

# ISO 4664-1:2022-07 (E)

## Rubber, vulcanized or thermoplastic - Determination of dynamic properties - Part 1: General guidance

---

Contents	Page
<b>Foreword .....</b>	<b>v</b>
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms and definitions .....</b>	<b>1</b>
<b>3.1 Terms applying to any periodic deformation .....</b>	<b>1</b>
<b>3.2 Terms applying to sinusoidal motion .....</b>	<b>3</b>
<b>3.3 Other terms applying to periodic motion .....</b>	<b>6</b>
<b>4 Symbols .....</b>	<b>6</b>
<b>5 General .....</b>	<b>8</b>
<b>5.1 Viscoelasticity .....</b>	<b>8</b>
<b>5.2 Use of dynamic test data .....</b>	<b>9</b>
<b>5.3 Classification of dynamic tests .....</b>	<b>9</b>
<b>5.3.1 General .....</b>	<b>9</b>
<b>5.3.2 Classification by type of vibration .....</b>	<b>9</b>
<b>5.3.3 Classification by mode of deformation .....</b>	<b>10</b>
<b>5.4 Factors affecting machine selection .....</b>	<b>11</b>
<b>6 Principles of dynamic motion for each vibration method .....</b>	<b>12</b>
<b>6.1 Forced vibration non-resonant method .....</b>	<b>12</b>
<b>6.1.1 Dynamic motion in linear response .....</b>	<b>12</b>
<b>6.1.2 Dynamic motion with nonlinear response .....</b>	<b>14</b>
<b>6.1.3 Free-vibration method .....</b>	<b>15</b>
<b>6.2 Forced resonant vibration .....</b>	<b>16</b>
<b>7 Test parameter dependence .....</b>	<b>18</b>
<b>7.1 Interdependence of frequency and temperature (time - temperature superposition) .....</b>	<b>18</b>
<b>7.2 Strain amplitude .....</b>	<b>19</b>
<b>8 Conditioning .....</b>	<b>19</b>
<b>8.1 Storage .....</b>	<b>19</b>
<b>8.2 Temperature .....</b>	<b>19</b>
<b>8.3 Mechanical conditioning .....</b>	<b>19</b>
<b>9 Forced vibration non-resonant method .....</b>	<b>20</b>
<b>9.1 Apparatus .....</b>	<b>20</b>
<b>9.2 Test piece .....</b>	<b>22</b>
<b>9.2.1 Test piece preparation .....</b>	<b>22</b>
<b>9.2.2 Test piece shapes and dimensions .....</b>	<b>22</b>
<b>9.2.3 Number of test pieces .....</b>	<b>24</b>
<b>9.3 Test conditions .....</b>	<b>24</b>
<b>9.3.1 Strain .....</b>	<b>24</b>
<b>9.3.2 Frequency and temperature .....</b>	<b>24</b>
<b>9.4 Test procedure .....</b>	<b>25</b>
<b>9.5 Expression of results .....</b>	<b>26</b>
<b>9.5.1 Parameters required .....</b>	<b>26</b>
<b>9.5.2 Wave-form method .....</b>	<b>26</b>

9.5.3	Hysteresis loop method .....	27
9.5.4	Stress-strain relationships and shape factors .....	28
10	Forced vibration resonant method .....	29
10.1	Apparatus .....	29
10.2	Expression of results .....	29
11	Free-vibration method .....	30
11.1	General .....	30
11.2	Test piece dimensions .....	30
11.3	Test conditions .....	30
Annex A (informative) Determination of the degree of nonlinearity(example of the calculation) .....		31
Annex B (informative) Procedure for time-temperature superposition(example of the calculation) ..		36
Bibliography .....		38