

# ISO 10276:2019-12 (E)

## Nuclear energy - Fuel technology - Trunnion systems for packages used to transport radioactive material

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
<b>1</b>	<b>Scope .....</b>	<b>1</b>
<b>2</b>	<b>Normative references .....</b>	<b>1</b>
<b>3</b>	<b>Terms,abbreviatedterms,symbolsanddefinitions .....</b>	<b>1</b>
<b>3.1</b>	<b>Terms and definitions .....</b>	<b>1</b>
<b>3.2</b>	<b>Symbols .....</b>	<b>4</b>
<b>3.3</b>	<b>Abbreviations .....</b>	<b>4</b>
<b>4</b>	<b>Regulatory requirements .....</b>	<b>4</b>
<b>4.1</b>	<b>General .....</b>	<b>4</b>
<b>4.2</b>	<b>Relevant regulations .....</b>	<b>4</b>
<b>5</b>	<b>Design .....</b>	<b>4</b>
<b>5.1</b>	<b>General .....</b>	<b>4</b>
<b>5.2</b>	<b>Design methodology .....</b>	<b>6</b>
<b>5.3</b>	<b>Materials .....</b>	<b>6</b>
<b>5.3.1</b>	<b>Material selection .....</b>	<b>6</b>
<b>5.3.2</b>	<b>Mechanical properties .....</b>	<b>7</b>
<b>5.4</b>	<b>Design loads .....</b>	<b>7</b>
<b>5.4.1</b>	<b>Assembly state .....</b>	<b>7</b>
<b>5.4.2</b>	<b>Tie-down .....</b>	<b>8</b>
<b>5.4.3</b>	<b>Lifting and/or tilting .....</b>	<b>9</b>
<b>5.4.4</b>	<b>Load cycles for fatigue analysis .....</b>	<b>9</b>
<b>5.5</b>	<b>Methods of analysis and design criteria .....</b>	<b>10</b>
<b>5.5.1</b>	<b>General .....</b>	<b>10</b>
<b>5.5.2</b>	<b>Strength analysis using analytical methods .....</b>	<b>10</b>
<b>5.5.3</b>	<b>Strength analysis using FEA methods .....</b>	<b>11</b>
<b>5.5.4</b>	<b>Brittle fracture evaluation .....</b>	<b>12</b>
<b>5.5.5</b>	<b>Fatigue analysis .....</b>	<b>12</b>
<b>5.6</b>	<b>Other requirements and recommendations .....</b>	<b>12</b>
<b>6</b>	<b>Manufacture .....</b>	<b>13</b>
<b>6.1</b>	<b>General .....</b>	<b>13</b>
<b>6.2</b>	<b>Assembly .....</b>	<b>14</b>
<b>6.3</b>	<b>Inspection during manufacture and assembly .....</b>	<b>14</b>
<b>6.3.1</b>	<b>Dimensional and visual inspection .....</b>	<b>14</b>
<b>6.3.2</b>	<b>Non-destructive examination .....</b>	<b>14</b>
<b>6.4</b>	<b>Testing during manufacture and assembly .....</b>	<b>15</b>
<b>6.4.1</b>	<b>Scope of testing .....</b>	<b>15</b>
<b>6.4.2</b>	<b>Chemical analysis .....</b>	<b>15</b>
<b>6.4.3</b>	<b>Mechanical testing of material properties .....</b>	<b>15</b>
<b>6.4.4</b>	<b>Static testing .....</b>	<b>16</b>
<b>7</b>	<b>Maintenance .....</b>	<b>17</b>
<b>7.1</b>	<b>General .....</b>	<b>17</b>
<b>7.2</b>	<b>Maintenance schedule .....</b>	<b>17</b>

7.3	Periodic inspection .....	18
7.3.1	General .....	18
7.3.2	Removable trunnions .....	18
7.3.3	Welded trunnions .....	18
7.3.4	Trunnion surfaces .....	18
7.3.5	Attachment threads in packaging body .....	18
7.3.6	Attachment bolts .....	19
7.3.7	Feature dimensions .....	19
7.4	Periodic testing .....	19
7.4.1	Types of testing .....	19
7.4.2	Trunnion system .....	19
7.4.3	Weld areas .....	19
7.5	Component replacement .....	19
7.6	Repairs .....	20
7.6.1	General .....	20
7.6.2	Features to be repaired and methods .....	20
8	Quality management system .....	21
	Bibliography .....	22