ISO/TR 22411:2021 (E)

Ergonomics data for use in the application of ISO/IEC Guide 71:2014

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Supporting ISO/IEC Guide 71 with human data

5 Data selection and format

5.1 Data selection
5.2 Data format of this document
5.3 How to use the data

6 Sensory characteristics and capabilities

6.1 Overview of sensory characteristics and capabilities
6.2 Vision
6.2.1 Visual sensitivity to colour (spectral sensitivity of the eye: ageing effect)
6.2.1.1 General
6.2.1.2 Sampled population
6.2.1.3 Methods and conditions of data collection
6.2.1.4 Data
6.2.1.5 Limitations
6.2.1.6 Application examples
6.2.1.7 References
6.2.2 Colour category (spans of fundamental colour, young people, older people, and people with low vision)
6.2.2.1 General
6.2.2.2 Sampled population
6.2.2.3 Methods and conditions of data collection
6.2.2.4 Data (spans of fundamental colours and colour combination tables)
6.2.2.4.1 Young people
6.2.2.4.2 Older people
6.2.2.4.3 People with defective colour vision
6.2.2.4.4 People with low vision
6.2.2.5 Limitations
6.2.2.6 Application examples
6.2.2.6.1 Identification by a single colour
6.2.2.6.2 Colour combination
6.2.2.7 References
6.2.3 Colour category (international comparison)
6.2.3.1 General
6.2.3.2 Sampled population
6.2.3.3 Methods and conditions of data collection
6.2.3.4 Data
6.2.3.5 Limitations
6.2.3.6 Application examples
6.2.3.7 References
6.2.4 Contrast sensitivity (young people, older people and people with low vision)
6.2.4.1 General
6.2.4.2 Sampled population
6.2.4.3 Methods and conditions of data collection

6.2.4.4 Data
6.2.4.5 Limitation
6.2.4.6 Application examples
6.2.4.7 References
6.2.5 Contrast for legibility (ageing effect)
6.2.5.1 General
6.2.5.2 Sampled population
6.2.5.3 Methods and conditions of data collection
6.2.5.4 Data
6.2.5.5 Limitations
6.2.5.6 Application examples
6.2.5.7 References
6.2.6 Visual acuity (effects of age, viewing distance and luminance)
6.2.6.1 General
6.2.6.2 Sampled population
6.2.6.3 Methods and conditions of data collection
6.2.6.4 Data
6.2.6.5 Limitations
6.2.6.6 Application examples
6.2.6.7 References
6.2.7 Minimum font size for legibility (effects of age, viewing distance and luminance)
6.2.7.1 General
6.2.7.2 Sampled population
6.2.7.3 Methods and conditions of data collection
6.2.7.4 Data
6.2.7.5 Limitations
6.2.7.6 Application examples
6.2.7.7 References
6.2.8 Minimum font size for legibility (international comparison)
6.2.8.1 General
6.2.8.2 Sampled population
6.2.8.3 Methods and conditions of data collection
6.2.8.4 Data
6.2.8.5 Limitations
6.2.8.6 Application examples
6.2.8.7 References
6.2.9 Minimum font size for legibility (low vision)
6.2.9.1 General
6.2.9.2 Sampled population
6.2.9.3 Methods and conditions of data collection
6.2.9.4 Data
6.2.9.5 Limitations
6.2.9.6 Application examples
6.2.9.7 References
6.2.10 Disability glare (ageing effect)
6.2.10.1 General
6.2.10.2 Sampled population
6.2.10.3 Methods and conditions of data collection
6.2.10.4 Data
6.2.10.5 Limitations
6.2.10.6 Application examples
6.2.10.7 References
6.2.11 Useful field of view (ageing effect)
6.2.11.1 General
6.2.11.2 Sampled population
6.2.11.3 Methods and conditions of data collection
6.2.11.4 Data
6.2.11.5 Limitations
6.2.11.6 Application examples
6.2.11.7 References
6.2.12 Lighting level and visual performance (ageing effect)
6.2.12.1 General
6.2.12.2 Sampled population
6.2.12.3 Methods and conditions of data collection

6.2.12.4 Data
6.2.12.5 Limitations
6.2.12.6 Application examples
6.2.12.7 References
6.2.13 Visibility of an indicator lamp: Context and task specific data (effects of ageing and low vision)
6.2.13.1 General
6.2.13.2 Sampled population
6.2.13.3 Methods and conditions of data collection
6.2.13.4 Data
6.2.13.5 Limitations
6.2.13.6 Application examples
6.2.13.7 References
6.3 Hearing
6.3.1 Hearing-sensitivity decrease as a function of age
6.3.1.1 General
6.3.1.2 Sampled population
6.3.1.3 Methods and conditions of data collection
6.3.1.4 Data
6.3.1.5 Limitations
6.3.1.6 Application examples
6.3.1.7 References
6.3.2 Tone perception in quiet conditions (ageing effect)
6.3.2.1 General
6.3.2.2 Sampled population
6.3.2.3 Methods and conditions of data collection
6.3.2.4 Data
6.3.2.5 Limitations
6.3.2.6 Application examples
6.3.2.7 References
6.3.3 Sensitivity to low-frequency tones (ageing effect)
6.3.3.1 General
6.3.3.2 Sampled population
6.3.3.3 Methods and conditions of data collection
6.3.3.4 Data
6.3.3.5 Limitations
6.3.3.6 Application examples
6.3.3.7 References
6.3.4 Equal-loudness-level contours (ageing effect)
6.3.4.1 General
6.3.4.2 Sampled population
6.3.4.3 Methods and conditions of data collection
6.3.4.4 Data
6.3.4.5 Limitations
6.3.4.6 Application examples
6.3.4.7 References
6.3.5 Tone perception in noisy conditions (ageing effect)
6.3.5.1 General
6.3.5.2 Sampled population
6.3.5.3 Methods and conditions of data collection
6.3.5.4 Data
6.3.5.5 Limitations
6.3.5.6 Application examples
6.3.5.7 References
6.3.6 Sound pressure level of spoken announcements in public space (ageing effect)
6.3.6.1 General
6.3.6.2 Sampled population
6.3.6.3 Methods and conditions of data collection
6.3.6.4 Data
6.3.6.5 Limitations
6.3.6.6 Application examples
6.3.6.7 References
6.3.7 Audible conditions for speech communication in a noisy environment (ageing effect)
6.3.7.1 General

6.3.7.2 Sampled population
6.3.7.3 Methods and conditions of data collection
6.3.7.4 Data
6.3.7.5 Limitations
6.3.7.6 Application examples
6.3.7.7 References
6.4 Touch
6.4.1 Tactile pressure sense and spatial resolution (ageing effect)
6.4.1.1 General
6.4.1.2 Sampled population
6.4.1.3 Methods and conditions of data collection
6.4.1.4 Data
6.4.1.5 Limitations
6.4.1.6 Application examples
6.4.1.7 References
6.4.2 Tactile spatial resolution (people with visual disabilities)
6.4.2.1 General
6.4.2.2 Sampled population
6.4.2.3 Methods and conditions of data collection
6.4.2.4 Data
6.4.2.5 Limitations
6.4.2.6 Application examples
6.4.2.7 References
6.4.3 Tactile spatial resolution (body location and ageing effect)
6.4.3.1 General
6.4.3.2 Sampled population
6.4.3.3 Methods and conditions of data collection
6.4.3.4 Data
6.4.3.5 Limitations
6.4.3.6 Application examples
6.4.3.7 References
6.4.4 Tactile temporal resolution (sensitivity to vibration, ageing effect)
6.4.4.1 General
6.4.4.2 Sampled population
6.4.4.3 Methods and conditions of data collection
6.4.4.4 Data
6.4.4.5 Limitations
6.4.4.6 Application examples
6.4.4.7 References
6.4.5 Legibility of tactile symbols and characters (effects of ageing and experience in the use of tactile symbols and characters for people with visual disabilities)
6.4.5.1 General
6.4.5.2 Sampled population
6.4.5.3 Methods and conditions of data collection
6.4.5.4 Data
6.4.5.5 Limitations
6.4.5.6 Application examples
6.4.5.7 References
6.4.6 Legibility of tactile symbols and characters (international comparison)
6.4.6.1 General
6.4.6.2 Sampled population
6.4.6.3 Methods and conditions of data collection
6.4.6.4 Data
6.4.6.5 Limitations
6.4.6.6 Application examples
6.4.6.7 References
6.5 Thermal sense
6.5.1 Surface temperature (ageing effect)
6.5.1.1 General
6.5.1.2 Sampled population
6.5.1.3 Methods and conditions of data collection
6.5.1.4 Data
6.5.1.5 Limitations
6.5.1.6 Application examples

6.5.1.7 References
6.5.2 Air temperature (ageing effect)
6.5.2.1 General
6.5.2.2 Sampled population
6.5.2.3 Methods and conditions of data collection
6.5.2.4 Data
6.5.2.5 Limitations
6.5.2.6 Application examples
6.5.2.7 References
6.5.3 Thermal comfort (physical disabilities)
6.5.3.1 Thermal comfort responses of people with physical disabilities
6.5.3.2 Sampled population
6.5.3.3 Methods and conditions of data collection
6.5.3.4 Data
6.5.3.4.1 General
6.5.3.4.2 Thermal sensation ratings
6.5.3.4.2.1 Thermal sensation ratings for slightly cool to cool – PMV = −1,5
6.5.3.4.2.2 Thermal sensation ratings for neutral (comfortable) – PMV = 0,0
6.5.3.4.2.3 Thermal sensation ratings for slightly warm to warm – PMV = +1,5
6.5.3.4.3 Dissatisfaction ratings
6.5.3.4.4 Variability in data
6.5.3.5 Limitations
6.5.3.6 Application examples
6.5.3.7 References

7 Physical characteristics and capabilities

7.1 Overview of physical characteristics and capabilities
7.2 Physical characteristics related to body size
7.2.1 Basic body size (design range from small to large size)
7.2.1.1 General
7.2.1.2 Sampled population
7.2.1.3 Methods and conditions of data collection
7.2.1.4 Data
7.2.1.5 Limitations
7.2.1.6 Application examples
7.2.1.7 References
7.2.2 Grip diameter (ageing effect)
7.2.2.1 General
7.2.2.2 Sampled population
7.2.2.3 Methods and conditions of data collection
7.2.2.4 Data
7.2.2.5 Limitations
7.2.2.6 Application examples
7.2.2.7 References
7.3 Movement – fine hand use abilities
7.3.1 Hand steadiness (ageing effect)
7.3.1.1 General
7.3.1.2 Sampled population
7.3.1.3 Methods and conditions of data collection
7.3.1.4 Data
7.3.1.5 Limitations
7.3.1.6 Application examples
7.3.1.7 References
7.3.2 Eye-hand coordination (dexterity, ageing effect)
7.3.2.1 General
7.3.2.2 Sampled population
7.3.2.3 Methods and conditions of data collection
7.3.2.4 Data
7.3.2.5 Limitations
7.3.2.6 Application examples
7.3.2.7 References
7.4 Movement – functions of upper body structure
7.4.1 Reach range (effects of ageing and stature)
7.4.1.1 General

7.4.1.2 Sampled population
7.4.1.3 Methods and conditions of data collection
7.4.1.4 Data
7.4.1.5 Limitations
7.4.1.6 Application examples
7.4.1.7 References
7.4.2 Reach range (graspability, female 5th percentile of body size)
7.4.2.1 General
7.4.2.2 Sampled population
7.4.2.3 Methods and conditions of data collection
7.4.2.4 Data
7.4.2.5 Limitations
7.4.2.6 Application examples
7.4.2.7 References
7.4.3 Reach range in three dimensions of height, forward distance (depth), and left-right width for older people and people with disabilities (rheumatism and Parkinson's disease)
7.4.3.1 General
7.4.3.2 Sampled population
7.4.3.3 Methods and conditions of data collection
7.4.3.4 Data
7.4.3.5 Limitations
7.4.3.6 Application examples
7.4.3.7 References
7.4.4 Rotation: pronation and supination (ageing effect)
7.4.4.1 General
7.4.4.2 Sampled population
7.4.4.3 Methods and conditions of data collection
7.4.4.4 Data
7.4.4.5 Limitations
7.4.4.6 Application examples
7.4.4.7 References
7.5 Movement – Functions of lower body structure
7.5.1 Step height (ageing effect)
7.5.1.1 General
7.5.1.2 Sampled population
7.5.1.3 Methods and conditions of data collection
7.5.1.4 Data
7.5.1.5 Limitations
7.5.1.6 Application examples
7.5.1.7 References
7.5.2 Step height: Subjective evaluation of physical load (ageing effect, international comparison)
7.5.2.1 General
7.5.2.2 Sampled population
7.5.2.3 Methods and conditions of data collection
7.5.2.4 Data
7.5.2.5 Limitations
7.5.2.6 Application examples
7.5.2.7 References
7.5.3 Tread depth of stairs (ageing effect)
7.5.3.1 General
7.5.3.2 Sampled population
7.5.3.3 Methods and conditions of data collection
7.5.3.4 Data
7.5.3.5 Limitations
7.5.3.6 Application examples
7.5.3.7 References
7.5.4 Walking speed (ageing effect)
7.5.4.1 General
7.5.4.2 Sampled population
7.5.4.3 Methods and conditions of data collection
7.5.4.4 Data
7.5.4.5 Limitations

7.5.4.6 Application examples
7.5.4.7 References
7.5.5 Slope of ramps and wheelchair operation (physical disabilities)
7.5.5.1 General
7.5.5.2 Sampled population
7.5.5.3 Methods and conditions of data collection
7.5.5.4 Data
7.5.5.5 Limitations
7.5.5.6 Application examples
7.5.5.7 References
7.6 Muscle strength and muscle endurance
7.6.1 Grip force of the hand (ageing effect)
7.6.1.1 General
7.6.1.2 Sampled population
7.6.1.3 Methods and conditions of data collection
7.6.1.4 Data
7.6.1.5 Limitations
7.6.1.6 Application examples
7.6.1.7 References
7.6.2 Pressing force of the thumb
7.6.2.1 General
7.6.2.2 Sampled population
7.6.2.3 Methods and conditions of data collection
7.6.2.4 Data
7.6.2.5 Limitations
7.6.2.6 Application examples
7.6.2.7 References
7.6.3 Compressive force of the index finger
7.6.3.1 General
7.6.3.2 Sampled population
7.6.3.3 Methods and conditions of data collection
7.6.3.4 Data
7.6.3.5 Limitations
7.6.3.6 Application examples
7.6.3.7 References
7.6.4 Operating torque in four different conditions
7.6.4.1 General
7.6.4.2 Sampled population
7.6.4.3 Methods and conditions of data collection
7.6.4.4 Data
7.6.4.5 Limitations
7.6.4.6 Application examples
7.6.4.7 References
7.6.5 Grip strength (ageing effect)
7.6.5.1 General
7.6.5.2 Sampled population
7.6.5.3 Methods and conditions of data collection
7.6.5.4 Data
7.6.5.5 Limitations
7.6.5.6 Application examples
7.6.5.7 References
7.6.6 Lifting strength (gender effect)
7.6.6.1 General
7.6.6.2 Sampled population
7.6.6.3 Methods and conditions of data collection
7.6.6.4 Data
7.6.6.5 Limitations
7.6.6.6 Application examples
7.6.6.7 References
7.6.7 Lifting strength (effects of age and gender)
7.6.7.1 General
7.6.7.2 Sampled population
7.6.7.3 Methods and conditions of data collection
7.6.7.4 Data

7.6.7.5 Limitations
7.6.7.6 Application examples
7.6.7.7 References
7.6.8 Pushing force with two hands (ageing effect)
7.6.8.1 General
7.6.8.2 Sampled population
7.6.8.3 Methods and conditions of data collection
7.6.8.4 Data
7.6.8.5 Limitations
7.6.8.6 Application examples
7.6.8.7 References
7.6.9 Pulling force with one hand (ageing effect)
7.6.9.1 General
7.6.9.2 Sampled population
7.6.9.3 Methods and conditions of data collection
7.6.9.4 Data
7.6.9.5 Limitations
7.6.9.6 Application examples
7.6.9.7 References
7.6.10 Pushing force with a finger (ageing effect)
7.6.10.1 General
7.6.10.2 Sampled population
7.6.10.3 Methods and conditions of data collection
7.6.10.4 Data
7.6.10.5 Limitations
7.6.10.6 Application examples
7.6.10.7 References
7.6.11 Static torque with two hands (ageing effect)
7.6.11.1 General
7.6.11.2 Sampled population
7.6.11.3 Methods and conditions of data collection
7.6.11.4 Data
7.6.11.5 Limitations
7.6.11.6 Application examples
7.6.11.7 References
7.6.12 Torque and force for opening packages (effects of ageing and disabilities)
7.6.12.1 General
7.6.12.2 Sampled population
7.6.12.3 Methods and conditions of data collection
7.6.12.4 Data
7.6.12.5 Limitations
7.6.12.6 Application examples
7.6.12.7 References
7.6.13 Jar opening (perceived effort, older women)
7.6.13.1 General
7.6.13.2 Sampled population
7.6.13.3 Methods and conditions of data collection
7.6.13.4 Data
7.6.13.5 Limitations
7.6.13.6 Application examples
7.6.13.7 References
7.6.14 Upper extremity muscle strength (ageing effect)
7.6.14.1 General
7.6.14.2 Sampled population
7.6.14.3 Methods and conditions of data collection
7.6.14.4 Data
7.6.14.5 Limitations
7.6.14.6 Application examples
7.6.14.7 References

8 Cognitive characteristics and capabilities

8.1 Overview of cognitive characteristics and capabilities
8.2 Attention
8.2.1 Selective attention (selective listening, effect of age)

8.2.1.1 General
8.2.1.2 Sampled population
8.2.1.3 Methods and conditions of data collection
8.2.1.4 Data
8.2.1.5 Limitations
8.2.1.6 Application examples
8.2.1.7 References
8.2.2 Dual task performance (task complexity, ageing effect)
8.2.2.1 General
8.2.2.2 Sampled population
8.2.2.3 Methods and conditions of data collection
8.2.2.4 Data
8.2.2.5 Limitations
8.2.2.6 Application examples
8.2.2.7 References
8.2.3 Memory under dual task conditions (effects of dual tasks and ageing)
8.2.3.1 General
8.2.3.2 Sampled population
8.2.3.3 Methods and conditions of data collection
8.2.3.4 Data
8.2.3.5 Limitations
8.2.3.6 Application examples
8.2.3.7 References
8.3 Information processing
8.3.1 Processing speed and capacity
8.3.1.1 General
8.3.1.2 Sampled population
8.3.1.3 Methods and conditions of data collection
8.3.1.4 Data
8.3.1.5 Limitations
8.3.1.6 Application examples
8.3.1.7 References
8.4 Memory
8.4.1 Effects of ageing and cognitive disabilities on memory
8.4.1.1 General
8.4.1.2 Sampled population
8.4.1.3 Methods and conditions of data collection
8.4.1.4 Data
8.4.1.5 Limitations
8.4.1.6 Application examples
8.4.1.7 References
8.5 Language and literacy
8.5.1 Language use (ageing effects)
8.5.1.1 General
8.5.1.2 Sampled population
8.5.1.3 Methods and conditions of data collection
8.5.1.4 Data
8.5.1.5 Limitations
8.5.1.6 Application examples
8.5.1.7 References

Annex A (informative) Additional textual descriptions of figures

Page count: 239