



IDEAL Group, Inc.
2809 Bohlen Drive
Hilliard, Ohio 43026
<http://www.ideal-group.org>

Phone: +1.614.777.0660

Fax: +1.614.259.0013

TTY: +1.800. 750.07500

Table of Contents

International Design Standards	2
International Design Standards by Component and Function	26
Communications Technology Manufacturers and Service Providers.....	58
Audio Input Accessibility Evaluation Matrix by Disability	63
Audio input and output	64
Computer Hardware Accessibility Evaluation Matrix by Disability by Component	66
Controls Accessibility Evaluation Matrix by Disability.....	82
Displays Accessibility Evaluation Matrix by Disability.....	89
Documentation Accessibility Evaluation Matrix by Disability.....	91
Keyboards / Keypads Accessibility Evaluation Matrix by Disability	95
Help Systems: Guidelines for Accessibility	97

International Design Standards

CEN/ISS prepared an overview of the standardization environment in respect of design for all and assistive technologies in information and communication technologies.

Standards organizations and committees:

ACIF	Australian Communications Industry Forum
ANSI	American National Standards Institute
AS	Standards Australia
ATBCB	Architectural and Transportation Barriers Compliance Board
BSI	British Standards Institute
CEN	Comite Europeen de Normalisation
CSA	Canadian Standards Association
DIN	Deutsches Institut für Normung
DTG	Digital Television Group
EIA	Electronic Industries Alliance
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FEC	Federal Elections Commission

IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IMS	IMS Global Learning Consortium
INCITS	International Committee for Information Technology Standards
ISO	International Organisation for Standardisation
ITU	International Telecommunications Union
JISC	Japanese Industrial Standards Committee
NCITS	National Committee for Information Technology Standards
NIST	National Institute of Standards and Technology
NSF	Norges Standardiserings Forbund
W3C	World Wide Web Consortium
3GPP	3GPP

[Australian Communications Industry Forum](#)

PO Box 444, Milsons Point, New South Wales 1565, Australia.

Tel: (02) 9959 9111; Fax: (02) 9954 6136

Email: acif@acif.org.au Web www.acif.org.au

- ACIF G586: 2001 Access to Telecommunications for People with Disabilities.

- [AS/ACIF S040:1999 Requirements for general use Customer Equipment for use with the Standard Telephone Service - Features for special needs of persons with disabilities.](#)
- DR ACIF C 625:2004 Accessibility information for telephone equipment.

[American National Standards Institute](#)

1819 L Street NW, Washington DC 20036, USA.

Tel: +1 212 642 4900; Fax: +1 202 293 9287

Web www.ansi.org

- ANSI/INCITS 389 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: universal remote console.
- ANSI/INCITS 390 Protocol to facilitate operation of information and electronic products: User interface socket description.
- ANSI/INCITS 391 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Presentation templates.
- ANSI/INCITS 392 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Target properties sheet.
- ANSI/INCITS 393 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Resource description.
- ANSI/TIA-968-A, Telecommunications - Telephone Terminal Equipment - Technical Requirements for Connection of Terminal Equipment to the Telephone Network.
- C.63/ANSI IEEE C.63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, Measurements of wireless telephone emissions and hearing aid immunity, with predicted performance based on measures. (Now in use in an FCC order).
- HFES 200.1 Human Factors Engineering of Software User Interfaces - Introduction.
- HFES 200.2 Human Factors Engineering of Software User Interfaces - Accessibility.
- HFES 200.3 Human Factors Engineering of Software User Interfaces - Interaction Techniques.

- HFES 200.4 Human Factors Engineering of Software User Interfaces - Visual Presentation.
- HFES 200.5 Human Factors Engineering of Software User Interfaces - Voice Input/Output (IVR and Telephony).
- T1. 209-2003, American National Standard for Operations Administration and Maintenance and Provisioning (OAM&) - Network Tones and Announcements, Provides and industry standard way for network routing messages to be conveyed in TTY in addition to voice.
- T1. 718-2001, PCS 1900 - Cellular Text Telephone Modem (CTM) Transmitter Bit Exact C-Code.
- T1. 719-2001, PCS 1900 - Cellular Text Telephone Modem (CTM) General Description.
- TIA- 504-A, Telecommunications-Telephone Terminal Equipment -Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing.
- TIA/EIA-688, DTE/DCE Interface For Digital Cellular Equipment.
- TIA IS-127-2, Enhanced Variable Rate Codec, Speech Service Option 3 for Wideband Spread Spectrum Digital Systems - Addendum 2.
- TIA IS-707-A-2, Data Services Options for Spread Spectrum Systems - Radio Link Protocol Type 3 - Addendum No. 2.
- TIA IS-733-1, High Rate Speech Service Option 17 for Wideband Spread Spectrum Communications Systems.
- TIA IS-789A, Electrical Specification for the Portable Phone to Vehicle Interface.
- TIA IS-823, TTY/TDD Extension to TIA/EIA 136-410 Enhanced Full Rate Speech Codec.
- TIA IS-840, Minimum Performance Standards for Text Telephone Signal Detector and Text Telephone Signal Regenerator.
- TIA TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY).
- TR 30 TIA/EIA 825a, A Frequency Shift Keyed Modem for use on the Public Switched Telephone Network, The first standard for TTY signals, which permitted mainstream industry to design for compatibility with TTY as technologies moved to digital.

- TR 30.1 TIA 1001 (in process), Standards for text over IP (TIA 1001), U.S. effort to develop standard methods for carrying Baudot over IP telephony networks, using voice band data and gateway approaches.
- TR 45 TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY), Connector standard for wireless telephones and TTYs.

[Standards Australia](#)

GPO Box 5420, Sydney, New South Wales 2000, Australia.

Tel: +61 2 8206 6010; Fax: +61 8206 6020

Email: sales@standards.com.au Web www.standards.com.au

- AS 1428.1: (1992) Design of Access and Mobility - Part 1, General Requirements for Access - Buildings, Australian Standards.
- AS 1428.2: (1992) Design of Access and Mobility - Part 2, Enhanced and additional requirements - buildings and facilities.
- AS 1428.3: (1992) Design of Access and Mobility - Part 3, Requirements for children and adolescents with physical disabilities.
- AS 1428.4: (1992) Design of Access and Mobility - Part 4, Tactile ground surface indicators for the orientation of people with vision impairment.
- AS 3769 (1990) Automatic teller machines: User access.
- [AS/ACIF S040:1999 Requirements for general use Customer Equipment for use with the Standard Telephone Service - Features for special needs of persons with disabilities.](#)
- AS/NZS 4277:1995 Text Telecommunications - User Interface Requirements - for deaf people and people with hearing and speech disabilities.
- [Disability Standards for Education 2005.](#)

[United States Access Board - Architectural and Transportation Barriers Compliance Board](#)

United States Access Board, 1331 F Street, NW, Suite 1000, Washington, DC 20004-1111, USA.

Tel: +1 202 272 0080; Fax: +1 202 272 0081

Email: info@access-board.gov; Web: www.access-board.gov

- 28 CFR Part 35 Nondiscrimination on the Basis of Disability in State and Local Government Services. (Most commonly known as ADAAG - Americans with Disabilities Act Accessibility Guidelines)
- 28 CFR Part 36 Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities. (Most commonly known as ADAAG - Americans with Disabilities Act Accessibility Guidelines)
- 36 CFR Part 1194 [Docket No. 2000-01] RIN 3014-AA25 Electronic and Information Technology Accessibility Standards.
- 47 CFR Parts 6 & 7 Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities.

British Standards Institute

389 Chiswick High Road, London W4 4AL, UK.

Tel: +44 20 8996 9000; Fax: +44 20 8996 7400

Email: info@bsi-global.com Web www.bsi-global.com

- BS 700-6 (2005) Management of Inclusive Design.
- BS 6571 (1999) Vehicle Parking Control Equipment. This relates to the distance off the ground and from the vehicle of the barrier controlled parking equipment.
- BS 7997 (2003) Products for tactile paving surface indicators - Specification. This standard is based upon the guidance for the use of tactile paving and provides specification for achieving the correct profile, which may be detected underfoot without causing a tripping hazard.
- BS 8300 (2001) Design of Buildings and their Approaches to Meet the Needs of Disabled People. This addresses how to design the built environment to make it fully accessible and to overcome restrictions that prevent anyone from making full use of premises and their surroundings. The recommendations cover a wide range of impairments and activities.

- BS 5489 (1992) Road Lighting. Guide to the General Principles. To help ensure that road users and pedestrians are seen and safe. Takes into account changes following the publication of European Standard BS EN 13201.
- BS EN 13201 series (2003) Road Lighting. Performance requirements; Calculation of performance; Methods of measuring lighting performance.

[Comité Européen de Normalisation](#)

36 rue de Stassart, B-1050 Brussels, Belgium.

Tel: + 32 2 550 08 11; Fax: + 32 2 550 08 19

Email: infodesk@cenorm.be Web www.cenorm.be

- CWA 13987-1 Smart Card Systems - Interoperable citizen services - User related information (based on DISTINCT) - Part 1: Definition of User related information.
- CWA 13987-1 Smart Card Systems - Interoperable citizen services - User related information (based on DISTINCT) - Part 2: Implementation Guidelines.
- CWA 14147 (8 parts) Financial transactional IC card reader (FINREAD).
- CWA 14661 Guidelines to standardisers of ICT products and services in the CEN ICT domain.
- CWA 14835 Guidelines for making information accessible through sign language on the web.
- EN 614 Safety of Machinery: Ergonomic Design Principles: Part 1: Terminology and General Principles.
- EN 726 Requirements for IC cards and terminals for telecommunications use.
- EN 894 Ergonomics of human-system interaction.
- EN 1332 Machine readable cards, related device interfaces and operations.
Part 1 Design principles and symbols for the user interface.
Part 2 Dimension and location of tactile identifier for ID-1 cards.

- Part 3 Keypads.
- Part 4 Coding of user requirements for people with special needs.
- EN 29241 Ergonomic requirements for visual display terminals.
 - Part 4 Keyboard requirements.
 - Part 11 Usability statements.
- [Guide 6](#) (2002) Guidelines for standards developers to address the needs of older persons and persons with disabilities. Equivalent to ISO/IEC Guide 71.

[Canadian Standards Association](#)

CSA International, 178 Rexdale Boulevard, Toronto, Ontario M9W 1RE, Canada.

Web: www.csa.ca

- B65.1.1-01 (2001) Barrier-free design for Automated Banking Machines.
- B480-02 (2002) Customer Service for People with Disabilities.
- B651-95 (1995) Barrier-free design.

[Deutsches Institut für Normung \(German Institute for Standardization\)](#)

DIN Deutsches Institut für Normung, Burggrafenstrasse 6, 10787 Berlin, Germany.

Web: www2.din.de

- DIN Technical Report 124:2002 Products in design for all.

[Door and Access Systems Manufacturers Association International](#)

1300 Sumner Avenue, Cleveland, OH 44115-2851, USA.

Tel: +1 216 241 7333; Fax: +1 216 241 0105

Email: dasma@dasma.com; Web: www.dasma.com

- [DASMA 303](#) (2003) Performance Criteria for Accessible Communications Entry Systems.

[Digital Television Group](#)

7 Old Lodge Place, St Margarets, Twickenham, Middlesex, TW1 1RQ, United Kingdom.

Tel +1 703 907 7500

Web www.dtg.org.uk

[Electronic Industries Alliance](#)

2500 Wilson Blvd, Arlington, VA 22201, USA

Tel: +44 1730 893 144; Fax: +44 1730 895 460

Web www.eia.org

- EIA/CES 608, Analog Television Closed Captioning (Line 21 Data Services).
- EIA 708 B, Advanced Television Closed Captioning.

[European Telecommunications Standards Institute](#)

650 Route des Lucioles, F-06921 Sophia Antipolis Cedex, France.

Tel: +33 4 92 94 42 00; Fax: +33 4 93 65 47 16

Web www.etsi.org

- DEG HF 00031 Human factors guidelines for ICT products and services: Design for all.
- DTR/HF 02003 (1996) The implication of human ageing for the design of telephone terminals.
- DTR/HF 02009 (1996) Characteristics of telephone keypads.
- EG 201 013 (1997) Human Factors (HF); Definitions, abbreviations and symbols.
- EG 201 024 (1997) Human Factors (HF); User interface design principles for the Telecommunications Management Network (TMN) applicable to the "G" Interface.
- EG 201 103 (1998) Human Factors (HF); Human factors issues in Multimedia Information Retrieval Services (MIRS).

- EG 201 379 (1998) Human Factors (HF); Framework for the development, evaluation and selection of graphical symbols.
- EG 201 472 (2000) Human Factors (HF); Usability evaluation for the design of telecommunication systems, services and terminals.
- EG 201 795 (2000) Human Factors (HF); Issues concerning User identification in future telecommunications systems.
- EG 202 048 (2002) Guidelines on the Multimodality of Icons, Symbols and Pictograms.
- EG 202 116 (2002) Guidelines for ICT Products and Services: Design for All.
- EG 202 301 UCI: Using UCI to enhance communications for disabled, young and elderly people.
- EN 301 462 (March 2000) Symbols to identify telecommunications facilities for deaf and hard of hearing people.
- ES 201 125 (1998) Human Factors (HF); Universal Personal Telecommunications (UPT); Specification of the minimum Man-Machine Interface (MMI) for Phase 1 UPT.
- ES 201 275 (1998) Human Factors (HF); User control procedures in basic call, point-to-point connections, for Integrated Services Digital Network (ISDN) videotelephony.
- ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
- ES 202 076 Generic spoken command vocabulary for ICT devices and services.
- ETR 029 (1991) Access to telecommunications for people with special needs: Recommendations for improving and adapting telecommunication terminals and services for people with impairments.
- ETR 160 (1995) Human factors aspects of multimedia telecommunications.
- ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.
- ETR 167 (1995) User instruction for public telecommunication services: design guidelines.
- ETR 170 (1995) Human Factors (HF); Generic User control procedures for telecommunication terminals and services.

- ETR 208 (1995) Human Factors (HF): HF Aspects of universal personal telecommunications (UPT); User requirements.
- ETR 333 (1998) Text Telephony: Basic User Requirements and Recommendations.
- ETR 334 (1996) The implications of ageing for the design of telephone terminals.
- ETR 345 (Jan 1997) Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people.
- ETR 261-1 (1996) Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services; Part 1: General approach and summary of findings.
- ETS 138 (1998) Public terminals for the elderly.
- ETS 300 375 (November 1994) Pictograms for point to point videotelephony.
- ETS 300 381 Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
- ETS 300 488 (January 1996) Telephony for hearing impaired people: Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired.
- ETS 300 679 (September 1996) Telephony for the hearing impaired: Electrical coupling of telephone sets to hearing aids.
- ETS 300 738 (1997) Human Factors (HF): Minimum Man Machine Interface (MMI) to public network based supplementary services.
- ETS 300 767 (July 1997) Telephone prepayment cards: Tactile identifier.
- TC TR 001 (1991) Human Factors (HF): Generic Handsfree Procedures.
- TC TR 003 (1992) Human Factors (HF): Human Factors Aspects of Pan European Numbering.
- TC TR 004 (1992) Human Factors (HF); Harmonisation of code schemes as minimum Man Machine Interface for Telecommunication Terminals.

- TC TR 006 (1995) Human Factors (HF): Satellite Personal Communication Network; statement of User aspects for a S-PCN service.
- TC TR 007 (1996) Human Factors (HF); User requirements of enhanced terminals for public use.
- TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
- TR 101 806 (June 2000) Guidelines for telecommunications relay services for text telephones.
- TR 102 068 (2002) Requirements for Assistive Technology Devices in ICT.
- TR 103 073 UCI: Improving communications for disabled, young and elderly people.
- Work Item (to be completed by Strategic Task Force STF286 by end of 2006): Human Factors (HF)
 - Access symbols for use with video content and ICT devices.

[Federal Communications Commission](#)

Federal Communications Commission, 445 12th Street, SW Washington, DC 20554, USA.

Tel: +1 1 888 225 5322; Fax: +1 202 418 2830

Web: www.fcc.gov

- 47 CFR Parts 6 & 7 Access to Telecommunications Service, Telecommunications Equipment and Customer Premises Equipment by Persons with Disabilities.
- 47 CFR 79.1 Closed Captioning of Video Programming.
- 47 CFR 79.2 Accessibility of Programming Providing Emergency Information.
- 47 CFR 79.3 Video Description of Video Programming.

[Federal Elections Commission](#)

Federal Election Commission, 999 E Street, NW Washington DC 20463, USA.

Tel: +1 202 694 1100

Web: www.fec.gov

- FEC Voting Standards

[International Electrotechnical Commission](#)

3 rue de Varembé, CH-1211 Geneva 20, Switzerland.

Tel: +41 22 7340 150; Fax: +41 22 7333 843

Web www.iec.ch

- IEC 73 (1990) Colours of pushbuttons and their meanings.
- IEC 118-4 (1981) Hearing aids: magnetic field strength in audio frequency induction loops for hearing aid purposes.

[Institute of Electrical and Electronics Engineers](#)

Contact details in USA:

1828 L Street, N.W., Suite 1202, Washington, D.C. 20036-5104, USA.

Tel: +1 202 785 0017; Fax: +1 202 785 0835

Contact details in Asia:

59E Science Park Drive, The Fleming Singapore Science Park, Singapore 1118244.

Tel: +65 778 2873; Fax: +65 778 9723

Web: www.ieee.org and standards.ieee.org

- C.63/ANSI IEEE C.63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, Measurements of wireless telephone emissions and hearing aid immunity, with predicted performance based on measures. (Now in use in an FCC order).
- IEEE P1583 Voting Machine Standard
- IEEE P1621 Standard for user interface elements in power control of electronic devices employed in office/consumer environments.

[Internet Engineering Task Force](#)

IETF Secretariat, c/o Corporation for National Research Initiatives, 1895 Preston White Drive, Suite 100, Reston, VA 20191-5434, USA.

Tel +1 703 620 8990, Fax +1 703 620 9071

Web www.ietf.org

- ISOC/IETF RFC 3261 (2002) IETF RFC 2543 SIP Session initiation Protocol. Session initiation Protocol - used to connect Voice over IP (Internet Protocol) phone calls.
- IETF RFC 2793 RTP Payload for Text Conversation. RTP Payload for T.140 text conversation. MIME Registered as "text/t140", used in H.323 and SIP.
- IETF draft RFC Framework of requirements for real-time text conversation using SIP.
- IETF RFC 3351 User requirements. Handles transcoding and other value added services invoked through SIP.
- IETF RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals. Encoding and transport of tones over IP.
- IETF RFC 2733 An RTP Payload Format for Generic Forward Error Correction. Error correction method.

[IMS Global Learning Consortium](#)

35 Corporate Drive, 4th Floor, Burlington, MA 01803, USA.

Web: www.imsglobal.org

- ACCLIP 1.0 IMS Accessibility for Learner Information Package Specification.
- ACCMD 1.0 IMA AccessForAll Meta-data Specification.

[InterNational Committee for Information Technology Standards](#)

INCITS Secretariat c/o Information Technology Industry Council, 1250 Eye Street NW, Suite 200, Washington, DC 20005, USA.

Tel: +1 202 737 8888; Fax +1 202 638 4922

Email: incits@itic.org; Web: www.incits.org

- ANSI/INCITS 389 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: universal remote console.
- ANSI/INCITS 390 Protocol to facilitate operation of information and electronic products: User interface socket description.

- ANSI/INCITS 391 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Presentation templates.
- ANSI/INCITS 392 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Target properties sheet.
- ANSI/INCITS 393 Protocol to facilitate operation of information and electronic products through remote and alternative interfaces and intelligent agents: Resource description.

[International Organisation for Standardisation](#)

1 rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland.

Tel: +41 22 749 0111; Fax: +41 22 733 3430

Web www.iso.ch

- ISO 3461 (1988) General principles for the creation of graphical symbols.
- ISO 7000 (1989) Graphical symbols for use on equipment.
- ISO 7001 (1991) Public information symbols.
- ISO 7176-5 (1986) Wheelchairs - Part 5: Determination of overall dimensions, mass and turning space.
- ISO 7176/19 Wheeled mobility devices for use in motor vehicles for the impact testing of wheelchairs. Regarded as supporting evidence of the suitability of a wheelchair to travel in a vehicle.
- ISO 7239 (1990) Development and principles for application of public information symbols.
- ISO 7816 (1994-1999) Identification cards: Integrated circuit cards with contacts. Part 6 includes provision for storing language preferences.
- ISO 9186 (1989) Procedures for the development and testing of public information symbols.
- ISO 9241 (1998) Ergonomic requirements for office work with visual display terminals.
- ISO 10075 Ergonomic principles related to mental work-load.
- ISO 11429 (1996) Ergonomics - System of auditory and visual danger and information signals.

- ISO 13407 (1999) Human-centred design processes for interactive systems.
- ISO 14915 (2003) Software ergonomics for multimedia user interfaces.
- ISO 20282 (2001) Usability of everyday products.
- ISO/AWI 16071 Ergonomics of human-system interaction - Guidance on software accessibility. (Under development).
- ISO/AWI 23973 Software ergonomics for World Wide Web user interfaces. (Under development).
- ISO/CD 11550 Technical aids for blind and visually impaired persons: Tactile ground surface indicators.
- ISO/CD 13406 (1996) Ergonomic requirements for flat panel displays (Part 1-2).
- ISO/CD 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interaction with displays.
- ISO DIS 11549 (1998) Technical aids for vision and vision and hearing impaired persons: Acoustic and tactile signals for traffic lights.
- ISO DIS 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Displays.
- ISO/IEC 9127 Cover information for software packaging.
- ISO/IEC 9995 (1994) Information technology: Keyboard layouts for text and office systems.
- ISO/IEC 10536 (2000) Identification cards: Contactless integrated circuit cards.
- ISO/IEC 11581 (2000) User symbol interfaces and symbols: Icon symbols and functions.
- ISO/IEC 18019 Software documentation guidelines.
- ISO/IEC 18019 (2004) Guidelines for the design and preparation of user documentation for application software.
- ISO/IEC CD2 19786 Information Technology - Learning, education, and training - Participant accommodation information.

- ISO/IEC CD2 19787 Information Technology - Learning, education, and training - Participant performance information.
- ISO/IEC Guide 71 (2001) Guidelines for standards developers to address the needs of older persons with disabilities.
- ISO/IEC Guide 71.2 Guidelines to address the needs of older persons and persons with disabilities when developing standards.
- ISO/IEC NO895 Information Technology - Learning, education, and training - "Individualized Adaptability and Accessibility in E-Learning, Education and Training".
- ISO/IEC TR 19765 (proposed draft technical report expected summer 2005) Information Technology - Survey of icons and symbols that provide access to functions and facilities to improve the use of IT products by the elderly and persons with disabilities.
- ISO/IEC TR 19766 (proposed draft technical report expected summer 2005) Information Technology - Guidelines for the design of icons and symbols to be accessible to all users, including the elderly and persons with disabilities.
- ISO IS 9241-171 Ergonomics of human-system interaction - Guidance on software accessibility. (a restructured version of ISO TS 16071)
- ISO IS 9241-20 Ergonomics of human-system interaction - Accessibility Guideline for information communication equipment and services - General Guidelines.
- ISO/TR 9527 (1994) Building construction - needs of disabled people in buildings - design guidelines.
- ISO TR 22411 (proposed draft technical report expected summer 2005) Ergonomic data and guidelines for the application of ISO/IEC Guide 71 in standards related to products and services to address the needs of older persons and persons with disabilities.
- ISO TS 14415 Ergonomics of the thermal environment - Application of International standards to the disabled, the aged and other handicapped persons.
- ISO TS 16071 Guidance on accessibility.

- TR 19764 (2004) Technical report on "Guidelines, methodology, and reference criteria for cultural and linguistic adaptability in information technology products"

[International Telecommunications Union](http://www.itu.int)

Place des Nations, CH-1211 Geneva 20, Switzerland.

Tel +41 22 730 5111; Fax +41 22 733 7256

Web www.itu.int

- ITU-T E.118 (2001) Automatic international telephone credit cards.
- ITU-T E.121 (1996) Pictograms, symbols and icons to assist users of the telephone service.
- ITU-T E.133 (1988) Operating procedures for cardphones.
- ITU-T E.134 (1993) Human factors aspects of public terminals: Generic operating procedures.
- ITU-T E.135 (1993) Human factors aspects of public telecommunications terminals for people with disabilities.
- ITU-T E.136 (1997) Tactile identifier on pre-paid telephone cards.
- ITU-T E.161 (1995) Arrangements of figures, letters and symbols on telephones.
- ITU-T E.902 (1995) Interactive services design guidelines.
- ITU-T E.920 (1995) Procedures for designing, evaluating and selecting symbols, pictograms and icons.
- ITU-T P.370 (1996) Magnetic field strength around the earcap of telephone handsets which provide for coupling to hearing aids.
- ITU-T Study Group 16 v.150.1, Modem over IP, International Recommendation for transport of Modem over IP.
- ITU-T Study Group 16 V.VBS (in process), Voice Band Data over IP, International standardization to develop a new Recommendation for Voice Band Data over IP. Useful for text telephony over enterprise networks.

- ITU-T Study Group 16 V.ToIP (in process) QH-03001, Text Telephony over IP, International standardization to develop a new Recommendation for Text Telephony over IP.
- ITU-T Recommendation F.700, Framework Recommendation for multimedia services, Annex A.3., Multimedia Framework.
- ITU-T Recommendation F.703, Multimedia conversational services, Defines Text Telephony and Total Conversation services.
- ITU-T Recommendation H.224, A real time control protocol for simplex applications using the H.221 LSD/HSD/HLP channel., Addition of client id=2 for T.140 text transport.
- ITU-T Recommendation H.245, Control Protocol for Multimedia Communication, Multimedia Control protocol.
- ITU-T Recommendation H.248, Gateway control protocol, Text conversation protocol for multimedia application. With amendment 1 (2000). Control of gateway between all forms of text conversation.
- ITU-T Recommendation H.320, Narrow-band visual telephone systems and terminal equipment.
- ITU-T Recommendation H.323 Annex G; (02/00), Text Conversation and Text SET., Defines T.140 text inclusion in H.323 IP Multimedia.
- ITU-T Recommendation H.324, Terminal for low bit-rate multimedia communication, Addition of data channel for T.140 text.
- ITU-T Recommendation V.61, Analog simultaneous voice and data (permits Voice carry over with ASCII modems).
- ITU-T Recommendation T.134, Text Chat Application Entity, Application for text conversation in the T.120 data conferencing concept.
- ITU-T Recommendation T.140, Protocol for multimedia application text conversation., Text conversation protocol for multimedia application. With amendment 1 (2000).
- ITU-T Recommendation T.140 - Addendum, Marking of missing characters.
- ITU-T Recommendation V.18, Operational and Interworking Requirements for DCEs Operating in the Text Telephone Mode, Includes automatic interworking with most legacy text telephones.

- ITU-T Recommendation V.250, Serial asynchronous automatic dialing and control.
- ITU-T Recommendation V.8, Procedures for starting sessions of data transmission over the public switched telephone network.
- ITU-T Recommendation V.8 bis, Procedures for the identification and selection of common modes of operation between Data Circuit-terminating Equipments (DCEs) and between Data Terminal Equipments (DTEs) over the public switched telephone network, Operational and interworking requirements for DCEs operating in the text telephone mode.
- ITU-T Recommendation V.151 (under development), Procedures for the end-to-end connection of analogue text telephones over an IP network.
- ITU-T Recommendation V.152 (under development), Procedures for supporting Voice Band Data over IP networks.
- H Series Supplement 1, Video Quality for sign language and lip reading, Quality characteristics of video transmission of importance for sign language and lip-reading use.
- ITU Y.1541, Network performance objectives for IP-based services.

[Japanese Industrial Standards Committee](#)

1-3-1 Kasumigaseki, Chiyoda-ku, Tokyoo 100-8901, Japan.

Web www.jisc.org

- JIS S 0011: (2000) Guidelines for all people including elderly and people with disabilities - Marking of tactile dots on consumer products.
- JIS S 0012: (2000) Guidelines for all people including elderly and people with disabilities - Usability of consumer products.
- JIS S 0013: Guidelines for the elderly and people with disabilities- Auditory signals on consumer products

- JIS S 0014: Guidelines for the elderly and people with disabilities- Auditory signals on consumer products- Sound pressure levels of signals for the elderly and in noisy conditions
- JIS S 0021: (2000) Guidelines for all people including elderly and people with disabilities - Packaging and receptacles.
- JIS S 0022: Guidelines for all people including elderly and people with disabilities- Packaging and receptacles - Test methods for opening.
- JIS S 0024: Guidelines for older persons and persons with disabilities- Housing equipments
- JIS S 0025: Guidelines for all people including elderly and people with disabilities-Packaging and receptacles-Tactile warnings of danger-Requirements.
- JIS S 0031: Guidelines for the elderly and people with disabilities- Visual signs and displays - Specification of age-related relative luminance and its use in assessment of light.
- JIS S 0032: Guidelines for the elderly and people with disabilities- Visual signs and displays - Estimation of minimum legible size for a Japanese single character.
- JIS S 6310: (1996) Prepaid cards - General specification.
- JIS T 0901: Guidelines of electronic guide system using audible signage for visually impaired persons.
- JIS T 9251: Dimensions and patterns of raised parts of tactile groundsurface indicators for blind persons.
- JIS X 6310: Prepaid cards - General specification.
- JIS X 8341-1: Guidelines for older persons and persons with disabilities- information and communications equipment, software and services - Part1: Common Guidelines.
- JIS X 8341-2: Guidelines for older persons and persons with disabilities- information and communications equipment, software and services - Part2: Information processing equipment.
- JIS X 8341-3: Guidelines for older persons and persons with disabilities- information and communications equipment, software and services - Part3: Web Content.

- JIS X 8341-4 (Planning): Guidelines for older persons and persons with disabilities- information and communications equipment, software and services - Part4: Telecommunication equipment.
- JIS X 8341-5 (Planning): Guidelines for older persons and persons with disabilities- information and communications equipment, software and services - Part5: Office equipment.
- JIS Z 8071: Guidelines for standards developers to address the needs of older persons and persons with disabilities.
- JBM S-71-2004: Auditory signal (English version available).
- JBM S-73-2004: Guidelines for older persons and persons with disabilities-copier, multi-function machine and page printer.
- JBM IA-TR-7-2004: Operable zone of the office equipment for wheel chair users-recommended dimensions.
- JBM IA-TR-8-2004: Operable zone of the office equipment for wheel chair -technique of calculation.

[National Committee for Information Technology Standards](#)

1250 Eye Street NW, Suite 200, Washington DC 20005, USA.

Tel: +1 202 737 8888; Fax: +1 202 638 4922

Email: ncits@itic.org Web www.ncits.org

- Alternative Interface Access Protocol.

[National Institute of Standards and Technology](#)

Public Inquiries Unit, NIST, 100 Bureau Drive, Stop 1070 Gaithersburg, Maryland 20899-1070, USA.

Tel: +1 301 975 6478

Email: inquiries@nist.gov; Web www.nist.gov

- CBEFF (Draft) Common Biometric Exchange Framework Format.

[Norges Standardiserings Forbund](#)

Drammensveien 145A, PO Box 432, Skøyen, NO-0213 Oslo, Norway.

Tel: +47 22 04 92 30; Fax: +47 22 04 92 12

Web www.standard.no

- NS 3937 (1981) Functional measurements for use of wheelchairs.

[World Wide Web Consortium](#)

Contact details for Europe, Middle East, and Africa:

ERCIM, 2004, route des Lucioles, BP 93, 06902 Sophia-Antipolis, Cedex, France.

Tel: +33 4 92 38 75 90; Fax: +33 4 92 38 78 22

Contact details for Japan and Korea:

Keio University, 5322 Endo, Fujisawa, Kanagawa 252-8520, Japan.

Tel: +81 466 49 1170; Fax: +81 466 49 1171

Contact details for all other countries, including the Americas and Australia:

MIT, 32 Vassar Street, Room 32-G515, Cambridge, MA 02139, USA.

Tel: +1 617 253 2613; Fax: +1 617 258 5999

Web: www.w3.org

- WCAG Web Content Accessibility Guidelines
- ATAG Accessibility Testing Access Guidelines
- UAAG User Agent Accessibility Guidelines
- XAG XML Accessibility Guidelines (under consideration - not currently a guideline)
- XForms (Web Forms / interface standards)
- Timed Text (TT) Authoring Format 1.0 - Distribution Format Exchange Profile (DFXP)

[3GPP](#)

ETSI, Mobile Competence Centre, 650 Route des Lucioles, 06921 Sophia-Antipolis Cedex, France.

Web www.3gpp.org

- 3GPP TS 22.101, Service principles, Brief description of mobile text conversation.
- 3GPP TS 22.226, GTT Service Stage 1, GTT Specific service description.
- 3GPP TS 23.226, GTT Architecture Stage 2, GTT Specific description of network architecture for text conversation and especially CTM text telephony.
- 3GPP TS 26.226, CTM Modem, General description, Robust and error tolerant modem for text telephony specified for mobile networks.
- 3GPP TS 26.110, Circuit Switched Multimedia Telephony.
(3G.324), Includes text conversation using T.140 in AL1 channel.
- 3GPP TS 26.235, Packet Switched Conversational Multimedia (SIP), Includes text conversation using T.140 in RTP as RFC 2793.

Reference: Guidelines for the Design of Accessible Information and Communication Technology Systems:
<http://www.tiresias.org/guidelines/>. If you have any suggestions for improvements to these guidelines, please write to john.gill@rnib.org.uk

International Design Standards by Component and Function

Component or Function	Standard
Assistive Technology	Alternative Interface Access Protocol.
Assistive Technology	C.63/ANSI ANSI C.63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, Measurements of wireless telephone emissions and hearing aid immunity, with predicted performance based on measures. (Now in use in an FCC order).
Assistive Technology	ETS 300 381 Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
Assistive Technology	ETS 300 488 (January 1996) Telephony for hearing impaired people: Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired.
Assistive Technology	ETS 300 679 (September 1996) Telephony for the hearing impaired: Electrical coupling of telephone sets to hearing aids.
Assistive Technology	IEC 118-4 (1981) Hearing aids: magnetic field strength in audio frequency induction loops for hearing aid purposes.
Assistive Technology	ITU-T P.370 (1996) Magnetic field strength around the earcap of telephone handsets which provide for coupling to hearing aids.

Component or Function	Standard
Assistive Technology	TIA- 504-A, Telecommunications-Telephone Terminal Equipment - Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing.
Assistive Technology	TR 102 068 (2002) Requirements for Assistive Technology Devices in ICT.
Audio Output	ETS 300 381 Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
Audio Output	ETS 300 388 (December 1994) Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
Audio Output	ETS 300 488 (January 1996) Telephony for hearing impaired people: Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired.
Audio Output	ETS 300 679 (September 1996) Telephony for the hearing impaired: Electrical coupling of telephone sets to hearing aids.
Audio Output	ITU P370 Magnetic field strength around the earcap of telephone handsets which provide for coupling to hearing aids.
Cards and Smart Media	CWA 13987-1 Smart Card Systems - Interoperable citizen services - User related information (based on DISTINCT) - Part 1: Definition of User related information

Component or Function	Standard
Cards and Smart Media	CWA 13987-1 Smart Card Systems - Interoperable citizen services - User related information (based on DISTINCT) - Part 2: Implementation Guidelines.
Cards and Smart Media	CWA 14147 (8 parts) Financial transactional IC card reader (FINREAD).
Cards and Smart Media	EN 726 Requirements for IC cards and terminals for telecommunications use.
Cards and Smart Media	EN 1332 Machine readable cards, related device interfaces and operations. Part 2 Dimension and location of tactile identifier for ID-1 cards. Part 4 Coding of user requirements for people with special needs.
Cards and Smart Media	ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.
Cards and Smart Media	ETSI ETS 300 767 (July 1997) Telephone prepayment cards: Tactile identifier.
Cards and Smart Media	ISO 7816 Identification cards: Integrated circuit cards with contacts.
Cards and Smart Media	ISO/IEC 10536 (2000) Identification cards: Contactless integrated circuit cards. Part 1 Design principles and symbols for the user interface. Part 2 Dimension and location of tactile identifier for ID-1 cards. Part 3 Keypads. Part 4 Coding of user requirements for people with special needs.

Component or Function	Standard
Cards and Smart Media	ITU E118 Automatic international telephone credit cards.
Cards and Smart Media	ITU E136 Tactile identifier on pre-paid telephone cards.
Controls	DTR/HF 02009 (1996) Characteristics of telephone keypads.
Controls	EN 29241 Ergonomic requirements for visual display terminals.
Controls	ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
Controls	ETR 345 (Jan 1997) Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people.
Controls	IEC 73 (1990) Colours of pushbuttons and their meanings.
Controls	ISO 447 Machine tools: Direction of operation of controls.
Controls	ISO 1503 Geometric orientation and directions of movement.
Controls	ISO 13407 Human-centered design processes for interactive systems.
Controls	ISO 9241 International standards for colour use.
Controls	ISO DIS 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Displays.
Controls	ISO/CD 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interaction with

Component or Function	Standard
	displays.
Controls	ISO/IEC 9995 (1994) Information technology: Keyboard layouts for text and office systems.
Controls	ITU-T E.902 (1995) Interactive services design guidelines.
Controls	ITU-T Rec. H.245, Control Protocol for Multimedia Communication, Multimedia Control protocol.
Controls	ITU-T Recommendation H.224, A real time control protocol for simplex applications using the H.221 LSD/HSD/HLP channel., Addition of client id=2 for T.140 text transport.
Controls	ITU-T Recommendation H.248, Gateway control protocol, Text conversation protocol for multimedia application. With amendment 1 (2000). Control of gateway between all forms of text conversation. Part 4 Keyboard requirements.
Controls	TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Fonts	CR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Hardware	DEG HF 00031 Human factors guidelines for ICT products and services: Design for all.

Component or Function	Standard
Hardware	EG 202 116 (2002) Guidelines for ICT Products and Services: Design for All.
Hardware	TR 30 TIA/EIA 825a, A Frequency Shift Keyed Modem for use on the Public Switched Telephone Network, The first standard for TTY signals, which permitted mainstream industry to design for compatibility with TTY as technologies moved to digital.
Help Facilities	B480-02 (2002) Customer Service for People with Disabilities.
Help Facilities	ETR 160 (1995) Human factors aspects or multimedia telecommunications.
Help Facilities	ISO 9241 (1998) Ergonomics requirements for office work with visual display terminals (VDTs).
Help Facilities	ISO 11429 (1996) Ergonomics - System of auditory and visual danger and information signals.
Help Facilities	JIS S 0011: (2000) Guidelines for all people including elderly and people with disabilities - Marking of tactile dots on consumer products.
Help Facilities	JIS S 0012: (2000) Guidelines for all people including elderly and people with disabilities - Usability of consumer products.
Help Facilities	JIS S 0021: (2000) Guidelines for all people including elderly and people with disabilities - Packaging and receptacles.

Component or Function	Standard
Keypads	DTR/HF 02009 (1996) Characteristics of telephone keypads.
Keypads	EN 1332 Machine readable cards, related device interfaces and operations.
Keypads	EN 29241 Ergonomic requirements for visual display terminals.
Keypads	ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
Keypads	ETR 345 (Jan 1997) Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people.
Keypads	ETSI DTR/HF 02009 (1996) Characteristics of telephone keypads.
Keypads	ETSI TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Keypads	ETSI ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
Keypads	IEC 73 (1990) Colours of pushbuttons and their meanings.
Keypads	ISO 9564-1 (2002) Banking - Personal Identification Number (PIN) management and security, Part 1: PIN protection principles and techniques for online PIN verification in ATM and POS systems, Informative Annex E Additional guidelines for the design of a PIN entry device.

Component or Function	Standard
Keypads	ISO DIS 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Displays.
Keypads	ISO/CD 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interaction with displays.
Keypads	ISO/IEC 9995 (1994) Information technology: Keyboard layouts for text and office systems.
Keypads	ITU E161 Arrangements of figures, letters and symbols on telephones.
Keypads	ITU-T E.902 (1995) Interactive services design guidelines. Part 3 Keypads. Part 4 Keyboard requirements.
Keypads	TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Pictograms, Icons and Symbols	EG 201 379 (1998) Human Factors (HF); Framework for the development, evaluation and selection of graphical symbols.
Pictograms, Icons and Symbols	EN 1332 Machine readable cards, related device interfaces and operations.
Pictograms, Icons and Symbols	ETSI EG 202 048 (2002) Human Factors: Guidelines on the Multimodality of Icons, Symbols and Pictograms.

Component or Function	Standard
Pictograms, Icons and Symbols	ETSI ETS 300 375 (November 1994) Pictograms for point to point videotelephony.
Pictograms, Icons and Symbols	ETSI EN 301 462 (March 2000) Symbols to identify telecommunications facilities for deaf and hard of hearing people.
Pictograms, Icons and Symbols	ISO 11429 (1996) Ergonomics - System of auditory and visual danger and information signals.
Pictograms, Icons and Symbols	ISO 3461 General principles for the creation of graphical symbols.
Pictograms, Icons and Symbols	ISO 7000 (1989) Graphical symbols for use on equipment.
Pictograms, Icons and Symbols	ISO 7001 (1991) Public information symbols.
Pictograms, Icons and Symbols	ISO 7239 (1990) Development and principles for application of public information symbols.
Pictograms, Icons and Symbols	ISO 9186 (1989) Procedures for the development and testing of public information symbols.
Pictograms, Icons and Symbols	ISO/IEC 11581 (2000) User symbol interfaces and symbols: Icon symbols and functions.
Pictograms, Icons and Symbols	ITU-T E.121 (1996) Pictograms, symbols and icons to assist users of the telephone service.
Pictograms, Icons and Symbols	ITU-T E.161 (1995) Arrangements of figures, letters and symbols on telephones.

Component or Function	Standard
Pictograms, Icons and Symbols	ITU-T E.920 (1995) Procedures for designing, evaluating and selecting symbols, pictograms and icons. Part 1 Design principles and symbols for the user interface.
Plain Old Telephone System	ACIF G586:2001 Access to telecommunications for people with disabilities.
Plain Old Telephone System	ETR 029 Access to telecommunications for people with special needs: Recommendations for improving and adapting telecommunication terminals and services for people with impairments.
Plain Old Telephone System	DTR/HF 02009 (1996) Characteristics of telephone keypads.
Plain Old Telephone System	ETS 300 381 Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
Plain Old Telephone System	ETR 167 (1995) User instruction for public telecommunication services: design guidelines.
Plain Old Telephone System	TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Plain Old Telephone System	DTR/HF 02003 (1996) The implication of human ageing for the design of telephone terminals.
Plain Old Telephone System	ETS 300 388 (December 1994) Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.

Component or Function	Standard
Plain Old Telephone System	ETS 300 488 (January 1996) Telephony for hearing impaired people: Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired.
Plain Old Telephone System	ETS 300 679 (September 1996) Telephony for the hearing impaired: Electrical coupling of telephone sets to hearing aids.
Plain Old Telephone System	EN 301 462 (March 2000) Symbols to identify telecommunications facilities for deaf and hard of hearing people.
Plain Old Telephone System	ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
Plain Old Telephone System	TR 101 806 (June 2000) Guidelines for telecommunications relay services for text telephones.
Plain Old Telephone System	IEC 118-4 Hearing aids: magnetic field strength in audio frequency induction loops for hearing aid purposes.
Plain Old Telephone System	ITU E133 Operating procedures for cardphones.
Plain Old Telephone System	E134 Human factors aspects of public terminals: Generic operating procedures.
Plain Old Telephone System	E135 Human factors aspects of public telecommunications terminals for people with disabilities.
Plain Old Telephone System	E161 Arrangements of figures, letters and symbols on telephones.

Component or Function	Standard
Plain Old Telephone System	P370 Magnetic field strength around the earcap of telephone handsets which provide for coupling to hearing aids.
Public Access Terminals	AS 3769 Automatic Teller Machines: User Access
Public Access Terminals	B480-02 (2002) Customer Service for People with Disabilities.
Public Access Terminals	B65.1.1-01 (2001) Barrier-free design for Automated Banking Machines.
Public Access Terminals	B651-95 (1995) Barrier-free design.
Public Access Terminals	BS 6571 (1999) Vehicle Parking Control Equipment. This relates to the distance off the ground and from the vehicle of the barrier controlled parking equipment.
Public Access Terminals	EG 201 472 (2000) Human Factors (HF); Usability evaluation for the design of telecommunication systems, services and terminals.
Public Access Terminals	EN 726 Requirements for IC cards and terminals for telecommunications use.
Public Access Terminals	ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.
Public Access Terminals	ETR 170 (1995) Human Factors (HF); Generic User control procedures for telecommunication terminals and services.
Public Access Terminals	ETR 334 (1996) The implications of ageing for the design of

Component or Function	Standard
	telephone terminals.
Public Access Terminals	ETS 138 (1998) Public terminals for the elderly.
Public Access Terminals	ISO 7165-5 Wheelchairs - Part 5 Determination of overall dimensions, mass and turning space
Public Access Terminals	TC TR 007 (1996) Human Factors (HF); User requirements of enhanced terminals for public use.
Screen Phones	ETR 160 (1995) Human factors aspects of multimedia telecommunications.
Software	DEG HF 00031 Human factors guidelines for ICT products and services: Design for all.
Software	EG 202 116 (2002) Guidelines for ICT Products and Services: Design for All.
Software	HFES 200.3: , Human Factors Engineering of Software User Interfaces, Software interface standard (Standard now includes 5 interface strategies developed by Trace).
Software	HFES 200.5: , Human Factors Engineering of Software User Interfaces - Interactive Voice Response (IVR) and Telephony, A user interface standard for IVRs and voice mail.
Software	ISO 14915 (2003) Software ergonomics for multimedia user

Component or Function	Standard
	interfaces.
Software	ISO/AWI 16071 Ergonomics of human-system interaction - Guidance on software accessibility. (Under development).
Software	ISO/AWI 23973 Software ergonomics for World Wide Web user interfaces. (Under development).
Tactual Displays	EN 1332 Machine readable cards, related device interfaces and operations. Part 2 Dimension and location of tactile identifier for ID-1 cards.
Tactual Displays	ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.
Tactual Displays	ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.
Tactual Displays	ETS 300 767 (July 1997) Telephone prepayment cards: Tactile identifier.
Tactual Displays	ISO DIS 11549 (1998) Technical aids for vision and vision and hearing impaired persons: Acoustic and tactile signals for traffic lights.
Tactual Displays	ITU-T E.136 (1997) Tactile identifier on pre-paid telephone cards.
Tactual Displays	JIS S 0011: (2000) Guidelines for all people including elderly and people with disabilities - Marking of tactile dots on consumer

Component or Function	Standard
	products.
Tactual Displays	JIS S 0021: (2000) Guidelines for all people including elderly and people with disabilities - Packaging and receptacles.
Telecommunications	ACIF G586:2001 Access to telecommunications for people with disabilities.
Telecommunications	3GPP TS 22.101, Service principles, Brief description of mobile text conversation.
Telecommunications	3GPP TS 22.226, GTT Service Stage 1, GTT Specific service description.
Telecommunications	3GPP TS 23.226, GTT Architecture Stage 2, GTT Specific description of network architecture for text conversation and especially CTM text telephony.
Telecommunications	3GPP TS 26.110, Circuit Switched Multimedia Telephony. (3G.324), Includes text conversation using T.140 in AL1 channel.
Telecommunications	3GPP TS 26.226, CTM Modem, General description, Robust and error tolerant modem for text telephony specified for mobile networks.
Telecommunications	3GPP TS 26.235, Packet Switched Conversational Multimedia (SIP), Includes text conversation using T.140 in RTP as RFC 2793.
Telecommunications	ACIF G586: (2001) Access to Telecommunications for People with

Component or Function	Standard
	Disabilities.Alternative Interface Access Protocol.
Telecommunications	ANSI/TIA-968-A, Telecommunications - Telephone Terminal Equipment - Technical Requirements for Connection of Terminal Equipment to the Telephone Network.
Telecommunications	AS/ACIF S040: (1999) Requirements for general use Customer Equipment for use with the Standard Telephone Service - Features for special needs of persons with disabilities.
Telecommunications	C.63/ANSI ANSI C.63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, Measurements of wireless telephone emissions and hearing aid immunity, with predicted performance based on measures. (Now in use in an FCC order).
Telecommunications	DEG HF 00031 Human factors guidelines for ICT products and services: Design for all.
Telecommunications	DTR/HF 02003 (1996) The implication of human ageing for the design of telephone terminals.
Telecommunications	DTR/HF 02009 (1996) Characteristics of telephone keypads.
Telecommunications	EG 201 024 (1997) Human Factors (HF); User interface design principles for the Telecommunications Management Network (TMN) applicable to the "G" Interface.

Component or Function	Standard
Telecommunications	EG 201 103 (1998) Human Factors (HF); Human factors issues in Multimedia Information Retrieval Services (MIRS).
Telecommunications	EG 201 472 (2000) Human Factors (HF); Usability evaluation for the design of telecommunication systems, services and terminals.
Telecommunications	EG 201 795 (2000) Human Factors (HF); Issues concerning User identification in future telecommunications systems.
Telecommunications	EG 202 116 (2002) Guidelines for ICT Products and Services: Design for All.
Telecommunications	EN 301 462 (March 2000) Symbols to identify telecommunications facilities for deaf and hard of hearing people.
Telecommunications	EN 726 Requirements for IC cards and terminals for telecommunications use.
Telecommunications	ES 201 125 (1998) Human Factors (HF); Universal Personal Telecommunications (UPT); Specification of the minimum Man-Machine Interface (MMI) for Phase 1 UPT.
Telecommunications	ES 201 275 (1998) Human Factors (HF); User control procedures in basic call, point-to-point connections, for Integrated Services Digital Network (ISDN) videotelephony.
Telecommunications	ES 201 381 (December 1998) Telecommunication keypads and keyboards: Tactile identifiers.

Component or Function	Standard
Telecommunications	ETR 029 (1991) Access to telecommunications for people with special needs: Recommendations for improving and adapting telecommunication terminals and services for people with impairments.
Telecommunications	ETR 160 (1995) Human factors aspects of multimedia telecommunications.
Telecommunications	ETR 165 (1995) Recommendations for a tactile identifier on machine readable cards for telecommunications terminals.
Telecommunications	ETR 167 (1995) User instruction for public telecommunication services: design guidelines.
Telecommunications	ETR 170 (1995) Human Factors (HF); Generic User control procedures for telecommunication terminals and services.
Telecommunications	ETR 208 (1995) Human Factors (HF): HF Aspects of universal personal telecommunications (UPT); User requirements.
Telecommunications	ETR 261-1 (1996) Human Factors (HF); Assessment and definition of a harmonized minimum man-machine interface (MMI) for accessing and controlling public network based supplementary services; Part 1: General approach and summary of findings.
Telecommunications	ETR 333 (1998) Text Telephony: Basic User Requirements and Recommendations.

Component or Function	Standard
Telecommunications	ETR 334 (1996) The implications of ageing for the design of telephone terminals.
Telecommunications	ETR 345 (Jan 1997) Characteristics of telephone keypads and keyboards; Requirements of elderly and disabled people.
Telecommunications	ETS 138 (1998) Public terminals for the elderly.
Telecommunications	ETS 300 375 (November 1994) Pictograms for point to point videotelephony.
Telecommunications	ETS 300 381 Telephony for hearing impaired people: Inductive coupling of telephone earphones to hearing aids.
Telecommunications	ETS 300 488 (January 1996) Telephony for hearing impaired people: Characteristics of telephone sets that provide additional receiving amplification for the benefit of the hearing impaired.
Telecommunications	ETS 300 679 (September 1996) Telephony for the hearing impaired: Electrical coupling of telephone sets to hearing aids.
Telecommunications	ETS 300 738 (1997) Human Factors (HF): Minimum Man Machine Interface (MMI) to public network based supplementary services.
Telecommunications	ETS 300 767 (July 1997) Telephone prepayment cards: Tactile identifier.

Component or Function	Standard
Telecommunications	H Series Supplement 1, Video Quality for sign language and lip reading, Quality characteristics of video transmission of importance for sign language and lip-reading use.
Telecommunications	HFES 200.3: , Human Factors Engineering of Software User Interfaces, Software interface standard (Standard now includes 5 interface strategies developed by Trace).
Telecommunications	HFES 200.5: , Human Factors Engineering of Software User Interfaces - Interactive Voice Response (IVR) and Telephony, A user interface standard for IVRs and voice mail.
Telecommunications	IETF draft RFC Framework of requirements for real-time text conversation using SIP.
Telecommunications	IETF RFC 2733 An RTP Payload Format for Generic Forward Error Correction. Error correction method.
Telecommunications	IETF RFC 2793 RTP Payload for Text Conversation. RTP Payload for T.140 text conversation. MIME Registered as "text/t140", used in H.323 and SIP.
Telecommunications	IETF RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals. Encoding and transport of tones over IP.
Telecommunications	IETF RFC 3351 User requirements. Handles transcoding and other value added services invoked through SIP.

Component or Function	Standard
Telecommunications	ISOC/IETF RFC 3261 (2002) IETF RFC 2543 SIP Session initiation Protocol. Session initiation Protocol - used to connect Voice over IP (Internet Protocol) phone calls.
Telecommunications	ITU Y.1541, Network performance objectives for IP-based services.
Telecommunications	ITU-T E.118 (2001) Automatic international telephone credit cards.
Telecommunications	ITU-T E.121 (1996) Pictograms, symbols and icons to assist Users of the telephone service.
Telecommunications	ITU-T E.133 (1988) Operating procedures for cardphones.
Telecommunications	ITU-T E.134 (1993) Human factors aspects of public terminals: Generic operating procedures.
Telecommunications	ITU-T E.135 (1993) Human factors aspects of public telecommunications terminals for people with disabilities.
Telecommunications	ITU-T E.136 (1997) Tactile identifier on pre-paid telephone cards.
Telecommunications	ITU-T E.161 (1995) Arrangements of figures, letters and symbols on telephones.
Telecommunications	ITU-T E.902 (1995) Interactive services design guidelines.
Telecommunications	ITU-T E.920 (1995) Procedures for designing, evaluating and selecting symbols, pictograms and icons.

Component or Function	Standard
Telecommunications	ITU-T P.370 (1996) Magnetic field strength around the earcap of telephone handsets which provide for coupling to hearing aids.
Telecommunications	ITU-T Rec. F.700, Framework Recommendation for multimedia services, Annex A.3., Multimedia Framework.
Telecommunications	ITU-T Rec. F.703, Multimedia conversational services, Defines Text Telephony and Total Conversation services.
Telecommunications	ITU-T Rec. H.245, Control Protocol for Multimedia Communication, Multimedia Control protocol.
Telecommunications	ITU-T Rec. H.323 Annex G; (02/00), Text Conversation and Text SET., Defines T.140 text inclusion in H.323 IP Multimedia.
Telecommunications	ITU-T Rec.H.320, Narrow-band visual telephone systems and terminal equipment.
Telecommunications	ITU-T Rec.H.324, Terminal for low bit-rate multimedia communication, Addition of data channel for T.140 text.
Telecommunications	ITU-T Rec.T.134, Text Chat Application Entity, Application for text conversation in the T.120 data conferencing concept.
Telecommunications	ITU-T Rec.T.140 - Addendum, Marking of missing characters, Marking of missing characters.
Telecommunications	ITU-T Rec.V.151 (under development), Procedures for the end-to-end connection of analogue text telephones over an IP network.

Component or Function	Standard
Telecommunications	ITU-T Rec.V.152 (under development), Procedures for supporting Voice Band Data over IP networks.
Telecommunications	ITU-T Rec.V.250, Serial asynchronous automatic dialling and control.
Telecommunications	ITU-T Recommendation H.224, A real time control protocol for simplex applications using the H.221 LSD/HSD/HLP channel., Addition of client id=2 for T.140 text transport.
Telecommunications	ITU-T Recommendation H.248, Gateway control protocol, Text conversation protocol for multimedia application. With amendment 1 (2000). Control of gateway between all forms of text conversation.
Telecommunications	ITU-T Recommendation T.140, Protocol for multimedia application text conversation., Text conversation protocol for multimedia application. With amendment 1 (2000).
Telecommunications	ITU-T Recommendation V.18, Operational and Interworking Requirements for DCE:s Operating in the Text Telephone Mode, Includes automatic interworking with most legacy text telephones.
Telecommunications	ITU-T Recommendation V.61, Analog simultaneous voice and data (permits Voice carry over with ASCII modems).

Component or Function	Standard
Telecommunications	ITU-T Recommendation V.8 bis, Procedures for the identification and selection of common modes of operation between Data Circuit-terminating Equipments (DCEs) and between Data Terminal Equipments (DTEs) over the public switched telephone network, Operational and interworking requirements for DCE:s operating in the text telephone mode.
Telecommunications	ITU-T Recommendation V.8, Procedures for starting sessions of data transmission over the public switched telephone network.
Telecommunications	ITU-T Study Group 16 v.150.1, Modem over IP, International Recommendation for transport of Modem over IP.
Telecommunications	ITU-T Study Group 16 V.ToIP (in process) QH-03001, Text Telephony over IP, International standardization to develop a new Recommendation for Text Telephony over IP.
Telecommunications	ITU-T Study Group 16 V.VBS (in process), Voice Band Data over IP, International standardization to develop a new Recommendation for Voice Band Data over IP. Useful for text telephony over enterprise networks.
Telecommunications	T1 T1.209-2003, American National Standard for Operations Administration and Maintenance and Provisioning (OAM&P) - Network Tones and Announcements, Provides and industry standard way for network routing messages to be conveyed in TTY in addition to voice.

Component or Function	Standard
Telecommunications	T1. 719-2001, PCS 1900 - Cellular Text Telephone Modem (CTM) General Description.
Telecommunications	T1.718-2001, PCS 1900 - Cellular Text Telephone Modem (CTM) Transmitter Bit Exact C-Code.
Telecommunications	TC TR 001 (1991) Human Factors (HF): Generic Handsfree Procedures.
Telecommunications	TC TR 003 (1992) Human Factors (HF): Human Factors Aspects of Pan European Numbering.
Telecommunications	TC TR 004 (1992) Human Factors (HF); Harmonisation of code schemes as minimum Man Machine Interface for Telecommunication Terminals.
Telecommunications	TC TR 006 (1995) Human Factors (HF): Satellite Personal Communication Network; statement of User aspects for a S-PCN service.
Telecommunications	TC TR 007 (1996) Human Factors (HF); User requirements of enhanced terminals for public use.
Telecommunications	TCR-TR 023 (1994) Assignment of alphabetic letters to digits on push button dialling keypads.
Telecommunications	TIA- 504-A, Telecommunications-Telephone Terminal Equipment - Magnetic Field and Acoustic Gain Requirements for Headset Telephones Intended for Use by the Hard of Hearing.

Component or Function	Standard
Telecommunications	TIA IS-127-2, Enhanced Variable Rate Codec, Speech Service Option 3 for Wideband Spread Spectrum Digital Systems - Addendum 2.
Telecommunications	TIA IS-707-A-2, Data Services Options for Spread Spectrum Systems - Radio Link Protocol Type 3 - Addendum No. 2.
Telecommunications	TIA IS-733-1, High Rate Speech Service Option 17 for Wideband Spread Spectrum Communications Systems.
Telecommunications	TIA IS-789A, Electrical Specification for the Portable Phone to Vehicle Interface.
Telecommunications	TIA IS-823, TTY/TDD Extension to TIA/EIA 136-410 Enhanced Full Rate Speech Codec.
Telecommunications	TIA -IS-840, Minimum Performance Standards for Text Telephone Signal Detector and Text Telephone Signal Regenerator.
Telecommunications	TIA TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY).
Telecommunications	TIA/EIA-688, DTE/DCE Interface For Digital Cellular Equipment.
Telecommunications	TR 101 806 (June 2000) Guidelines for telecommunications relay services for text telephones.
Telecommunications	TR 102 068 (2002) Requirements for Assistive Technology Devices in ICT.

Component or Function	Standard
Telecommunications	TR 30 TIA/EIA 825a, A Frequency Shift Keyed Modem for use on the Public Switched Telephone Network, The first standard for TTY signals, which permitted mainstream industry to design for compatibility with TTY as technologies moved to digital.
Telecommunications	TR 30.1 TIA 1001 (in process), Standards for text over IP (TIA 1001), U.S. effort to develop standard methods for carrying Baudot over IP telephony networks, using voice band data and gateway approaches.
Telecommunications	TR 45 TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY), Connector standard for wireless telephones and TTYs.
Television	EIA 708 B, Advanced Television Closed Captioning.
Television	EIA/CES 608, Analog Television Closed Captioning (Line 21 Data Services).
Television	ISO 13407 (1999) Human-centred design processes for interactive systems.
Touchscreens	ISO/CD 13406 (1996) Ergonomic requirements for flat panel displays (Part 1-2).
Touchscreens	ISO/CD 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interaction with displays.

Component or Function	Standard
Touchscreens	ISO DIS 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Displays.
Touchscreens	ITU-T E.902 (1995) Interactive services design guidelines.
Video Telephones	ETSI ETR 160 (1995) Human factors aspects of multimedia telecommunications.
Video Telephones	ETSI ETS 300 375 (November 1994) Pictograms for point to point videotelephony.
Visual displays	AS 3769 (1990) Automatic teller machines: User access.
Visual displays	EN 1332 Machine readable cards, related device interfaces and operations. Part 1 Design principles and symbols for the user interface.
Visual displays	EN 29241 Ergonomic requirements for visual display terminals.
Visual displays	EN 894 Ergonomics of human-system interaction.
Visual displays	HFES 200.3. Human Factors Engineering of Software User Interfaces, Software interface standard (Standard now includes 5 interface strategies developed by Trace).
Visual displays	HFES 200.5. Human Factors Engineering of Software User Interfaces - Interactive Voice Response (IVR) and Telephony, A user interface standard for IVRs and voice mail.

Component or Function	Standard
Visual displays	ISO 9241 (1998) Ergonomic requirements for office work with visual display terminals.
Visual displays	ISO 13407 (1999) Human-centred design processes for interactive systems.
Visual displays	ISO DIS 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Displays.
Visual displays	ISO/CD 13406 (1996) Ergonomic requirements for flat panel displays (Part 1-2).
Visual displays	ISO/CD 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interaction with displays.
Web	DEG HF 00031 Human factors guidelines for ICT products and services: Design for all.
Web	EG 202 116 (2002) Guidelines for ICT Products and Services: Design for All.
Web	IETF draft RFC Framework of requirements for real-time text conversation using SIP.
Web	IETF RFC 2733 An RTP Payload Format for Generic Forward Error Correction. Error correction method.

Component or Function	Standard
Web	IETF RFC 2793 RTP Payload for Text Conversation. RTP Payload for T.140 text conversation. MIME Registered as "text/t140", used in H.323 and SIP.
Web	IETF RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals. Encoding and transport of tones over IP.
Web	IETF RFC 3351 User requirements. Handles transcoding and other value added services invoked through SIP.
Web	ISO/AWI 23973 Software ergonomics for World Wide Web user interfaces. (Under development).
Web	ISOC/IETF RFC 3261 (2002) IETF RFC 2543 SIP Session initiation Protocol. Session initiation Protocol - used to connect Voice over IP (Internet Protocol) phone calls.
Web	ITU Y.1541, Network performance objectives for IP-based services.
Web	ITU-T Rec. F.700, Framework Recommendation for multimedia services, Annex A.3., Multimedia Framework.
Web	ITU-T Rec. F.703, Multimedia conversational services, Defines Text Telephony and Total Conversation services.
Web	ITU-T Rec.V.151 (under development), Procedures for the end-to-end connection of analogue text telephones over an IP network.

Component or Function	Standard
Web	ITU-T Rec.V.152 (under development), Procedures for supporting Voice Band Data over IP networks.
Web	ITU-T Recommendation H.224, A real time control protocol for simplex applications using the H.221 LSD/HSD/HLP channel., Addition of client id=2 for T.140 text transport.
Web	ITU-T Study Group 16 v.150.1, Modem over IP, International Recommendation for transport of Modem over IP.
Web	ITU-T Study Group 16 V.ToIP (in process) QH-03001, Text Telephony over IP, International standardization to develop a new Recommendation for Text Telephony over IP.
Web	ITU-T Study Group 16 V.VBS (in process), Voice Band Data over IP, International standardization to develop a new Recommendation for Voice Band Data over IP. Useful for text telephony over enterprise networks.
Web	TR 30 TIA/EIA 825a, A Frequency Shift Keyed Modem for use on the Public Switched Telephone Network, The first standard for TTY signals, which permitted mainstream industry to design for compatibility with TTY as technologies moved to digital.
Web	TR 30.1 TIA 1001 (in process), Standards for text over IP (TIA 1001), U.S. effort to develop standard methods for carrying Baudot over IP telephony networks, using voice band data and gateway approaches.

Component or Function	Standard
Wireless Interfaces	C.63/ANSI ANSI C.63.19, American National Standard for Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids, Measurements of wireless telephone emissions and hearing aid immunity, with predicted performance based on measures. (Now in use in an FCC order).
Wireless Interfaces	TIA TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY).
Wireless Interfaces	TR 45 TSB-121, 2.5 mm Audio Interface For Mobile Wireless Handsets - Text Telephones (TTY), Connector standard for wireless telephones and TTYs.

Reference: Guidelines for the Design of Accessible Information and Communication Technology Systems: <http://www.tiresias.org/guidelines/>. If you have any suggestions for improvements to these guidelines, please write to john.gill@rnib.org.uk

Communications Technology Manufacturers and Service Providers

Company	Revenue (\$millions)
IBM	\$89,131
Hewlett-Packard	\$73,061
Verizon Communications	\$67,752
Dell	\$41,444
SBC Communications	\$40,843
AT&T	\$34,529
Microsoft	\$32,187
Motorola	\$27,058
Sprint	\$26,202
BellSouth	\$22,635
Electronic Data Systems	\$21,596
Comcast	\$21,263
Cisco Systems	\$18,878
AT&T Wireless Services	\$16,695

Company	Revenue (\$millions)
Xerox	\$15,701
Qwest Communications	\$14,936
Sun Microsystems	\$11,434
Computer Sciences	\$11,347
Nextel Communications	\$10,820
Oracle	\$9,475
First Data	\$8,544
Lucent Technologies	\$8,470
Alltel	\$8,190
Science Applications Intl.	\$6,457
Apple Computer	\$6,207
Unisys	\$5,911
Cox Communications	\$5,759
NCR	\$5,598
Echostar Communications	\$5,551
Charter Communications	\$4,819

Company	Revenue (\$millions)
Pitney Bowes	\$4,577
Avaya	\$4,338
Cablevision Systems	\$4,208
Level 3 Communications	\$4,026
Qualcomm	\$3,971
Affiliated Computer Svcs.	\$3,787
NTL	\$3,645
Telephone & Data Sys.	\$3,445
Gateway	\$3,402
BearingPoint	\$3,139
Computer Assoc. Intl.	\$3,116
Corning	\$3,090
SunGard Data Systems	\$2,955
Western Digital	\$2,719
Fiserv	\$2,700
Electronic Arts	\$2,482

Company	Revenue (\$millions)
Citizens Communications	\$2,445
CenturyTel	\$2,381
PeopleSoft	\$2,267
eBay	\$2,165
Harris	\$2,093
Sabre Holdings	\$2,045
UTStarcom	\$1,964
Titan	\$1,860
IDT	\$1,835
Veritas Software	\$1,771
Cincinnati Bell	\$1,750
DST Systems	\$1,725
Intuit	\$1,677
Yahoo	\$1,625
Western Wireless	\$1,501
Perot Systems	\$1,461

Company	Revenue (\$millions)
Scientific-Atlanta	\$1,450
Symantec	\$1,407
EarthLink	\$1,402
Dun & Bradstreet	\$1,386
IMS Health	\$1,382
Compuware	\$1,375
Siebel Systems	\$1,354
BMC Software	\$1,327
Adobe Systems	\$1,295
Primus Telecommunications	\$1,288
Equifax	\$1,233
Total Revenue:	\$773,557

Audio Input Accessibility Evaluation Matrix by Disability

Questions to Ask	Visual	Hearing	Physical	Cognitive
Adjustable sensitive microphone?	no	minor	severe	no
Alternative method of input for people with a speech impairment (or with a strong accent)?	no	minor	severe	no
Background noise minimized?	no	severe	Minor	minor
Can the microphone be used by people in wheelchairs as well as by people standing?	no	no	severe	no
Facility for extra microphone?	no	no	no	no
Limited vocabulary word recognition?	minor	no	no	moderate
Opportunity for the user to undo incorrect inputs?	severe	no	severe	severe
Recognition feedback after each input?	severe	no	severe	moderate
Reset on call termination?	no	no	no	no
Speech-input keying?	moderate	no		moderate
Variable amplification?	no	minor		no

Audio input and output

Synthetic or digitally stored speech can be used for:

- Prompts or fixed messages (e.g. next stop on a tram).
- Error or help messages.
- Output of contents of screen.

If information is confidential, then speech output should be to an earphone (e.g. telephone handset).

For situations with poor viewing conditions (e.g. low illumination or high vibration) audio output can provide another modality of information dissemination or provide more redundancy. Audio messages are most appropriate when an immediate response is required with less reliance on referral to the message at a later date.

People with a hearing impairment often have difficulty in understanding synthetic speech output since it tends to have less redundancy than natural speech. The facility to repeat a message is frequently essential rather than just desirable.

Voice control

Voice control can be beneficial in situations where more than one task is performed simultaneously which require both hand and/or eye co-ordination. Its limitations include technological constraints which limit the vocabulary size and speed of accurate processing. Feedback of a mistake may interrupt other activities.

Accuracy of voice recognition systems deteriorates significantly if there is background noise. Accuracy is improved by allowing a limited choice of commands which should include common alternatives such as 'start' or 'begin'.

Microphones

A sensitive microphone will help persons with quiet voices or with restricted neck and chest movement that makes speaking difficult. It is also important for the user to be able to adjust the sensitivity of the microphone so that it can be used by either a person with a weak voice or a normal voice.

Amplification

Amplification of the microphone should be user controlled and should automatically reset for the next user.

Speech input

Speech input keying is a useful means of providing a hands-free facility for users with reliable voice, and may be valuable even where full hands-free operation is not necessary (e.g. when hand tremor interferes with manual keying). Speech input is also useful for dyslexic users who can read aloud and simultaneously enter keys thus avoiding short-term memory problems.

Recommendations in the guidelines include:**Audio output**

- Provide user control of volume of audio output.
- For acoustic signals to attract attention, use a frequency between 300Hz and 3000Hz.
- Messages should be simple and short.

Audio input

- Minimise background noise.
- Ensure that the microphone can be used by people in wheelchairs as well as by people standing in front of the terminal.
- Provide alternative method of input for people with a speech impairment (or with a strong accent).
- Provide recognition feedback after each input.
- Provide opportunity for the user to undo incorrect inputs.

Computer Hardware Accessibility Evaluation Matrix by Disability by Component

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Catches and Latches	Are controls and latches (ON/OFF) reachable and operable with one hand and minimal dexterity? (they shall not require tight grasping, pinching, or twisting of the wrist and the force required to activate controls and keys shall be 5 lbs. (22.2 N)	moderate	severe	no	no	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	maximum)							
Catches and Latches	Are controls tactilely discernible without activating the controls?	no	no	minor	moderate	no	no	no
Catches and Latches	Are the controls concave and with a non-slip surface?		Severe	no	no	no	no	no
Catches and Latches	Are the controls labeled with easily understandable symbols?	No	no	no	no	no	moderate	Severe

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Catches and Latches	Are the labels of important controls easily readable (high contrast and easy to read font)?	No	no	moderate	no	no	no	no
Catches and Latches	Are the options offered by the controls adjustable using software?	moderate	Severe	no	no	no	no	no
Catches and Latches	If biometric forms of control are used, are there alternative forms of activation?	moderate	moderate	moderate	moderate	moderate	moderate	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Catches and Latches	Is the status of all locking or toggle controls discernible both visually and through touch or sound?	No	no	moderate	moderate	moderate	moderate	no
Contrast	Can color and contrast setting be adjusted in order to produce high contrast color schemes?	no	no	moderate	no	no	no	no
Contrast	Is color an enhancement, and not the only way to convey information or distinguish	no	no	moderate	no	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	keys, controls and labels?							
Display	Can the screen Image be enlarged (usually by the video card)?	no	no	moderate	no	no	no	no
Display	If the display provides a mechanism for changing the position of the screen, is it easy to handle?	minor	moderate	no	no	no	no	no
Display	If there is an analogue of digital television receiver installed, is it equipped with caption	no	no	no	no	minor	moderate	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	decoder circuitry?							
Display	Is the display designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz?	minor	minor	no	no	no	no	no
Display	Is the display separate from the central processing unit so that it can be placed in an accessible position or replaced by another better suited to user needs?	minor	moderate	moderate	no	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Drives and removable media	Can insertion and removal of frequently accessed media be done using minimal reach and manual dexterity?	minor	moderate	no	no	no	no	no
Drives and removable media	Do the storage media drives use an open/shut platform?	minor	moderate	no	no	no	no	no
Drives and removable media	Is the user alerted of incorrect insertion of the storage media?	no	no	minor	moderate	no	no	no
External connections	Are cables and their corresponding	no	no	minor	moderate	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	connections tactilely differentiable?							
External connections	Do expansion slots, ports and connectors comply with publicly available industry standards?	minor	Severe	no	moderate	no	no	no
External connections	Is the force required to make the connection of appropriate cables, mounting and attaching of external elements, no greater than 5 pounds (22.2	minor	moderate	no	no	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	Newton's)?							
External connections	Is the information and control needed for the real time operation of the product available to an external device in a cross-industry standard form that is easily and completely translatable into text? (This form shall be available via a cross-industry standard port that does not	minor	moderate	minor	moderate	minor	minor	minor

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	require manipulation of a connector by the user.)							
Keys, keyboards and keypads	Are the keys tactilely discernible without activating them?	no	no	minor	moderate	no	no	no
Keys, keyboards and keypads	Are the labels of the keys easily readable (high contrast and easy to read font)?	no		moderate	no	no	no	no
Keys, keyboards and keypads	Can key repeat delay be adjusted to at least 2	moderate	Severe	no	no	no	no	moderate

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	seconds? And can key repeat rate be adjustable to 2 seconds per character?							
Keys, keyboards and keypads	Do each functional group of keys have a different color?	no	no	no	no	no	no	moderate
Keys, keyboards and keypads	Do the central keys of each functional group (for QWERTY keyboards, the J, F keys and the 5 key on the numerical pad) include tactile marks?	no	no	minor	moderate	no	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Keys, keyboards and keypads	Is tactile and sound feedback provided for key pressing?	moderate	Severe	minor	moderate	no	no	no
Keys, keyboards and keypads	Is the force required to activate keys 22.2 N maximum?	moderate	Severe	no	no	no	no	no
Keys, keyboards and keypads	Is the keyboard separate from the central processing unit so that it can be replaced by alternative input devices?	moderate	Severe	no	minor	no	no	moderate
Keys, keyboards and keypads	Is the status of all locking or toggle keys discernible	no	no		moderate	moderate	moderate	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	both visually and through touch or sound?							
Keys, keyboards and keypads	Is there any provision for keyguard mounting?	minor	moderate	no	no	no	no	no
Other	Is system start-up and restart accessible?	minor	minor	minor	moderate	no	no	no
Other	Is the computer system built to avoid the generation of electromagnetic or radio frequency fields that can interfere with users with	no	no	no	no	Severe	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
	hearing aids?							
Sounds	Can a volume gain of at least 20 dB above the ambient level be user selectable?	no	no	no	no	moderate	no	no
Sounds	If the product delivers output by an audio transducer which is normally held up to the ear, is there any means for effective wireless coupling to hearing aids?	no	no	no	no	moderate	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Sounds	If the product delivers speech output, are there mechanisms for private listening and interruptability?	no	no	minor	moderate	no	no	no
Sounds	Is all important audible output also provided in visual form?	no	no	no	no	moderate	Severe	no
Sounds	Is the internal central unit speaker located at the front edge of the computer and directed to the user?	no	no	no	no	minor	no	no

Component	Questions to Ask	Disability Category						
		Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cog.
Sounds	Is there a means to easily reset the volume to the user's volume setting?	no	no	no	no	moderate	no	no
Sounds	Is there a physical (or software) volume control?	no	no	minor	moderate	Severe	no	no
Sounds	Is there an interface so that use of system sounds can be known to software?	no	no	no	no	moderate	Severe	no

Controls Accessibility Evaluation Matrix by Disability

Questions to Ask	Visual	Hearing	Physical	Cognitive
Are any icons meaningful and simple?	minor	no	no	severe
Are colors used as the only way information is linked together?	severe	no	no	moderate
Are different parts of the user interface at different distances?	moderate	no	no	no
Are error messages clear and simple, revealing the problem and solution?		no	no	severe
Are finger / hand reference points available?	moderate	no	minor	minor

Questions to Ask	Visual	Hearing	Physical	Cognitive
Are frequently used controls easy to access?	severe	no	severe	moderate
Are instruction manuals available in alternative media?	severe	no	no	minor
Are similar controls grouped together?	moderate	no	no	moderate
Are the active controls clearly distinguished from labels and displays?	severe	no	no	severe
Are the controls large enough?	moderate	no	severe	no
Are the controls located between waist and shoulder height?	minor	no	severe	no
Are the interfaces, messages and labels consistent?	severe	no	no	severe

Questions to Ask	Visual	Hearing	Physical	Cognitive
Are the labels and instructions large and clear?	severe	no	no	moderate
Are the labels obscured when the control is used?	minor	no	no	minor
Are the labels perpendicular to the user's line of sight?	severe	no	minor	no
Are there time limits the user should respond within?	severe	no	moderate	minor
Can shortcut controls be assigned?	moderate	no	no	moderate
Can tactile marking be confused with one another?	severe	no	no	minor
Can the controls be differentiated tactually?	moderate	no	no	no

Questions to Ask	Visual	Hearing	Physical	Cognitive
Can the controls be operated in low illumination conditions?	moderate	no	minor	moderate
Can the controls be used with one hand?	minor	no	severe	no
Can the default settings be easily reset?	minor	minor	minor	minor
Can the interface be customized / configured by the user?	moderate	no	no	moderate
Do controls move as people expect them to move?	moderate	no	moderate	severe
Do push buttons have a concave surface?	moderate	no	minor	minor
Does one control perform more than 2 functions?	moderate	no	no	severe

Questions to Ask	Visual	Hearing	Physical	Cognitive
Does the control shape relate to the function?	minor	no	no	moderate
Does use require multi-tasking?	minor	no	minor	severe
If lights are used to indicate operation, are these maintained?	minor	minor	minor	minor
Is a lot of force required to operate the control?	no	no	severe	minor
Is an appropriate typeface used with good contrast on a plain background?	severe	no	no	moderate
Is auditory feedback provided?	severe	no	no	no
Is it clear what mode the user is operating in?	severe	no	minor	severe
Is speech output of		no	no	minor

Questions to Ask	Visual	Hearing	Physical	Cognitive
key presses provided?				
Is tactile feedback provided?	severe	no	no	no
Is the screen placed appropriately to the controls?	moderate	no	no	moderate
Is there a facility for correcting input errors?	moderate	no	moderate	moderate
Is there a headphone socket for speech output?	severe	minor	no	no
Is there a logical sequence of operations?	moderate	no	no	
Is there a minimal time delay between control operation and feedback?	minor	no	no	moderate
Is there a raised dot on the number		no	no	minor

Questions to Ask	Visual	Hearing	Physical	Cognitive
'5' of a numeric keypad?				
Is there a volume control for the speech output?	severe	severe	no	no
Is there an intelligent help facility?	moderate	no	no	moderate
Is there enough spacing between controls so the next control is not hit?	moderate	no	severe	no
Is training provided in the use of the system?	severe	no	moderate	severe

Displays Accessibility Evaluation Matrix by Disability

Questions to Ask	Visual	Hearing	Physical	Cognitive
Have you allowed for red/green and blue/yellow color blindness?	severe	no	no	no
Is the screen protected from glare?	severe	no	no	no
Is the screen readable from a wheelchair?	no	no	severe	no
Can the user adjust the angle of the display?	moderate	no	moderate	no
Can the user get close to the screen?	moderate	no	no	no
Can the user increase the character size?	moderate	no	no	no
Have you used a legible typeface?	severe	no	no	moderate
Is the text on a plain background	severe	no	no	severe
Have you used scrolling or flashing text?	moderate	no	no	moderate
Have you minimized parallax?	moderate	no	moderate	moderate
Is the language selectable?	no	no	no	no
Have you used standard icons?	minor	no	no	moderate

Documentation Accessibility Evaluation Matrix by Disability

Questions to Ask	Disability Category						
	Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cognitive
Can the documentation on paper be opened at any page without having to be held open?	minor	moderate	no	no	no	no	no
Do end-users have access to a description of the accessibility features in alternate formats at no additional	minor	moderate	moderate	Severe	minor	minor	minor

Disability Category							
Questions to Ask	Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cognitive
charge?							
Do support services accommodate the communication needs of end-users with disabilities?	minor	minor	minor	minor	minor	minor	minor
Is a gloss finish of the paper in the documentation avoided?	no	no	moderate	no	no	no	no

Disability Category							
Questions to Ask	Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cognitive
Is graphical information accompanied by a textual description of its content?	no	no	minor	moderate	no	no	no
Is information that is exclusively supported by color avoided?	no	no	moderate	no	no	no	no
Is the product documentation available in alternate formats upon request, at no additional charge?	minor	moderate	moderate	Severe	no	no	minor

Disability Category							
Questions to Ask	Physical	Severe Physical	Low Vision	Blind	Hard of Hearing	Deaf	Cognitive
Is there high contrast between the color of the paper and the type?	no	no	moderate	no	no	no	no

Keyboards / Keypads Accessibility Evaluation Matrix by Disability

Questions to Ask	Visual	Hearing	Physical	Cognitive
Are the keys color coded according to the relevant standard?	moderate	no	no	moderate
Are the keys internally illuminated when active?	minor	no	no	moderate
Are the keys laid out in a logical sequence?	severe	no	no	severe
Are the keys tactually discriminable by shape?	moderate	no	no	minor
Are the keys well spaced?	severe	no	severe	moderate
Can the keys be used by someone in a wheelchair?	no	no	severe	no
Can the system be used comfortably by someone who is left-handed?	no	no	no	no
Do the keys have concave tops?	minor	no	severe	no
Does using the keypad obscure the instructions or legends?	minor	no	no	minor

Questions to Ask	Visual	Hearing	Physical	Cognitive
Has a legible typeface been used to mark the keys?	severe	no	no	moderate
Is the '5' key marked tactually?		no	no	minor
Is the layout according to the relevant standard?	severe	no	no	severe
Is there auditory feedback on key press?	moderate	no	moderate	minor
Is there tactual feedback on key press?	moderate	no	moderate	minor

Help Systems: Guidelines for Accessibility

Instruction books:

The writing of instruction books should not be left to the end of a design project. Instructions should be tested on a range of potential users. The technical designers of a system should not be the only persons to write instructions, especially for non-technical users.

It will be of help to all people if information can be delivered in different ways and with thought for those with impairments. Alternative formats, such as large print and audio tape, are essential to visually impaired and dyslexic users. New technologies such as wireless systems and smart cards make it possible to design new ways to deliver information.

Help facilities:

Having problems in using an ICT system is not unique to disabled and elderly people, but they are more likely to have problems. A well designed system will provide, at the right time, appropriate relevant help in a form suitable for the user. However it is easier to specify than to implement, but this should not be used as an excuse for ignoring the problems faced by users and potential users.

Error messages must be in a meaningful form for the user so that they understand why it happened and what they need to do to rectify the situation. It is important that they are not "timed out" while correcting their errors.

Error messages should not put the blame on the user, and should appear within a few seconds of the error occurring. The user should be able to go back to the task being performed just before the error occurred. When it is practicable, many users would find it beneficial to obtain some human assistance. This may just be an audio link (e.g. via a telephone handset), but many intellectually impaired and hearing impaired users would prefer a video link.

The guidelines include the following recommendations:

- Guidance should be readily distinguishable from other displayed information.
- Provide the user with specific information relative to the task context rather than a generic message.
- Provide information on how to recover from errors.
- Indicate permitted range of values or syntax for user response.
- Ideally, multi-modal help should be provided.
- Allow skilled users the option of switching off help prompts if they are not required.
- Keep spoken messages short and simple.
- Do not use abbreviations in audio messages.
- Allow users to interrupt the help at any time and return to the task.
- An intelligent help facility is not an adequate solution to a poor user interface.