

ISO 9241-420:2011-07 (E)

Ergonomics of human-system interaction - Part 420: Selection of physical input devices

| Contents | | Page |
|---|--|-------------|
| Foreword | | vii |
| Introduction | | ix |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 1 |
| 4 | Procedures for selecting equipment -- General considerations | 11 |
| 4.1 | Rationale | 11 |
| 4.2 | Objectives for selection procedures | 13 |
| 5 | Performance criterion | 13 |
| 6 | Methods and aids for selection of devices | 14 |
| 6.1 | Task analysis | 14 |
| 6.2 | Selection based on product description | 14 |
| 6.3 | User tests | 14 |
| 6.4 | Selection based on dominant task primitive(s) with overriding importance | 15 |
| 6.5 | Selecting a keyboard | 17 |
| 7 | Field assessment of input devices | 18 |
| 7.1 | Rationale | 18 |
| 7.2 | Methods | 19 |
| Annex B (informative) | Tracing test | 24 |
| Annex C (informative) | Dragging test | 26 |
| Annex D (informative) | Assessment of comfort | 28 |
| Annex E (informative) | One-direction tapping test | 32 |
| Annex F (informative) | Multi-directional tapping test | 35 |
| Annex G (informative) | Test for mobile text entry (hand-held keyboards) | 37 |
| Annex H (normative) | Tables for selecting devices in consideration of product description | 40 |
| Annex I (informative) | Usability test for keyboards | 93 |
| Bibliography | | 94 |
| Tables Annex H Table H.1 -- Correspondence with generic requirements on compact keyboards -- Appropriateness | | 47 |
| Table H.2 -- Correspondence with generic requirements on compact keyboards -- Operability | | 47 |
| Table H.3 -- Correspondence with generic requirements on compact keyboards -- Controllability | | 47 |

| | |
|--|----|
| Table H.4 -- Correspondence with generic requirements on compact keyboards -- Biomechanical load | 48 |
| Table H.5 -- Functional properties of compact keyboards -- Design of keys of compact keyboards -- Design of keys | 48 |
| Table H.6 -- Functional properties of compact keyboards -- Design of keys -- Key legends | 48 |
| Table H.7 -- Functional properties of compact keyboards -- Design of keyboard -- Sections and zones | 49 |
| Table H.8 -- Functional properties of compact keyboards -- Design of keyboard -- Mechanical design | 49 |
| Table H.9 -- Other considerations for compact keyboards -- Electrical properties | 50 |
| Table H.10 -- Other considerations for compact keyboards -- Maintainability-related properties | 50 |
| Table H.11 -- Other considerations for compact keyboards -- Interdependencies | 50 |
| Table H.12 -- Other considerations for compact keyboards -- Documentation | 50 |
| Table H.13 -- Correspondence with generic requirements on full-size keyboards -- Appropriateness | 51 |
| Table H.14 -- Correspondence with generic requirements on full-size keyboards -- Operability | 51 |
| Table H.15 -- Correspondence with generic requirements on full-size keyboards -- Controllability ... | 51 |
| Table H.16 -- Correspondence with generic requirements on full-size keyboards -- Biomechanical load | 52 |
| Table H.17 -- Functional properties of full-size keyboards -- Design of keys -- Design of keys | 52 |
| Table H.18 -- Functional properties of full-size keyboards -- Design of keys -- Key legends | 52 |
| Table H.19 -- Functional properties of full-size keyboards -- Design of keyboard -- Sections and zones | 53 |
| Table H.20 -- Functional properties of full-size keyboards -- Design of keyboard -- Mechanical design | 53 |
| Table H.21 -- Other considerations for full-size keyboards -- Electrical properties | 53 |
| Table H.22 -- Other considerations for full-size keyboards -- Maintainability-related properties | 54 |
| Table H.23 -- Other considerations for full-size keyboards -- Interdependencies | 54 |
| Table H.24 -- Other considerations for full-size keyboards -- Documentation | 54 |
| Table H.25 -- Correspondence with generic requirements on mice -- Appropriateness | 55 |
| Table H.26 -- Correspondence with generic requirements on mice -- Operability | 55 |
| Table H.27 -- Correspondence with generic requirements on mice -- Controllability | 55 |
| Table H.28 -- Correspondence with generic requirements on mice -- Biomechanical load | 56 |
| Table H.29 -- Functional properties of mice -- Functional properties | 56 |
| Table H.30 -- Functional properties of mice -- Button design | 56 |

| | |
|---|----|
| Table H.31 -- Functional properties of mice -- Considerations of handedness | 57 |
| Table H.32 -- Functional properties of mice -- Resolution consistency | 57 |
| Table H.33 -- Other properties of mice -- Mechanical properties | 57 |
| Table H.34 -- Other properties of mice -- Electrical properties | 57 |
| Table H.35 -- Other properties of mice -- Maintainability-related properties | 57 |
| Table H.36 -- Other properties of mice -- Health- and safety-related properties | 58 |
| Table H.37 -- Interdependencies and documentation of mice -- Interdependency with software | 58 |
| Table H.38 -- Interdependencies and documentation of mice -- Interdependency with use environment | 58 |
| Table H.39 -- Interdependencies and documentation of mice -- Documentation | 59 |
| Table H.40 -- Correspondence with generic requirements on pucks -- Appropriateness | 59 |
| Table H.41 -- Correspondence with generic requirements on pucks -- Operability | 60 |
| Table H.42 -- Correspondence with generic requirements on pucks -- Controllability | 60 |
| Table H.43 -- Correspondence with generic requirements on pucks -- Biomechanical load | 60 |
| Table H.44 -- Functional properties of pucks -- Functional properties | 61 |
| Table H.45 -- Functional properties of pucks -- Button design | 61 |
| Table H.46 -- Functional properties of pucks -- Consideration of handedness | 61 |
| Table H.47 -- Functional properties of pucks -- Resolution consistency | 62 |
| Table H.48 -- Other properties of pucks -- Mechanical properties | 62 |
| Table H.49 -- Other properties of pucks -- Electrical properties | 62 |
| Table H.50 -- Other properties of pucks -- Maintainability-related properties | 62 |
| Table H.51 -- Other properties of pucks -- Health- and safety-related properties | 63 |
| Table H.52 -- Interdependencies and documentation of pucks -- Interdependency with software | 63 |
| Table H.53 -- Interdependencies and documentation of pucks -- Interdependency with use environment | 63 |
| Table H.54 -- Interdependencies and documentation of pucks -- Documentation | 64 |
| Table H.55 -- Correspondence with generic requirements on joysticks -- Appropriateness | 64 |
| Table H.56 -- Correspondence with generic requirements on joysticks -- Operability | 65 |
| Table H.57 -- Correspondence with generic requirements on joysticks -- Controllability | 65 |
| Table H.58 -- Correspondence with generic requirements on joysticks -- Biomechanical load | 65 |
| Table H.59 -- Functional properties of joysticks -- Functional properties | 66 |
| Table H.60 -- Functional properties of joysticks -- Button design | 66 |

| | |
|--|----|
| Table H.61 -- Functional properties of joysticks -- Consideration of handedness | 66 |
| Table H.62 -- Functional properties of joysticks -- Resolution consistency | 67 |
| Table H.63 -- Other properties of joysticks -- Mechanical properties | 67 |
| Table H.64 -- Other properties of joysticks -- Electrical properties | 67 |
| Table H.65 -- Other properties of joysticks -- Maintainability-related properties | 67 |
| Table H.66 -- Other properties of joysticks -- Health- and safety-related properties | 68 |
| Table H.67 -- Interdependencies and documentation of joysticks -- Interdependency with software . | 68 |
| Table H.68 -- Interdependencies and documentation of joysticks -- Interdependency with use environment | 68 |
| Table H.69 -- Interdependencies and documentation of joysticks -- Documentation | 68 |
| Table H.70 -- Correspondence with generic requirements on trackballs -- Appropriateness | 69 |
| Table H.71 -- Correspondence with generic requirements on trackballs -- Operability | 69 |
| Table H.72 -- Correspondence with generic requirements on trackballs -- Controllability | 70 |
| Table H.73 -- Correspondence with generic requirements on trackballs -- Biomechanical load | 70 |
| Table H.74 -- Functional properties of trackballs -- Functional properties | 70 |
| Table H.75 -- Functional properties of trackballs -- Button design | 71 |
| Table H.76 -- Functional properties of trackballs -- Consideration of handedness | 71 |
| Table H.77 -- Functional properties of trackballs -- Resolution consistency | 71 |
| Table H.78 -- Other properties of trackballs -- Mechanical properties | 72 |
| Table H.79 -- Other properties of trackballs -- Electrical properties | 72 |
| Table H.80 -- Other properties of trackballs -- Maintainability-related properties | 72 |
| Table H.81 -- Other properties of trackballs -- Health- and safety-related properties | 72 |
| Table H.82 -- Interdependencies and documentation of trackballs -- Interdependency with software | 73 |
| Table H.83 -- Interdependencies and documentation of trackballs -- Interdependency with use environment | 73 |
| Table H.84 -- Interdependencies and documentation of trackballs -- Documentation | 73 |
| Table H.85 -- Correspondence with generic requirements on touchpads -- Appropriateness | 74 |
| Table H.86 -- Correspondence with generic requirements on touchpads -- Operability | 74 |
| Table H.87 -- Correspondence with generic requirements on touchpads -- Controllability | 75 |
| Table H.88 -- Correspondence with generic requirements on touchpads -- Biomechanical load | 75 |
| Table H.89 -- Functional properties of touchpads -- Functional properties | 75 |
| Table H.90 -- Functional properties of touchpads -- Button design | 76 |

| | |
|---|----|
| Table H.91 -- Functional properties of touchpads -- Consideration of handedness | 76 |
| Table H.92 -- Functional properties of touchpads -- Resolution consistency | 76 |
| Table H.93 -- Other properties of touchpads -- Mechanical properties | 77 |
| Table H.94 -- Other properties of touchpads -- Electrical properties | 77 |
| Table H.95 -- Other properties of touchpads -- Maintainability-related properties | 77 |
| Table H.96 -- Other properties of touchpads -- Health- and safety-related properties | 77 |
| Table H.97 -- Interdependencies and documentation of touchpads -- Interdependency with software | 78 |
| Table H.98 -- Interdependencies and documentation of touchpads -- Interdependency with use environment | 78 |
| Table H.99 -- Interdependencies and documentation of touchpads -- Documentation | 78 |
| Table H.100 -- Correspondence with generic requirements on tablets/overlays -- Appropriateness .. | 79 |
| Table H.101 -- Correspondence with generic requirements on tablets/overlays -- Operability | 79 |
| Table H.102 -- Correspondence with generic requirements on tablets/overlays -- Controllability | 80 |
| Table H.103 -- Correspondence with generic requirements on tablets/overlays -- Biomechanical load | 80 |
| Table H.104 -- Functional properties of tablets/overlays -- Functional properties | 80 |
| Table H.105 -- Functional properties of tablets/overlays -- Button design | 81 |
| Table H.106 -- Functional properties of tablets/overlays -- Consideration of handedness | 81 |
| Table H.107 -- Functional properties of tablets/overlays -- Resolution consistency | 81 |
| Table H.108 -- Other properties of tablets/overlays -- Mechanical properties | 82 |
| Table H.109 -- Other properties of tablets/overlays -- Legibility and visibility of legends and graphical symbols | 82 |
| Table H.110 -- Other properties of tablets/overlays -- Electrical properties | 83 |
| Table H.111 -- Other properties of tablets/overlays -- Maintainability-related properties | 83 |
| Table H.112 -- Other properties of tablets/overlays -- Health- and safety-related properties | 83 |
| Table H.113 -- Interdependencies and documentation of tablets/overlays -- Interdependency with software | 84 |
| Table H.114 -- Interdependencies and documentation of tablets/overlays -- Interdependency with use environment | 84 |
| Table H.115 -- Interdependencies and documentation of tablets/overlays -- Documentation | 84 |
| Table H.116 -- Correspondence with generic requirements on styli and light pens -- Appropriateness | 85 |
| Table H.117 -- Correspondence with generic requirements on styli and light pens -- Operability | 85 |

| | |
|--|----|
| Table H.118 -- Correspondence with generic requirements on styli and light pens -- Controllability | 85 |
| Table H.119 -- Correspondence with generic requirements on styli and light pens -- Biomechanical load | 86 |
| Table H.120 -- Functional properties of styli and light pens -- Functional properties | 86 |
| Table H.121 -- Functional properties of styli and light pens -- Button design | 87 |
| Table H.122 -- Functional properties of styli and light pens -- Consideration of handedness | 87 |
| Table H.123 -- Functional properties of styli and light pens -- Mechanical properties | 88 |
| Table H.124 -- Other properties of styli and light pens -- Electrical properties | 88 |
| Table H.125 -- Other properties of styli and light pens -- Maintainability-related properties | 88 |
| Table H.126 -- Other properties of styli and light pens -- Health- and safety-related properties | 88 |
| Table H.127 -- Interdependencies and documentation of styli and light pens -- Interdependency with software | 88 |
| Table H.128 -- Interdependencies and documentation of styli and light pens -- Interdependency with use environment | 89 |
| Table H.129 -- Interdependencies and documentation of styli and light pens -- Documentation | 89 |
| Table H.130 -- Correspondence with generic requirements on touch-sensitive screens -- Appropriateness | 89 |
| Table H.131 -- Correspondence with generic requirements on touch-sensitive screens -- Operability | 89 |
| Table H.132 -- Correspondence with generic requirements on touch-sensitive screens -- Controllability | 90 |
| Table H.133 -- Correspondence with generic requirements on touch-sensitive screens -- Biomechanical load | 90 |
| Table H.134 -- Functional properties of touch-sensitive screens -- Functional properties | 91 |
| Table H.135 -- Functional properties of touch-sensitive screens -- Mechanical properties | 91 |
| Table H.136 -- Other properties of touch-sensitive screens -- Electrical properties | 91 |
| Table H.137 -- Other properties of touch-sensitive screens -- Maintainability-related properties | 92 |
| Table H.138 -- Other properties of touch-sensitive screen -- Health- and safety-related properties | 92 |
| Table H.139 -- Other properties of touch-sensitive screens -- Interdependency with software | 92 |
| Table H.140 -- Other properties of touch-sensitive screens -- Interdependency with use environment | 92 |
| Table H.141 -- Other properties of touch-sensitive screen -- Mechanical properties | 92 |