

# ISO 3691-4:2020-02 (E)

## Industrial trucks - Safety requirements and verification - Part 4: Driverless industrial trucks and their systems

---

<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>2</b>
<b>3</b>	<b>Terms and definitions .....</b>	<b>4</b>
<b>4</b>	<b>Safety requirements and/or protective/risk reduction measures .....</b>	<b>10</b>
4.1	General .....	10
4.1.1	Overall requirements .....	10
4.1.2	Normal climatic conditions .....	10
4.1.3	Electrical requirements .....	10
4.1.4	Stored energy components .....	11
4.1.5	Edges or angles .....	11
4.1.6	Guards .....	11
4.1.7	Interlocking devices for guards .....	11
4.1.8	Two hand control devices .....	11
4.1.9	Transmission parts .....	11
4.1.10	Electro-sensitive protective equipment .....	11
4.1.11	Pressure-sensitive protective devices .....	11
4.1.12	Hydraulic systems .....	11
4.1.13	Pneumatic systems .....	11
4.1.14	Avoidance of automatic restart .....	12
4.1.15	Foot protection .....	12
4.2	Braking system .....	12
4.3	Speed control .....	12
4.4	Automatic battery charging .....	12
4.5	Load handling .....	13
4.6	Steering .....	13
4.7	Stability .....	13
4.7.1	General .....	13
4.7.2	Tilting platform stability test .....	13
4.7.3	Stability requirements for trucks not covered by 4.7.2 .....	14
4.8	Protective devices and complementary measures .....	14
4.8.1	Emergency stop .....	14
4.8.2	Detection of persons in the path .....	15
4.9	Modes of operation .....	17
4.9.1	General .....	17
4.9.2	Automatic mode .....	18
4.9.3	Manual mode .....	19
4.9.4	Maintenance mode .....	20
4.10	Trucks intended to tow trailers .....	20
4.11	Safety-related parts of the control system .....	20
4.12	Electromagnetic compatibility (EMC) .....	25
4.13	Conveyors fitted to a truck .....	25
4.13.1	Trucks fitted with conveyors .....	25
4.13.2	Conveyors .....	26

<b>5</b>	<b>Verification of safety requirements and/or protective measures</b>	<b>26</b>
5.1	General	26
5.2	Tests for detection of persons	26
5.3	Stability tests	28
5.3.1	General	28
5.3.2	Stability tests for truck not covered by 4.7.2	28
5.4	Fitness for purpose	28
5.4.1	General	28
5.4.2	Structural tests	28
5.4.3	Dynamic tests	29
<b>6</b>	<b>Information for use</b>	<b>29</b>
6.1	General	29
6.2	Warning systems	29
6.3	Instruction handbook for use	30
6.3.1	General	30
6.3.2	Concerning the trucks and system	30
6.3.3	Operation of the trucks and system	31
6.3.4	Routine service and maintenance of the trucks and system	31
6.3.5	Operating information	32
6.3.6	Information for the application	32
6.3.7	Details for floor/ground conditions	32
6.3.8	Details for power sources	32
6.3.9	Truck modification	33
6.4	Minimum marking	33
6.4.1	Marking	33
6.4.2	Warning signs	33
6.4.3	Information plates	33
6.5	Putting into service (commissioning)	34
<b>Annex A (normative) Requirements for preparation of the operating zones</b>		<b>35</b>
<b>Annex B (informative) List of significant hazards</b>		<b>45</b>
<b>Annex C (normative) Determination of rated capacity</b>		<b>50</b>
<b>Annex D (informative) Load transfer operations</b>		<b>52</b>
<b>Annex E (normative) Verification of essential health and safety requirements</b>		<b>55</b>
<b>Bibliography</b>		<b>84</b>