

# DIN EN 12195-1:2011-06 (E)

## Load restraining on road vehicles - Safety - Part 1: Calculation of securing forces

---

<b>Contents</b>		<b>Page</b>
Foreword .....		4
Introduction .....		5
<b>1</b>	<b>Scope .....</b>	<b>6</b>
<b>2</b>	<b>Normative references .....</b>	<b>6</b>
<b>3</b>	<b>Terms, definitions, symbols, units and abbreviations .....</b>	<b>6</b>
3.1	General terms and definitions .....	6
3.2	Terms and definition of calculation parameters .....	8
3.3	Symbols, units and terms .....	10
<b>4</b>	<b>Acceleration coefficients .....</b>	<b>11</b>
4.1	General .....	11
4.2	Load on load carriers during road transport .....	11
4.3	Load on load carriers during rail transport .....	12
4.4	Load on load carriers during sea transport .....	12
<b>5</b>	<b>Methods of calculation .....</b>	<b>13</b>
5.1	General .....	13
5.2	Stability of unsecured load .....	14
5.3	Blocking .....	15
5.4	Frictional lashing .....	16
5.4.1	General .....	16
5.4.2	Avoiding sliding .....	16
5.4.3	Avoiding tilting .....	17
5.5	Direct lashing .....	20
5.5.1	General .....	20
5.5.2	Slope lashing in longitudinal or transverse direction .....	20
5.5.3	Diagonal lashing .....	21
5.5.4	Loop lashing .....	24
5.5.5	Spring lashing .....	27
<b>6</b>	<b>Parameters .....</b>	<b>28</b>
6.1	Friction factor .....	28
6.2	Transmission of force during frictional lashing .....	29
<b>7</b>	<b>Cargo securing testing .....</b>	<b>29</b>
<b>8</b>	<b>Instruction for use .....</b>	<b>29</b>
8.1	General .....	29
8.2	Marking .....	30
<b>Annex A (informative) Examples for the calculation of lashing forces .....</b>		<b>31</b>
<b>Annex B (normative) Friction .....</b>		<b>38</b>
<b>B.1</b>	<b>Practical methods for the determination of the friction factor <math>\mu</math> .....</b>	<b>38</b>
B.1.1	General .....	38
B.1.2	Inclination test .....	38
B.1.3	Pulling test .....	38

<b>B.2</b>	<b>Friction factors <math>\mu</math> of some usual goods and surfaces .....</b>	<b>39</b>
	<b>Annex C (informative) Load securing protocol .....</b>	<b>41</b>
	<b>Annex D (normative) Practical tests for determination of the efficiency of cargo securing arrangements .....</b>	<b>42</b>
<b>D.1</b>	<b>Dynamic driving test .....</b>	<b>42</b>
<b>D.2</b>	<b>Inclination test .....</b>	<b>42</b>
<b>D.2.1</b>	<b>Description of test .....</b>	<b>42</b>
<b>D.2.2</b>	<b>Example .....</b>	<b>44</b>
<b>D.2.3</b>	<b>Theoretical background .....</b>	<b>45</b>
	<b>Annex E (informative) Documentation of practical tests .....</b>	<b>47</b>
	<b>Bibliography .....</b>	<b>48</b>