</b>
	<b>Introduction</b> .....	<b>vi</b>
<b>1</b>	<b>Scope</b> .....	<b>1</b>
<b>2</b>	<b>Normative references</b> .....	<b>1</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>1</b>
<b>4</b>	<b>Symbols and abbreviated terms</b> .....	<b>2</b>
<b>5</b>	<b>Test purpose</b> .....	<b>2</b>
	5.1 Thermal balance test.....	2
	5.2 Thermal vacuum test.....	3
	5.2.1 General purpose.....	3
	5.2.2 Qualification test.....	3
	5.2.3 Proto-flight test.....	3
	5.2.4 Acceptance test.....	3
<b>6</b>	<b>Test methods</b> .....	<b>3</b>
	6.1 Thermal balance test.....	3
	6.1.1 Test description.....	3
	6.1.2 Test conditions.....	6
	6.1.3 Basic requirements of test facilities.....	7
	6.1.4 Monitoring during TBT.....	7
	6.2 Thermal vacuum test.....	7
	6.2.1 Test description.....	7
	6.2.2 Test conditions.....	10
	6.2.3 Basic requirements for test facilities.....	13
	6.2.4 Monitoring during TVT.....	13
<b>7</b>	<b>Test facility</b> .....	<b>13</b>
	7.1 Laboratory environment.....	13
	7.2 Laboratory infrastructure.....	14
	7.3 Test system.....	14
	7.3.1 Overview.....	14
	7.3.2 Chamber system.....	14
	7.3.3 Vacuum system.....	15
	7.3.4 Thermal system.....	15
	7.3.5 Data acquisition system.....	18
	7.3.6 MGSE.....	18
	7.3.7 Contamination measurement and control system.....	18
<b>8</b>	<b>Test requirements</b> .....	<b>19</b>
	8.1 Test tolerance and accuracy.....	19
	8.2 Test configuration.....	19
	8.3 Temperature and heat flux measurement.....	20
	8.3.1 General.....	20
	8.3.2 Location of temperature monitoring point for test article.....	20
	8.3.3 Location of temperature monitoring point for test equipment.....	20
	8.4 Heating device selection.....	20
	8.5 Safety requirements and recommendations.....	21
<b>9</b>	<b>Test procedure</b> .....	<b>21</b>

9.1	Test flow .....	21
9.2	Test procedure.....	21
9.2.1	General.....	21
9.2.2	Before test.....	22
9.2.3	Test implementation .....	23
9.2.4	After test.....	23
<b>10</b>	<b>Test interruption and handling.....</b>	<b>24</b>
10.1	Interruption .....	24
10.1.1	Test facility malfunction .....	24
10.1.2	Test article malfunction.....	24
10.2	Interruption handling.....	24
<b>11</b>	<b>Test documentation.....</b>	<b>24</b>
<b>Annex A (informative) Main characteristic of a solar simulator.....</b>		<b>25</b>
<b>Annex B (informative) An example of IR heater design flow for absorbed flux simulation method in TBT.....</b>		<b>27</b>
<b>Bibliography.....</b>		<b>30</b>