

# ISO 19380:2019-08 (E)

## Heavy commercial vehicles and buses - Centre of gravity measurements - Axle lift, tilt-table and stable pendulum test methods

---

<b>Contents</b>		<b>Page</b>
Foreword .....		v
Introduction .....		vi
1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	1
4	Principles .....	3
5	Variables .....	3
5.1	Reference system .....	3
5.2	Variables to be measured .....	3
5.2.1	Variables to be measured for location of xCG and yCG coordinates of centre of gravity in horizontal plane .....	3
5.2.2	Variables to be measured using the axle lift method for location of zCG coordinates .....	4
5.2.3	Variables to be measured using the tilt-table method for location of zCG coordinates .....	4
5.2.4	Variables to be measured using the stable pendulum method for location of zCG coordinates .....	4
6	Measuring equipment .....	5
7	Test conditions .....	6
7.1	General .....	6
7.2	Ambient conditions .....	6
7.3	Test surface .....	6
7.4	Test vehicle .....	6
7.5	Operating and other liquids .....	6
7.6	Loading conditions, suspension and mechanical parts .....	6
8	Determination of the centre of gravity in the horizontal plane .....	7
8.1	General .....	7
8.2	xCG position of the centre of gravity in the horizontal plane .....	7
8.2.1	Two axle vehicles .....	7
8.2.2	More than two axles .....	7
8.3	yCG position of the centre of gravity in the horizontal plane .....	8
8.3.1	Two axle vehicles .....	8
8.3.2	More than two axles .....	8
9	Determination of the centre of gravity height .....	8
9.1	General .....	8
9.2	Axle lift method .....	8
9.2.1	General guidance .....	8
9.2.2	Procedure .....	10
9.2.3	Determination of the axle load and inclination angle .....	11
9.2.4	Location of the centre of gravity above the ground plane with loaded tyre radius .....	11
9.3	Tilt-table method .....	12
9.3.1	General guidance .....	12
9.3.2	Tilt-table procedures .....	14

9.3.3	Determination of the centre of gravity height zCG .....	15
9.3.4	Data presentation .....	15
9.4	Stable pendulum method .....	15
9.4.1	General guidance .....	15
9.4.2	Stable pendulum procedure .....	17
9.4.3	Determination of platform properties .....	17
9.4.4	Determination of the applied torque .....	17
9.4.5	Consideration of platform deflection .....	18
9.4.6	Determination of the centre of gravity height, zCG .....	18
9.4.7	Data Presentation .....	18
Annex A (informative)	Determination of static loaded radius, rstat .....	19
Annex B (informative)	Test report -- Axle lift method .....	20
Annex C (informative)	Test report -- Tilt method (up to 3 axles) .....	23
Annex D (informative)	Test report -- Stable pendulum method .....	26
Bibliography	.....	29