

DIN EN ISO 19296:2019-04 (E)

Mining - Mobile machines working underground - Machine safety (ISO 19296:2018)

Contents		Page
European foreword		5
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2006/42/EC aimed to be covered		6
Foreword		7
Introduction		8
1	Scope	9
2	Normative references	9
3	Terms and definitions	12
4	Safety requirements and/or protective/risk reduction measures	17
4.1	General requirements	17
4.1.1	General	17
4.1.2	Moving parts	17
4.1.3	Equipment carrier restraints	18
4.1.4	Starting system	18
4.1.5	Unintended movement	18
4.2	Lifting and transportation	18
4.3	Towing and retrieval	18
4.4	Fluid power systems	19
4.4.1	Hydraulic systems	19
4.4.2	Pneumatic systems	20
4.5	Electrical equipment	21
4.5.1	General	21
4.5.2	Electromagnetic compatibility (EMC)	21
4.5.3	Batteries	21
4.6	Machines powered by diesel engine	21
4.6.1	Fuel and exhaust	21
4.6.2	Exhaust pipes	21
4.6.3	Engine cooling system	22
4.7	Fuel systems	22
4.7.1	Fuel tanks	22
4.7.2	Fuel tank filler inlet	22
4.7.3	Fuel tank vent system	22
4.7.4	Fuel tank drainage device	22
4.7.5	Fuel shut-off system	22
4.7.6	Fuel lines	23
4.8	Light intensity and quantity	23
4.8.1	General	23
4.8.2	Head lights	23
4.8.3	Tail lights	23
4.8.4	Reversing lights	23
4.8.5	Stop lamps	23
4.8.6	Both direction lights	23
4.8.7	Protective systems	24
4.9	Warning devices and safety signs	24
4.10	Braking	24

4.10.1	General requirements	24
4.11	Control systems and devices	24
4.11.1	General	24
4.11.2	Control devices	24
4.11.3	Steering systems	25
4.11.4	Displays	25
4.12	Operator and passenger's position	26
4.12.1	Protection	26
4.12.2	Access systems	26
4.12.3	Visibility	26
4.12.4	Interior space, dimensions, and seats	27
4.13	Fire protection	27
4.14	Noise	28
4.14.1	Noise reduction at source at the design stage	28
4.14.2	Information on noise emission	28
4.15	Vibrations	29
4.16	Radiation health risks	29
4.17	Tyres and rims	29
4.18	Stability	30
4.19	Load haul dump capacity	30
4.20	Maintenance	30
4.20.1	General	30
4.20.2	Frequent maintenance	30
4.20.3	Support devices	30
4.20.4	Tiltable cab support device	31
4.21	Quick coupler systems	31
5	Verification of safety requirements and/or protective/risk reduction measures	31
6	Information for use	31
6.1	Operator's manual	31
6.1.1	General	31
6.1.2	Information on noise emission	32
6.1.3	Information concerning hand-arm and whole-body vibration emission	32
6.2	Marking	33
6.2.1	General	33
6.2.2	Attachment points	33
6.2.3	Section or sub-assemblies	33
6.3	Training manuals	34
Annex A (normative)	Brake requirements for rubber tyred underground mining machines	35
A.1	General	35
A.2	Normative references	35
A.3	Terms and definitions	35
A.4	General requirements	35
A.4.1	Required brake systems	35
A.4.2	Common components	35
A.4.3	Brake control system	35
A.4.4	Service brake systems	35
A.4.5	Secondary brake systems	36
A.4.6	Parking brake systems	37
A.4.7	Hydrostatic brake systems	37
A.4.8	Systems with combined brake and steer function	37
A.4.9	Performance and warning devices for stored energy sources	37
A.4.10	Brake systems with electronic MCS	38
A.4.11	Machines designed to tow trailers	38
A.4.12	Machine instructions and labels	38
A.4.13	Estimating brake slope capability	38
A.5	Test conditions	38
A.5.1	Overall test parameters	38
A.5.2	General test conditions	38

A.5.3	Test course	38
A.5.4	Machine test configuration	38
A.6	Performance tests	39
A.6.1	General	39
A.6.2	Brake system controls	39
A.6.3	Stored energy sources	39
A.6.4	Holding performance	39
A.6.5	Stopping performance	39
A.6.6	General exceptions from ISO 3450:2011	40
A.7	Test report	40
Annex B (informative) List of significant hazards, hazardous situations and hazardous events		41
Annex C (normative) Verification table		45
Annex D (informative) Examples of performance levels for safety-related functions		50
Bibliography		51