

ISO/TR 22100-3:2016-10 (E)

Safety of machinery - Relationship with ISO 12100 - Part 3: Implementation of ergonomic principles in safety standards

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Strategy for risk assessment and risk reduction in relation to ergonomic hazards	2
4.1	General	2
4.2	Significant ergonomic hazards in relation to ISO 12100	4
4.3	Potential consequences	4
4.3.1	General	4
4.3.2	Discomfort	4
4.3.3	Fatigue	5
4.3.4	Musculoskeletal disorders	5
4.3.5	Stress	6
4.3.6	Human error	7
5	Incorporating ergonomics into the risk assessment process	8
5.1	Information for risk assessment	8
5.1.1	General	8
5.1.2	Information for establishing assessment criteria	8
5.2	Determination of limits of machinery (user aspects)	9
5.3	Hazard identification	9
5.3.1	General concept for identifying ergonomic hazards	9
5.3.2	Determination of hazards based on essential characteristics and capabilities of intended operator population	9
5.4	Risk estimation	13
5.4.1	General	13
5.4.2	Risk estimation tools	13
5.5	Risk evaluation	13
5.5.1	General	13
5.5.2	Evaluating the risk reduction achieved by the application of ergonomic principles	13
5.5.3	Comparison of ergonomic risks	14
6	Risk reduction -- Design guidance	14
6.1	General	14
6.2	Risk reduction -- Human variability	14
6.3	Risk reduction -- Posture and movement space	15
6.4	Risk reduction -- Work rate and pattern	16
6.5	Risk reduction -- Human error	16
6.6	Risk reduction -- Operator/machine interface	17
6.7	Risk reduction -- Workplace environment	18
6.7.1	General	18
6.7.2	Visual factors	18
6.7.3	Auditory factors	19
6.7.4	Vibration factors	19
6.7.5	Thermal factors	19

7	Verification of safety requirements	19
	Annex A (informative) Standards dealing with ergonomics relevant to machinery design	20
	Annex B (informative) Work system and machinery design	24
	Annex C (informative) Ergonomics standards for specific applications	30
	Annex D (informative) Example of part of the implementation of the ergonomic factors	31
	Bibliography	35