

# ISO/TS 19837:2018-03 (E)

## Safety of machinery - Trapped key interlocking devices - Principles for design and selection

---

Contents		Page
Foreword .....		v
1 Scope .....	1	1
2 Normative references .....		1
3 Terms and definitions .....		1
4 Symbols and abbreviated terms .....		4
5 Operating principles and typical forms of trapped key interlocking system .....	5	5
5.1 General .....		5
5.2 Functional decomposition of a trapped key interlocking system .....		8
5.2.1 Isolation control .....		9
5.2.2 Intermediate transfer .....		12
5.2.3 Access control .....		13
6 General requirements for the design of Trapped Key interlocking device .....	13	13
6.1 General .....		13
6.2 Device architecture and positive mechanical action .....		13
6.3 Endurance/Strength .....		14
6.3.1 General .....		14
6.3.2 Resistance to shock and vibration .....		14
6.3.3 Mechanical life .....		14
6.3.4 Rotary actuators for access locks .....		14
6.3.5 Key retention .....		15
6.4 Systematics .....		15
6.5 Safety FMEA/FTA .....		15
6.6 Validating Performance Level .....		15
6.7 Design to minimize defeat .....		16
6.7.1 General .....		16
6.7.2 Scheme design for ease of use .....		16
6.7.3 Coded actuators .....		16
6.7.4 Reproduction of keys .....		16
6.8 Clearances and creepage distances .....		17
6.9 Isolation control .....		17
6.9.1 General .....		17
6.9.2 Direct mechanical action (Power interlocking) .....		17
6.9.3 Solenoid controlled switch .....		17
6.10 Access control .....		17
6.10.1 Escape release .....		17
6.10.2 Emergency release .....		18
6.10.3 Auxiliary release .....		18
7 System configuration .....		18
7.1 General .....		18
7.2 Key coding .....		18
7.3 Key transfer plan .....		19
7.4 System selection .....		19
7.4.1 General .....		19
7.4.2 Isolation control .....		19

7.4.3	Intermediate transfer .....	19
7.4.4	Access control .....	19
8	Information for use .....	19
<b>Annex A (informative) Examples of trapped key interlock devices .....</b>		<b>20</b>
<b>Annex B (informative) FMEA analysis -- Typical failure modes for consideration in trapped key systems .....</b>		<b>26</b>
<b>Annex C (informative) Safety functions and validation in accordance with ISO 13849-1 and ISO 13849-2 .....</b>		<b>27</b>
<b>Annex D (informative) Selection of trapped key interlocking devices .....</b>		<b>29</b>
<b>Bibliography .....</b>		<b>30</b>