

# DIN EN 16603-35-03:2014-12 (E)

Space engineering - Liquid propulsion for launchers; English version EN 16603-35-03:2014

---

<b>Contents</b>	<b>Page</b>
<b>Foreword</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>5</b>
<b>1 Scope</b> .....	<b>6</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>8</b>
3.1 Terms from other standards.....	8
3.2 Abbreviated terms.....	8
<b>4 Overview of a liquid propulsion system</b> .....	<b>9</b>
<b>5 Functional</b> .....	<b>11</b>
5.1 Overview .....	11
5.2 Mission .....	11
5.3 Functions.....	11
<b>6 Constraints</b> .....	<b>12</b>
6.1 Acceleration.....	12
6.2 Geometrical constraints .....	12
6.3 Electrical constraints.....	12
6.4 Safety .....	12
<b>7 Development</b> .....	<b>13</b>
7.1 Overview .....	13
7.2 Development logic .....	13
<b>8 Interfaces</b> .....	<b>16</b>
8.1 Overview .....	16
8.2 General.....	16
<b>9 Design</b> .....	<b>17</b>
9.1 General.....	17
9.2 Specification .....	17
9.3 Propulsion system selection .....	17

9.3.1	Overview.....	17
9.3.2	System selection.....	17
9.3.3	Propellant selection.....	18
9.3.4	Engine selection.....	18
9.3.5	Selection of the TVC system .....	18
9.4	Propulsive system detailed design.....	19
9.4.1	Overview.....	19
9.4.2	General.....	19
9.4.3	Filling and draining system.....	19
9.4.4	Propellant tanks and management.....	20
9.4.5	Propellant feed system.....	23
9.5	Liquid engines .....	24
9.5.1	General.....	24
9.5.2	Performance .....	25
9.5.3	Functional system analysis .....	25
9.5.4	Thrust chamber assembly (TCA).....	29
9.5.5	Gas generator and pre-burner.....	36
9.5.6	Turbomachinery subsystem .....	36
9.5.7	Control and monitoring systems .....	38
9.5.8	Auxiliary functions supplied by the stage.....	40
9.5.9	Components.....	41
9.6	Mechanical design.....	44
<b>10</b>	<b>Ground support equipment .....</b>	<b>48</b>
<b>11</b>	<b>Materials .....</b>	<b>49</b>
<b>12</b>	<b>Verification .....</b>	<b>50</b>
<b>13</b>	<b>Production and manufacturing .....</b>	<b>51</b>
<b>14</b>	<b>In-service.....</b>	<b>52</b>
14.1	General.....	52
14.2	Operation.....	52
<b>15</b>	<b>Deliverables .....</b>	<b>53</b>
	<b>Bibliography.....</b>	<b>54</b>