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241
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台灣醫療暨生技器材工業同業公會 收 107.12.10 文 檔號：107824

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主旨：請就本局編擬之CNS 草-制1071030無障礙設計－公共廁所之沖水按鈕及呼叫按鈕形狀及顏色及其與安裝於牆上供紙器間之配置等4種國家標準草案惠提意見，如無意見亦請在空白意見書上註明無意見，並請於108年2月20日前惠復（或電子郵件寄jerrycr.wu@bsmi.gov.tw）本局第一組第四科吳啟瑞。

說明：檢附上開草案暨空白意見書各1份 。

正本：王委員鴻祥、何委員達仁、林委員欽德、林委員睿哲、胡委員昌明、常委員挽瀾、張委員乃修、張委員力山、張委員惠美、許委員世輝、郭委員介誠、黃委員銘智、楊委員聖弘、劉委員杰柟、鄭委員孟淙、鄭委員宗記、盧委員武雄、衛生福利部社會及家庭署、內政部營建署、內政部建築研究所、中華民國人因工程學會、中華民國工業設計協會、中華民國老人福利推動聯盟、中華民國脊髓損傷者聯合會、中華民國無障礙科技發展協會、台北市無障礙資源推廣協會、台灣室內空間設計學會、台灣省私立台灣盲人重建院、台灣創意設計中心、台灣障礙者權益促進會、台灣醫療暨生技器材工業同業公會、自由空間基金會、社團法人中華民國身心障礙聯盟、社團法人中華視障聯盟、社團法人台灣失智症協會、社團法人台灣衛浴文化協會、財團法人台灣電子檢驗中心、財團法人自行車暨健康科技工業研究發展中心、財團法人金屬工業研究發展中心(北區)、陽明大學物理治療暨輔助科技學系、愛盲基金會、臺北市立啟明學校、經濟部標準檢驗局第六組

副本：經濟部標準檢驗局第一組

CNS 草-制 1071030 無障礙設計－公共廁所之沖水按鈕及呼叫按鈕形狀及顏色及其與安裝於牆上供紙器間之配置等 4 種國家標準草案審查意見書

此致　　經濟部標準檢驗局　第一組第四科吳啟瑞　　共　頁第　頁

草案編號	節　次	審　查　意　見
	編修說明： 為落實國內輔具產品市場相關檢驗法標準化之目標，以期保障消費者權益，促進國內輔具產業之發展，制定此 4 種無障礙設計相關國家標準。	

審查委員或單位簽名（請務必填寫）：

文號：經標一字第 1071001951 號、108 年 2 月 20 日截止（請不必備文，本表若不敷使用，請自行影印）、倘需各標準草案或意見書空白表電子檔，請以 E-mail(jerrycr.wu@bsmi.gov.tw)來函索取。

標準檢驗局承辦人：吳啟瑞

ICS 91.040.10;13.180

中華民國國家標準

CNS

無障礙設計－公共廁所之沖水按鈕及呼叫按鈕形狀及顏色及其與安裝於牆上供紙器間之配置

Accessible design − Shape and colour of a flushing button and a call button, and their arrangement with a paper dispenser installed on the wall in public restroom

CNS 草-制
1071030:2019
S3

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前言

本標準係依據 2015 年發行之第 1 版 ISO 19026，不變更技術內容，制定成為中華民國國家標準者。

本標準係依標準法之規定，經國家標準審查委員會審定，由主管機關公布之中華民國國家標準。

依標準法第四條之規定，國家標準採自願性方式實施。但經各該目的事業主管機關引用全部或部分內容為法規者，從其規定。

本標準並未建議所有安全事項，使用本標準前應適當建立相關維護安全與健康作業，並且遵守相關法規之規定。

本標準之部分內容，可能涉及專利權、商標權與著作權，主管機關及標準專責機關不負責任何或所有此類專利權、商標權與著作權之鑑別。

1. 適用範圍

本標準規定安裝在廁所牆壁上之沖水按鈕(flushing button)及呼叫按鈕(call button)形狀及顏色，及其與供紙器(paper dispenser)之配置。本標準僅適用於在非特定大量人群使用之坐式公共廁所(具一般馬桶隔室及有各種功能的馬桶隔間)牆壁上安裝之沖水按鈕及/或呼叫按鈕，排除很難在紙架上放置沖水按鈕及通話按鈕之具有大型紙架的廁所及 ISO 21542 兩側橫向移動的 A 型廁所。

2. 引用標準

下列標準因本標準所引用，成為本標準之一部分。下列引用標準適用最新版(包括補充增修)。

ISO 21542:2011 Building construction − Accessibility and usability of the built environment

3. 用語與定義

下列用語及定義適用於本標準。

3.1 公共廁所(public restroom)

安裝在鐵路車站、機場、公園、禮堂、醫院、百貨公司、酒店、辦公室等大眾化公共建築及設施中，供非特定大量人群使用之廁所。

3.2 一般廁所隔間(general toilet compartment)

隔間設置有座椅式洗手間，沒有特別考慮輪椅使用者。

3.3 多功能之廁所隔間(toilet compartment with various functions)

大的隔間設置有座椅式洗手間，考慮輪椅使用者、嬰兒及/或小孩。

3.4 沖水按鈕

馬桶沖水設備的按鈕開關。

3.5 呼叫按鈕

輔助警報按鈕開關。

3.6 供紙器

容納衛生紙的設備。

4. 沖水按鈕及呼叫按鈕之形狀

沖水按鈕之形狀應為圓形或橢圓形。呼叫按鈕之形狀透過觸摸可容易地與沖水按鈕區分(如四邊形、矩形或三角形)。沖水按鈕及呼叫按鈕尺寸應易於手指、手掌或手的頂部推動。

按鈕高度應該從周圍表面突出，並使具有視覺障礙人士可透過觸摸識別按鈕。

5. 沖水按鈕及呼叫按鈕之顏色與對比

沖水按鈕及呼叫按鈕顏色及其與周圍顏色之對比定義如下。

備考：本標準中提及之周圍是指與沖水按鈕及呼叫按鈕相鄰之區域。

5.1 按鈕顏色

沖水按鈕及呼叫按鈕的顏色應足以區分彼此之不同。

備考：呼叫按鈕因其輔助警報目的，顏色通常為紅色。

5.2 沖水按鈕及呼叫按鈕顏色及其與周圍顏色之對比

應保持沖水按鈕及呼叫按鈕的顏色與周圍顏色間之對比(視覺對比參照 ISO 21542:2011 B.7)。

6. 沖水按鈕、呼叫按鈕及供紙器之配置

沖水按鈕、呼叫按鈕及供紙器之配置定義如下。

(a) 沖水按鈕、呼叫按鈕及供紙器應以大多數使用者可操作及視覺障礙者容易識別之方式配置。應考量不同姿勢如坐姿及站姿。

(b) 沖水按鈕、呼叫按鈕及供紙器應以群聚配置在同一面牆上。

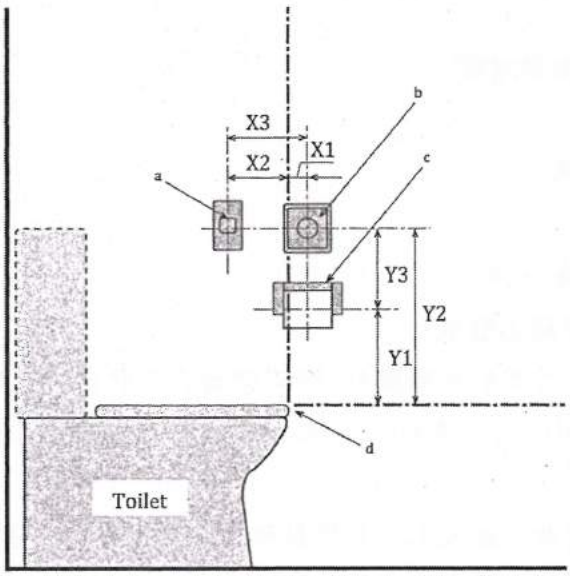
(c) 沖水按鈕應安裝於供紙器之上方。呼叫按鈕應與沖水按鈕同一高度，且在馬桶座位前方或後方。

(d) 沖水按鈕、呼叫按鈕及供紙器之位置應符合圖 1 及表 1 條件。

(e) 若其他設備如扶手、溫水洗滌設備之遙控器及/或洗手盆與沖水按鈕、呼叫按鈕及供紙器安裝在同一牆面時，這些設備應以不妨礙沖水按鈕、呼叫按鈕及供紙器使用之方式配置之。

(f) 即使由於供紙器之形狀或隔室側壁的表面狀況，尺度不符合圖 1 及表 1，也應維持(c)所述之位置關係。

(g) 另一個呼叫按鈕或拉繩應置放之最低高度應為 100 mm，並朝向沖水按鈕之前側，以讓使用者甚至在跌倒姿勢都可輕鬆操作。



說明

a 呼叫按鈕　　c 供紙器

b 沖水按鈕　　d 馬桶座上表面頂端

圖 1　呼叫按鈕、沖水按鈕及供紙器之配置

表 1　呼叫按鈕、沖水按鈕及供紙器之配置及尺寸

單位：mm

<table>
<tr><th>設備</th><th>離馬桶座上表面頂端
(基準點)之水平距離</th><th>離馬桶座上表面頂端(基準點)之垂直距離</th><th>二者相距距離</th></tr>
<tr><td>供紙器</td><td rowspan="2">X1：距馬桶座前方距離
大約 0 至 100</td><td>Y1：距馬桶座前方距離
大約 150 至 400</td><td>—</td></tr>
<tr><td>沖水按鈕</td><td rowspan="2">Y2：距馬桶座前方距離
大約 400 至 550</td><td>Y3：大約 100 至 200
距滾筒衛生紙之
垂直距離</td></tr>
<tr><td>呼叫按鈕</td><td>X2：距馬桶座後方距離
大約 100 至 200</td><td>X3：大約 200 至 300
距沖水按鈕之水
平距離</td></tr>
</table>

參考資料

相對應國際標準

ISO 19026:2015　Accessible design – Shape and colour of a flushing button and a call button, and their arrangement with a paper dispenser installed on the wall in public restroom

ICS 13.180

中華民國國家標準

CNS

使用圖畫符號之溝通輔助板設計準則

Design principles for communication support board using pictorial symbols

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前言

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1. 適用範圍

為促進溝通，本標準規定溝通輔助板之基本架構。可依特定溝通目的設計各種溝通輔助板。

本標準規定不同類型之格式/媒體之共同基本要素，如簡單板、書籍方式或數位媒體。本標準不規定溝通輔助板之任何特定設計或任何特定圖形符號。

關於圖形符號之設計原則，本標準介紹在設計及開發圖形符號時適用之設計原則範例。

備考： 用於創建圖形符號之基本模式之例，參照附錄 A。使用圖形符號之溝通輔助板之例，參照附錄 B 及附錄 C。

2. 用語與定義

下列用語及定義適用於本標準。

2.1 圖形符號(graphical symbol)

獨立於語言之外，具用於傳輸信息之特定含義視覺可感知之圖形。

(來自 ISO 17724:2003)

2.2 圖畫符號(pictorial symbol)

包括表示及抽象符號之視覺圖，有時會多種組合使用。

2.3 溝通輔助板(communication support board)

用來支持有溝通困難的人的工具。

備考 1. 其可用於各種情況及地方，如私人、公共及教育用途。

備考 2. 此包括口頭溝通或語言表達有溝通障礙者。

3. 溝通輔助板基本架構

3.1 板(board)

(a) 尺寸

尺寸應適用於其預期之使用者及用途。

(b) 材料

溝通輔助板可使用紙或塑膠製成。

若使用紙，建議表面層使用可以寫字及擦去之材料。

(c) 格式/媒體

可使用下述不同形式之格式/媒體。

(1) 單頁之溝通輔助板。

(2) 尤其在需要數頁時，書本形式會更加實用。

(3) 數位媒體。

當溝通輔助板由數頁組成時，建議按類別分類，如運輸設施、食物和飲料、依日常生活順序排列等。

備考：溝通輔助板之例參照附錄 C。

(d) 背景顏色

建議使用白色背景。但為了效果，板的背景可為彩色，不包括符號。

當在單個板上顯示多個符號時，建議板使用白色背景，以與大多數為黑色背景的各個符號之形成對比。

備考：背景顏色參照圖 C.6。

3.2 指示項目

(a) 標題

標題應位於溝通輔助板之上部，以便易於理解預期用途。數位媒體它應出現在第一幕上。標題可由圖畫符號及/或文字組成。

(b) 字體

溝通輔助板上所使用之字體，應依下述準則仔細選擇。

無襯線字體或帶有非常小襯線之字體。

正常或粗體。

備考：字體範例參照附錄 E。

(c) 語言

當需要文字時應使用中文，為方便溝通輔助板使用，文字可翻譯成英文。在使用多國語言情況下，在一個單板上應限制 4 種語言。

在數位媒體中，應透過改變屏幕或配置來實現多種語言之改變。

(d) 圖畫符號

(1) 一個板上之符號設計應一致。

(2) 符號應與背景形成對比，並響應安全顏色。

(3) 圖畫符號應清楚、簡明及醒目。

當使用圖片或照片時，得使用高解析度。

(e) 圖畫符號布局

(1) 在一個框中，相同類別內之圖片符號與其他信息(如文字或符號)應區分開，且依序排列(參照圖 1)。

(2) 為使每個符號都是清晰且可識別，依格式/媒體之尺寸，其圖形符號之數量應適當。

備考：範例參照圖 C.4。

(3) 關於安全及緊急情況之圖形符號，具有高度優先，且應設置於溝通輔助板之最上方。

(4) 可結合圖畫符號及圖形符號使用。

(5) 可結合圖畫符號、照片及插圖使用。

(6) 動畫功能可用於數位媒體。

(7) 在單個板上，用以表示常見答案及短語，如“是”、“否”及“不知道”之圖畫符號應置於方便交談處。

備考：結合圖畫符號、照片及插圖使用之例參照附錄 B。

(f) 字幕

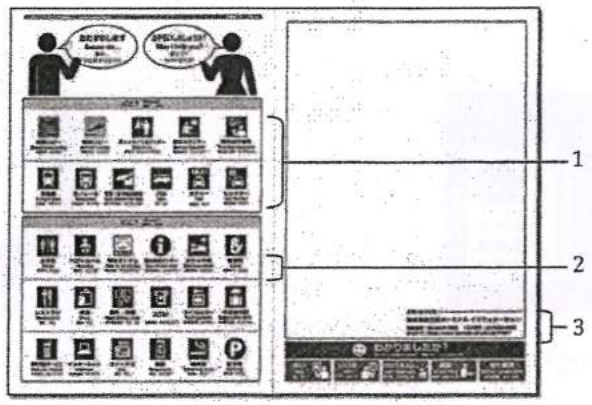
當使用字幕來解釋圖形符號之含義時，其應位於圖形符號之上方或下方區域。

(g) 空白處

在溝通輔助板前面或背面提供用於書寫補充問題之空白。

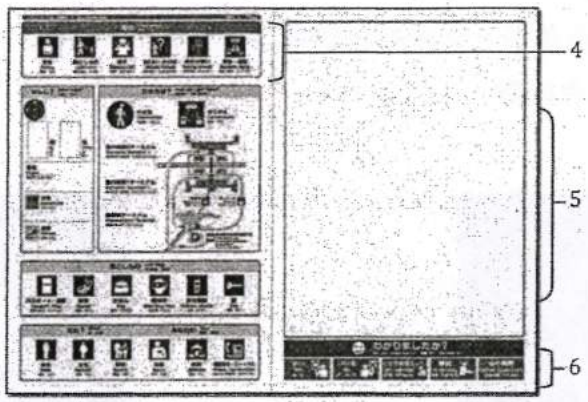
(h) 出版者

有關出版者及可進行查詢之訊息應置於溝通輔助板之下半部或背面。在數位媒體中，它應該出現在最後一幕。



左側　　右側

前頁



左側　　右側

次頁

說明

1 結合圖畫符號及圖形符號

2 解釋圖畫符號含意之字幕

3 出版者及諮詢之資訊

4 高度優先圖畫符號應配置在最上部位

5 書寫補充問題之空白

6 一般答案及短語

圖 1　布局範例

4. 設計圖形符號原則

以下原則涉及圖形符號的設計。

(a) 一致性

當創建新圖形符號時，應當與現有之圖形符號及相同類別之圖形符號保持一致性。若已於社會中廣泛使用之常用符號適用於圖形符號，則須檢查它們之間調和性。若符號為國際標準所接受，則應特別考慮避免與其他圖形符號混淆(參照圖 2 及圖 3)。

備考：參照 ISO 7001

圖 2　電話

圖 3　電話

(b) 純色或輪廓

原則上，在黑色背景上之圖形符號應以白色繪製(參照圖 4 及圖 5)。但可在白色背景上使用黑色繪製。

圖 4　黑色背景

圖 5　繪製對象用白色(藥房)

(c) 簡單表示

圖畫符號應簡單清楚地繪製。它應表達基本特徵，以便於觀察者容易地識別以促進溝通(參照圖 6 及圖 7)。

圖 6　狗

圖 7　胃痛

(d) 對比表示

可一對同時出現表示配對概念(如大與小)，以增強可理解性(參照圖 8 及圖 9)。

圖 8　大

圖 9　小

(e) 主題澄清

當一組的一部分在圖形符號中出現時，主要對象應該聚焦於白色，而其他事物可用白線繪製(參照圖 10 及圖 11)。

圖 10　朋友

圖 11　騎馬教練

(f) 細節表示

當顯示類別中的類似物體時，重要的是注意用於溝通目的之典型特徵，如自行車踏板，機車引擎，柿子的莖及番茄(參照圖 12、圖 13、圖 14 及圖 15)。

圖 12　自行車

圖 13　機車

圖 14　柿子

圖 15　番茄

(g) 線寬

對於一個圖形符號，優先使用不超過兩種寬度來繪製線(參照圖 16 及圖 17)。繪製圖形符號之細節，參照附件 A。

圖 16　遊樂園

圖 17　超市

(h) 自然描述

代表生物或自然的圖畫符號應保持其基本特徵(參照圖 18 及圖 19)。

圖 18　河流

圖 19　鳥

人類特徵之圖形符號應代表自然之人類形式(參照圖 20 及圖 21)。

圖 20　男生

圖 21　跑步

(i) 動作表示

作為在圖形符號中表示動作之技術，可使用箭頭表示之(參照圖 22 及圖 23)。動畫功能可用於數位媒體中。

圖 22　拿

圖 23　放

(j) 符號之結合

當設計圖形符號時，已經建立之圖形符號可組合在同一張中，如“兒童”與“學校”結合意味著“幼兒園”(參照圖 24)。其他結合範例參照圖 25、圖 26、圖 27 及圖 28。

圖 24　幼兒園

圖 25　學校朋友

圖 26　輪椅舞蹈

圖 27　想法

圖 28　停車場

(k) 位置之識別

在有建築物圖像格式內的項目或活動的繪製符號有助於識別，以得到這些項目之位置，並區分這些項目與這些位置。

備考：來自位置之項目之例如下述。

- 藥物來自藥房(參照圖 5)。
- 購物推車/雜貨來自超市(參照圖 17)。
- 戶外停車來自停車場(參照圖 28)。

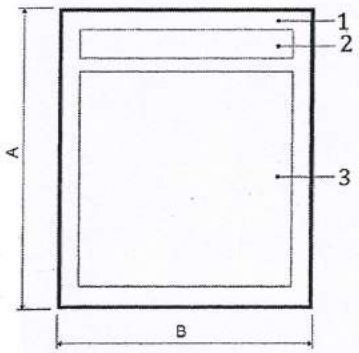
附錄 A
(參考)
創建圖形符號原始形式之範例 － 基本模式

A.1 一般

本附錄規定用以創建圖形符號原始形式之基本模式。

A.2 基本模式

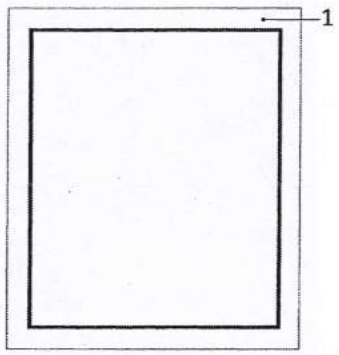
基本模式分別於圖 A.1 及圖 A.2 說明之。



說明

1 基本區域

圖 A.1 基本模式



說明

1 邊框

2 文字區域

3 主題區域

圖 2 含邊框之基本模式

A.3 創建準則

A.3.1 基本區域

用以創建圖形符號、特定格式之基本模式應予以識別(參照圖 A.1 及圖 A.2)。圖形符號應繪製在方形 A×B 中，邊界至少為 A 的 1 %。

A.3.2 含文字之基本區域

文字可包含在基本區域中，並應放置在圖形符號上方。

A.3.3 加邊框之基本區域

可以在基本區域周圍加邊框。

A.3.4 圖畫符號之線寬

用於創建圖形符號之基本線寬應至少為 1 mm。但為了增強可理解性、可視性、可讀性及加工技術之實用性，可以改變線寬。

附錄 B
(參考)
圖片符號、照片及插圖之組合

為了方便溝通，圖片符號可以與照片及插圖結合使用。 符號也可以用照片及插圖替代(參照圖 B.1、圖 B.2、圖 B.3 及圖 B.4)。

圖 B.1　我們正在看蜘蛛及螞蟻

圖 B.2　醫生照片

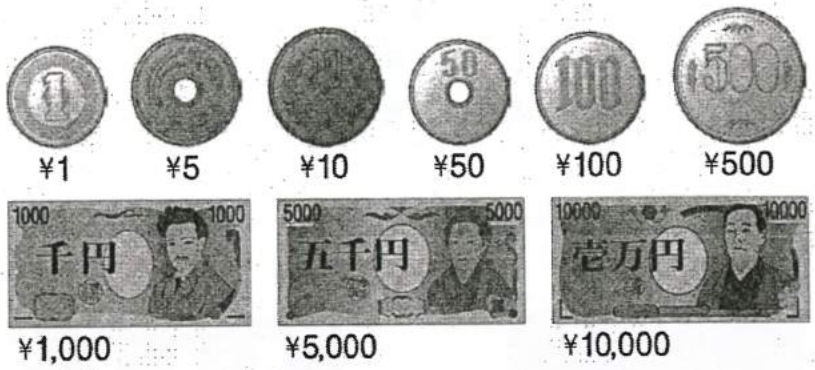


圖 B.3　貨幣例證

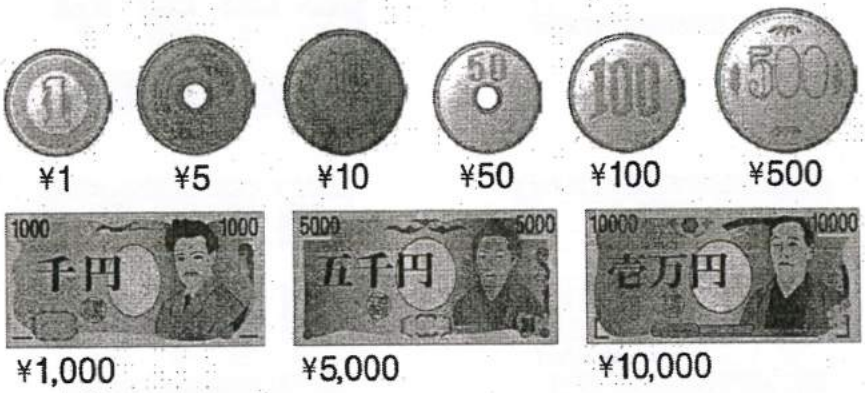


圖 B.4　貨幣照片

附錄 C

(參考)

溝通輔助板分類 1

本附錄提供本標準所述之溝通輔助板之例。

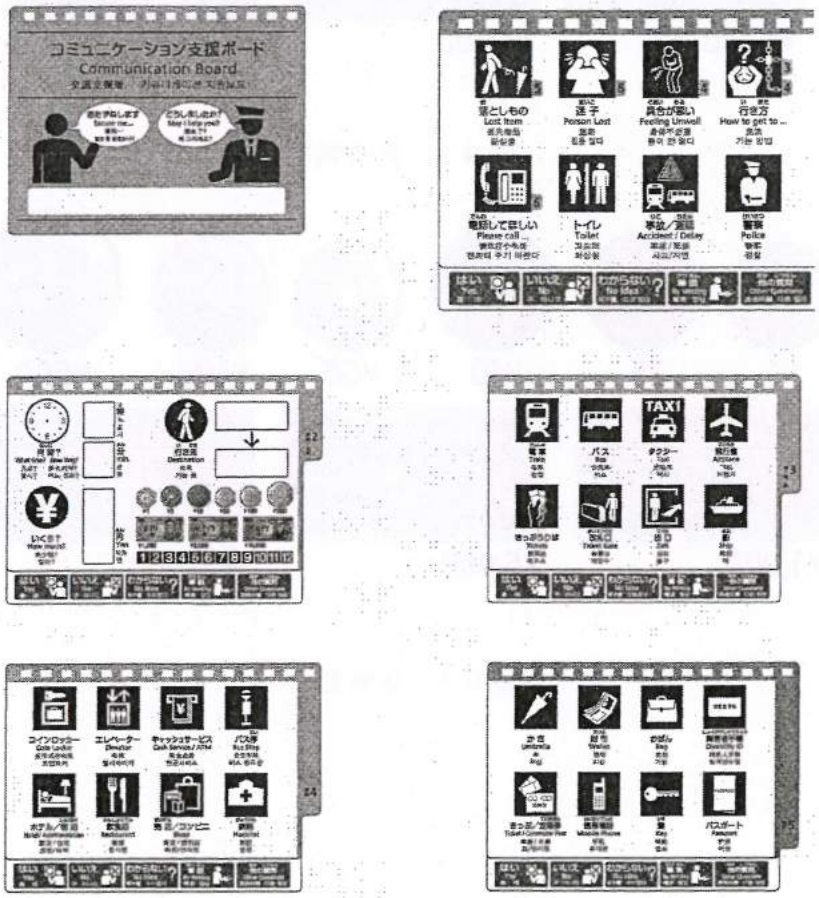


圖 C.1　日本公共運輸溝通輔助板範例

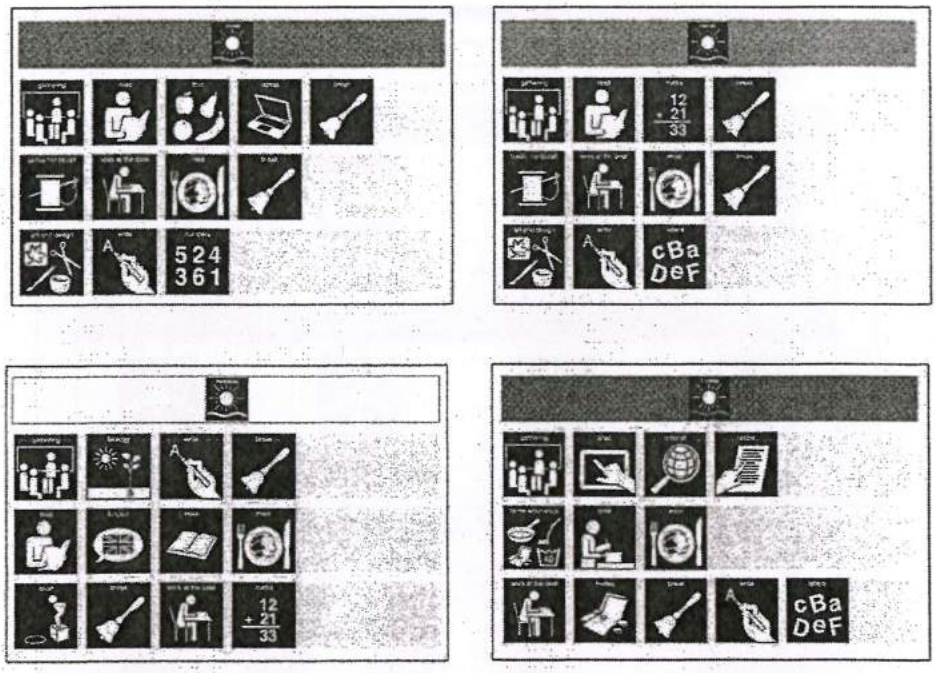


圖 C.2　瑞典學校周一至週五行事曆溝通輔助板範例

圖 C.3　日本機場報到櫃台溝通輔助板範例

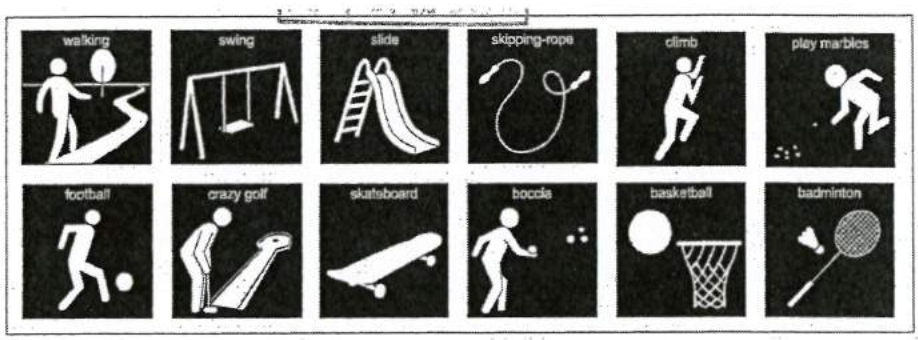


圖 C.4　瑞典選擇休閒活動溝通輔助板範例

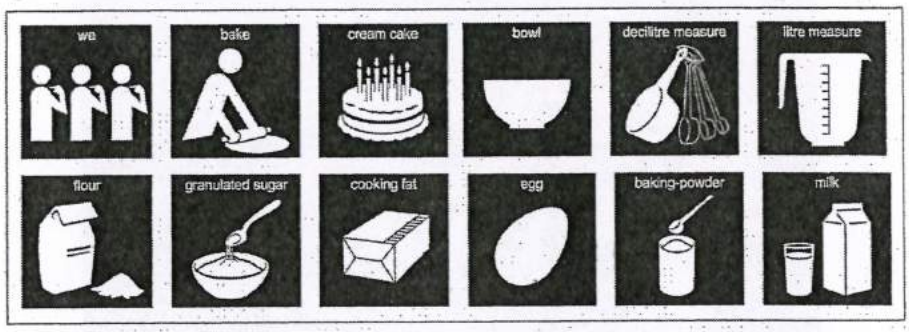


圖 C.5　瑞典烘烤蛋糕溝通輔助板範例

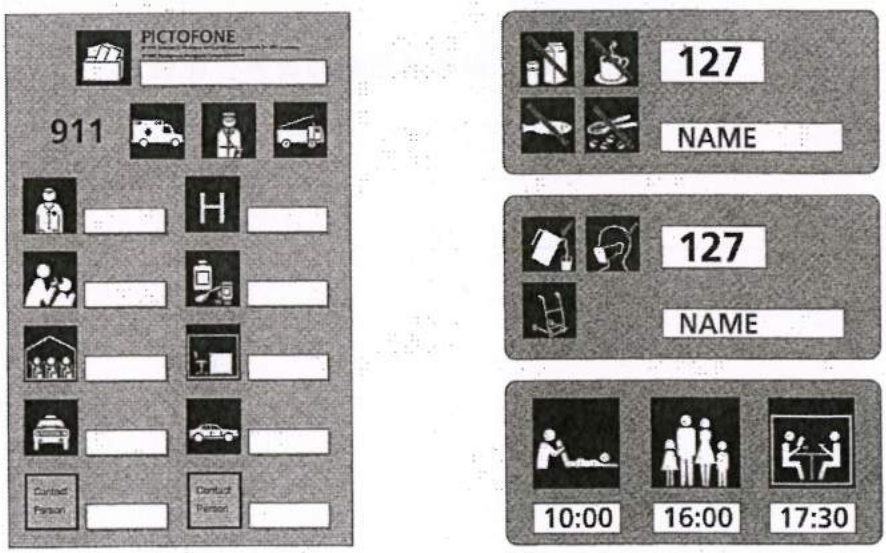


圖 C.7　加拿大醫院及保健設施溝通輔助板範例

圖 C.7　日本數位媒體溝通輔助板範例

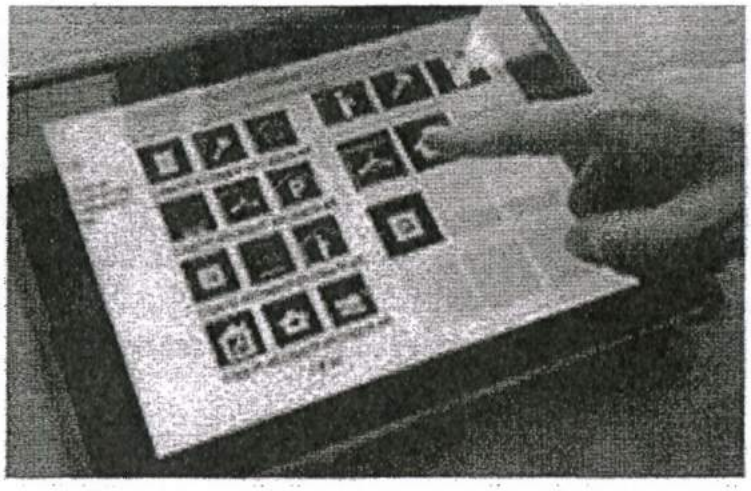


圖 C.8　日本數位媒體溝通輔助板另一範例

附錄 D
(參考)
溝通輔助板分類 2

本附件提供不使用本標準中提出之設計圖形符號原則的溝通輔助板之設計範例。

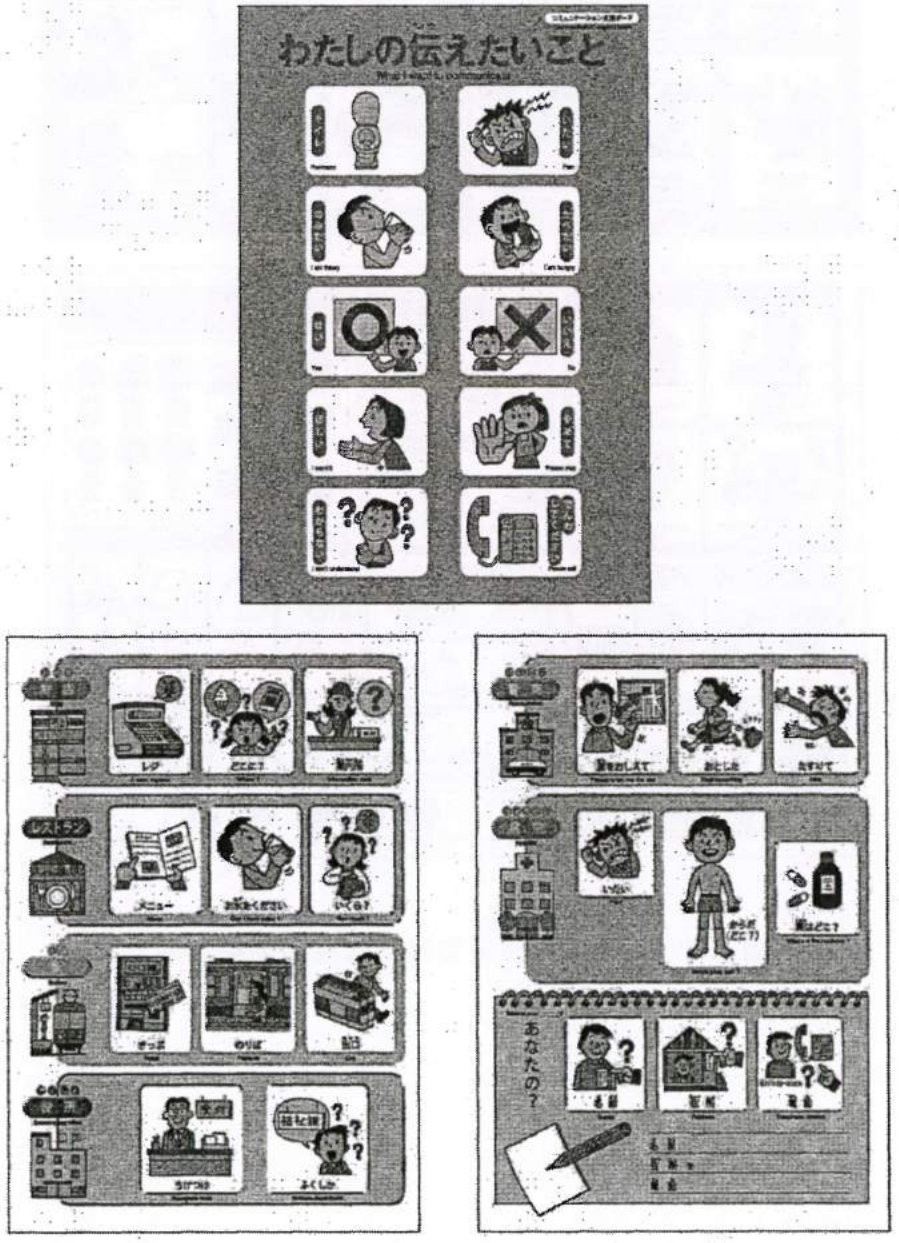


圖 D.1　日本公共機構溝通輔助板範例

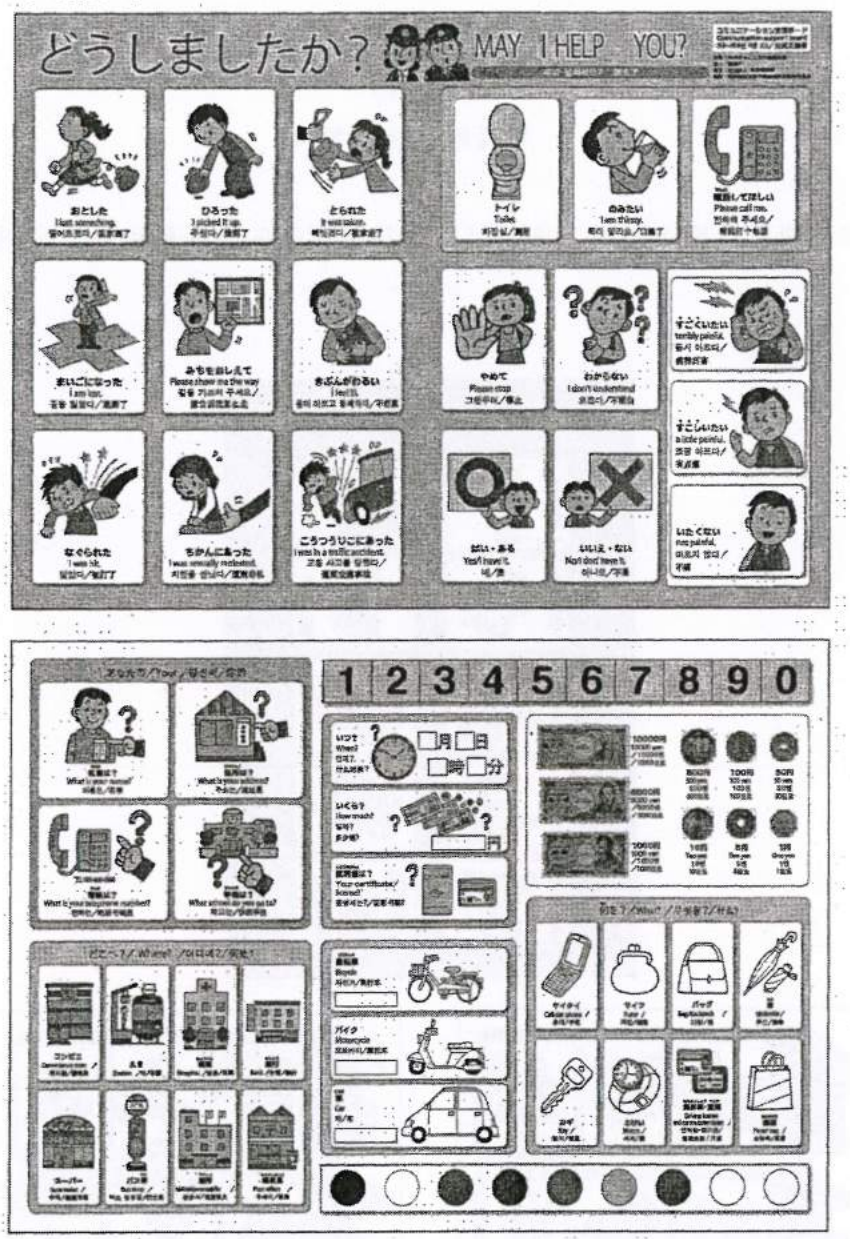


圖 D.2　日本警察局及警察箱溝通輔助板範例

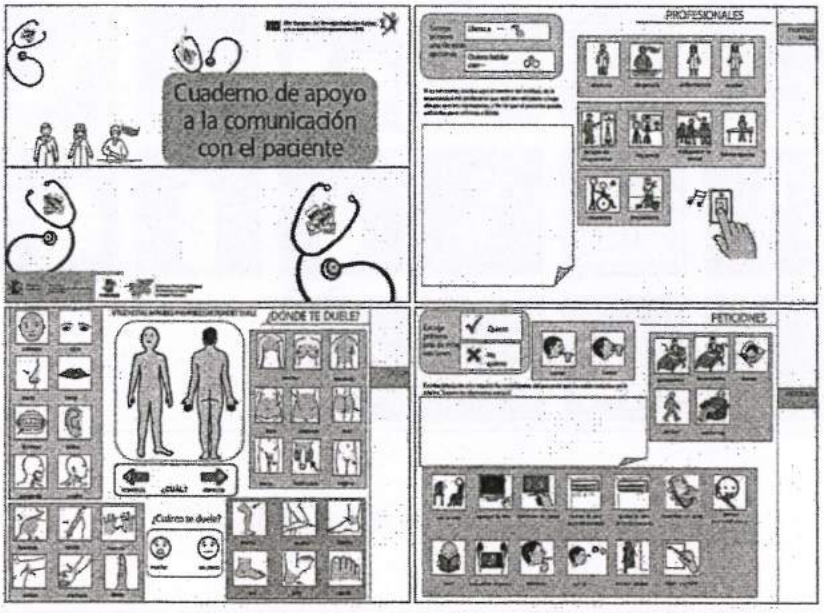


圖 D.3　西班牙醫院溝通輔助板範例

圖 D.4　馬拉加(西班牙)溝通輔助板範例

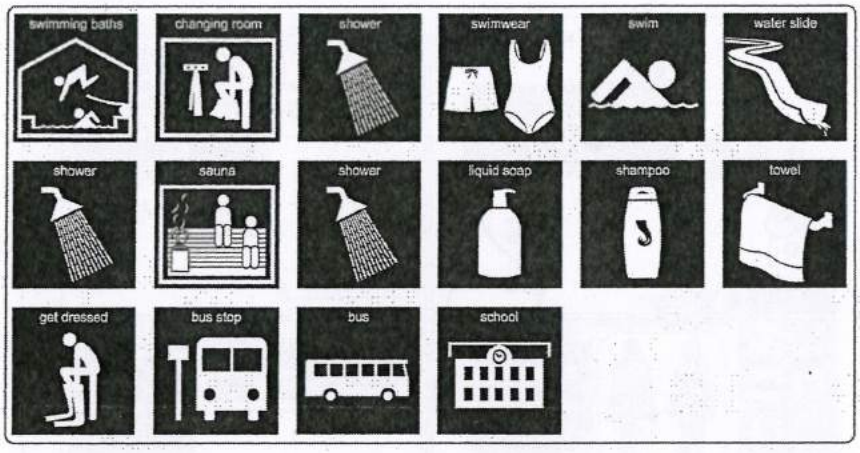


圖 D.5　瑞典游泳溝通輔助板範例

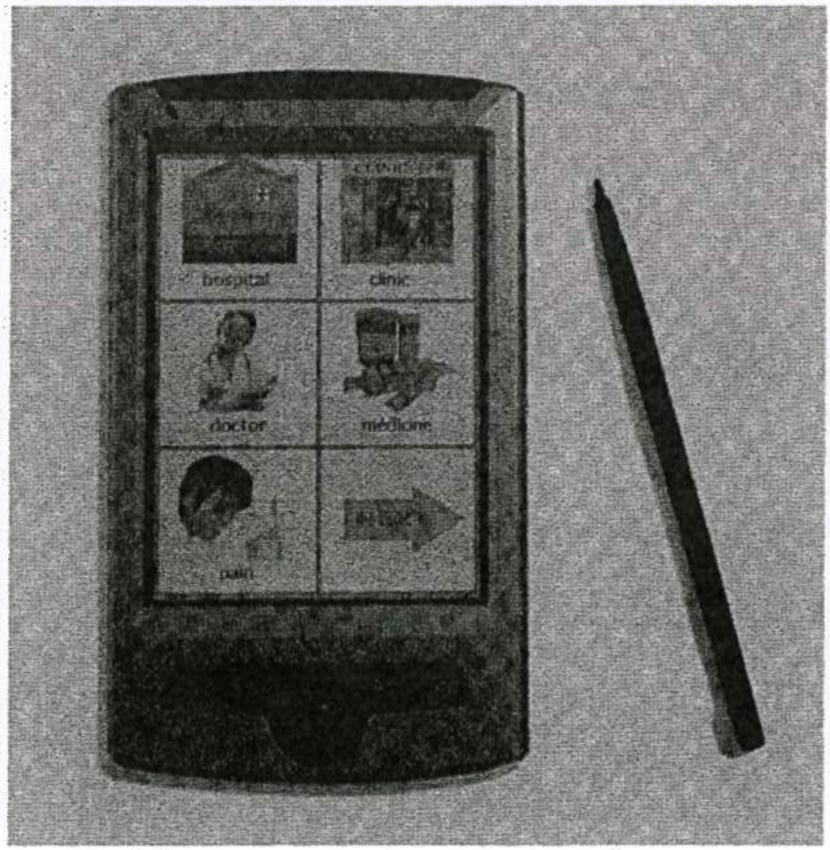


圖 6　在 PDA 上呈現圖示符號、插圖及照片之範例

附錄 E
(參考)
字體示例

本附件提供了容易閱讀之無襯線字體示例。

ABCDEFGHIJKKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz 0123456789

ABCDEFGHIJKKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz 0123456789

コミュニケーション支援ボード 名前住所電話日月火水木金土 あいうえおかきくけこ

コミュニケーション支援ボード 名前住所電話日月火水木金土 あいうえおかきくけこ

參考資料

[1] ISO 3864-1 Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings

[2] ISO 3864-2 Graphical symbols – Safety colours and safety signs – Part 2: Design principles for product safety labels

[3] ISO 7000 Graphical symbols for use on equipment – Registered symbols

[4] ISO 7001 Graphical symbols – Public information symbols

[5] ISO 7010 Graphical symbols – Safety colours and safety signs – Registered safety signs

[6] ISO 17724:2003 Graphical symbols – Vocabulary

[7] ISO 22727 Graphical symbols – Creation and design of public information symbols – Requirements

[8] ISO 80416-2 Basic principles for graphical symbols for use on equipment – Part 2: Form and use of arrows

[9] IEC 80416-1 Basic principles for graphical symbols for use on equipment – Part 1: Creation of graphical symbols for registration

[10] IEC 80416-3 Basic principles for graphical symbols for use on equipment – Part 3: Guidelines forthe application of graphical symbols

[11] JIS Z 8210:2002 Public information symbols

[12] JIS T 0103:2005 Design principles of pictorial symbols for communication support

[13] JIS S 0101:2000 Graphical warning symbols for consumers

[14] FUJISAWA K. Communication with visual symbols: Japanese version application of PIC edition (Shikaku shinboru de comyunikeshon: Nihonban PIC katsuyo hen). Chiyoda-ku, Tokyo, 2001

[15] SHIMIZU H. Psychology of visual symbols (Shikaku shinboru no shinrigaku). Chiyoda-ku, Tokyo, 2003

[16] Communication support board in public transportation, source: Foundation for Promoting Personal Mobility and Ecological Transportation, 2008

[17] ANA Communication support board, source: All Nippon Airways Co., Ltd., 2009

[18] Libra de comunicaci6n para Espacios Deportivos, source: Ayuntamiento de Malaga, Spain, 2010

[19] Communication support boards, source: Maharaj, S.C. PictoFone (1982) George Reed Foundation, Regina Sk. Canada. & PICTOVIEW Room Displays (2002)

[20] Communication support board, source: Meiji Yasuda Mental Health Foundation, 2003

[21] Communication support board in police version, source: Meiji Yasuda Mental Health Foundation, 2008

[22] Caderno de apoio a comunicaci6n co paciente, source: CEAPAT- IMSERSO, Spain,

2010

[23] Source of PDA quotation – Picture to Speech Communication project, MINDS – Clementi Training & Development Centre Singapore

相對應國際標準

ISO 19027:2016 Design principles for communication support board using pictorial symbols

差異分析

無

ICS 13.180; 11.180.30

中華民國國家標準

CNS

無障礙設計－觸覺導引地圖之訊息內容、形狀及顯示法

Accessible design – Information contents, figuration and display methods of tactile guide maps

CNS 草-制
1071032:2019
S3

中華民國　年　月　日制定公布
Date of Promulgation:　-　-

中華民國　年　月　日修訂公布
Date of Amendment:　-　-

本標準非經經濟部標準檢驗局同意不得翻印

※

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差異分析 ..... 錯誤！尚未定義書籤。

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前言

本標準係依據2016年發行之第 1 版 ISO 19028，不變更技術內容，制定成為中華民國國家標準者。

本標準係依標準法之規定，經國家標準審查委員會審定，由主管機關公布之中華民國國家標準。

依標準法第四條之規定，國家標準採自願性方式實施。但經各該目的事業主管機關引用全部或部分內容為法規者，從其規定。

本標準並未建議所有安全事項，使用本標準前應適當建立相關維護安全與健康作業，並且遵守相關法規之規定。

本標準之部分內容，可能涉及專利權、商標權與著作權，主管機關及標準專責機關不負責任何或所有此類專利權、商標權與著作權之鑑別。

1. 適用範圍

本標準規定提供建築物位置訊息之觸覺導引地圖的訊息內容、形狀及顯示方法，包括用於一般公眾、公共交通及公園，以及附近之周圍環境，包括通往它們的通路，以使有視力損傷及失明者能夠安全順利地在那些設施移動。

2. 引用標準

下列標準因本標準所引用，成為本標準之一部分。下列引用標準適用最新版(包括補充增修)。

ISO 17049	Accessible design – Application of braille on signage, equipment and appliances
ISO 21542:2011	Building construction – Accessibility and usability of the built environment

3. 用語與定義

下列用語及定義適用於本標準。

3.1 觸覺導引圖(tactile guide map)

提供視力損傷及失明者建築物包括公眾、公共交通及公園之內部與外部位置可供識別資訊的訊息地圖。其使用如凸(高起)線及/或凸或具有兩種類型的凹形(雕刻)表面，觸覺標記(3.6)、點字及/或凸起字符(3.10)及/或大印刷字體：其具安裝在設施中及可攜式小冊子二種形式。

3.2 標題(title)

在點字中之簡明文字及/或凸起字符(3.10)用以指示觸覺導引圖(3.1)之內容。

3.3 註釋(commentary)

在點字及/或凸起字符(3.10)內之訊息，以給出觸覺導引圖(3.1)及觸覺標記(3.6)之注意及使用的一般描述。

3.4 刻字(lettering)

字母、數字、單詞或其組合，以在觸覺導引圖(3.1)中標記感興趣之項目。

3.5 圖例(legend)

用於觸覺圖形(3.7)之索引，用以解釋觸覺標記(3.6)及/或點字縮寫，及/或用於觸覺圖的凸起字符(3.10)。

3.6 觸覺標記(tactile marks)

用於觸覺導引圖(3.1)之凸形或凹形標記，以提供設施及設備資訊。

3.7 觸覺圖形(tactile figure)

由凸線及/或凸或凹表面、觸覺標記(3.6)、點字及/或凸起字符(3.10)組成之聚集的浮雕狀圖形。

3.8 印刷字符(printed characters)

用鉛筆、筆及印刷寫的字符，而不是點字。

3.9 大印刷字體(large print)

對具殘餘視力的人具有高可讀性之文字。

3.10 凸起字符(raised characters)

特別設計可藉由觸摸讀取字母及數字組成的凸起/浮雕字符。

3.11 觸覺可讀性(tactile readability)

透過觸摸可輕鬆閱讀點字及其他觸覺訊息。

[來源 ISO 17849-1:2013, 2.5]

3.12 圖標(pictogram)

包括符號加上預期傳達特定訊息的其他圖形元素，如邊框、背景圖案或顏色等組成之圖形。

[來源 ISO 17840-1:2015, 2.14]

3.13 觸覺行走表面指示器(tactile walking surface indicator, TWSI)

標準化之行走表面，用於視覺損傷及失明者訊息。

4. 觸覺導引圖上欲顯示之訊息內容

4.1 觸覺導引圖之組成

觸覺導引圖應由下述內容組成。

(a) 標題。

(b) 註釋。

當觸覺導引圖不需要對內容作任何描述時，可以省略註釋。針對小冊子形式之觸覺圖，註釋可個別放置。

(c) 圖例

若觸覺導引圖僅包含普通且容易識別之觸覺標記，而不需要解釋且不使用點字及凸起字符之縮寫，則可省略圖例。

(d) 觸覺圖形

(e) 其他訊息內容

(1) 比例尺

在適當情況下，為方便導航，圖上應加指示圖中距離之比例尺。

(2) 北方

若適當，應指示北方。

4.2 訊息內容原則

4.2.1 觸覺導引圖應僅限於能掌握旅行地點及/或路徑所需之最少訊息。

在觸覺導圖中提供之訊息量，大部分由觸覺圖之目的決定。所提供之訊息不同於地圖是用於指示行駛路線或提供區域之概覽。所有不適用於觸覺導引圖之預期目的的信息應予以省略。

例： 每個樓梯中之階數訊息通常在〝方位及機動圖(mobility maps)〞中提供，其專門用於訓練具視力損傷及失明者，在通常觸覺圖中通常省略這樣的訊息。

4.2.2 當選擇要在地圖上顯示之訊息時，應當優先考慮支持具視力損傷及失明者能安全平穩移動的內容。

4.2.3 應優先考慮觸覺可讀性。

導引圖中，觸覺訊息的觸覺可讀性受到各種因素的影響，這些因素將被考慮為它們的相互依賴性，此又廣泛地影響觸覺圖形及標記的選擇、大小及形狀。

當視覺導引與觸覺導引圖具可用之一致範圍時，儘管訊息量可能不同，圖亦應保持相互一致性。

4.2.4 所有包含在觸覺導引圖中的觸覺標記類型(無論觸覺圖或刻字)均應容易識別，且在地圖相對應區域中可透過圖例或刻字來解釋。

4.2.5 應避免使用一般用於視力正常之技術圖畫或尋路記號的象形圖，因其透過手指觸摸來閱讀時，太過複雜且結構精細。

4.2.6 印刷字符也可與觸覺圖形一起用於觸覺導引圖上。

4.2.7 關於地圖特定點可使用已安裝導引地圖的刻字點、電子標籤給出的聲音訊息替代。

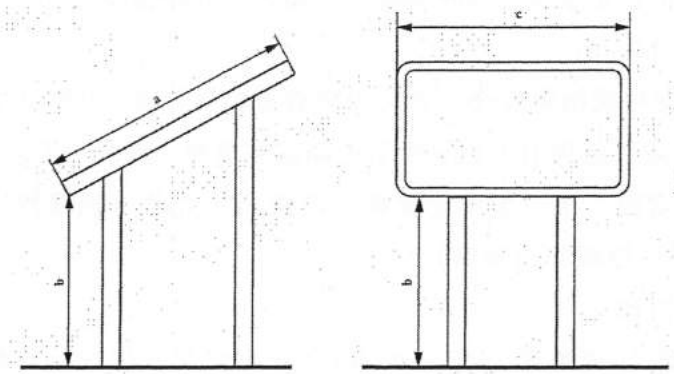
4.2.8 應顯示生產日期及聯繫訊息。

5. 觸覺導引圖圖形

5.1 尺度

觸覺導引圖之物理尺寸應針對要在地圖中描繪之位置或區域尺寸的觸覺導引圖目的所需的訊息量相關。

安裝之觸覺導引圖尺寸應安裝抓握距離 600 mm 內之桌面上(參照圖 1)及安裝於牆壁(參照圖 2)。當以小冊子形式製備觸覺導引圖時，應當特別注意，摺痕不應妨礙觸覺閱讀。



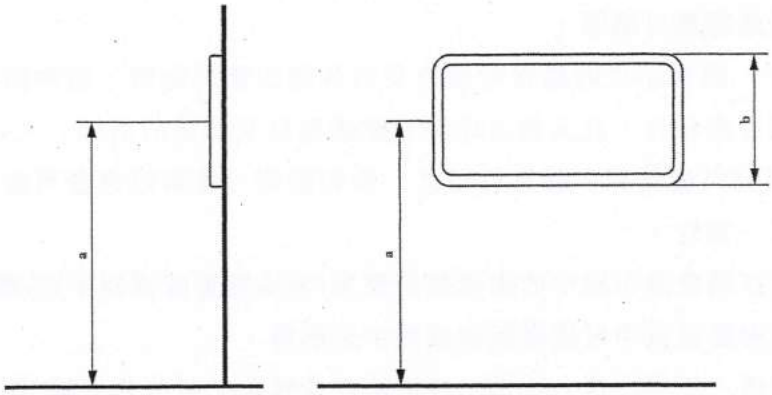
說明

a 600 mm 內

b 900 mm

c 約 1,000 mm

圖 1　桌式安裝配置圖例



說明

a 1,400 mm 最佳

b 600 mm 內

備考：觸覺導引地圖框架不包括在觸覺地圖尺度中。

圖 2　牆式安裝配置圖例

5.2 觸覺導引圖安裝之位置

安裝在牆上之觸覺導引圖應垂直地板，且其中心線高度最好距地面高 1,400 mm。這些尺度不適用於水平安裝於地板或傾斜接近水平安裝於地板之導引圖(參照圖 1)。若為這些導引圖，應選擇不會妨礙觸覺閱讀位置安裝之。

安裝桌最低部位距地面應具 900 mm 之間隙，以方便輪椅使用者靠近之，參照 ISO 21542:2011 40.14。

應非常小心確保視覺損傷及全盲者可找到觸覺導引地圖，如使用 TWSIs 或類似適當之觸覺導引及/或聲音導引他們至導引地圖或在電梯、樓梯等固定地點安裝平面圖。當決定安裝高度時，應考慮特定地圖之目標組，此將導致關於地圖安裝高度的其他決定(如，當目標組是兒童時)。

5.3 觸覺導引圖之方向

5.3.1 當安裝導引圖時，觸覺導引圖中指示方向參考標記及現在位置應嚴格遵守地圖安裝地點的實際方向及現在位置。如地圖中所示之特定辦公室在建築物右側位置，其就應在實際建築物的右側。

備考：注意當觸覺導引圖以一定角度(如 180°或與實際方向成任何其它角度)放置時，視障者將面臨問題，因他們無法看到其他如樓梯、升降梯電梯等可以讓他們能夠調整地圖中給出的錯誤方向的地標。有些人在腦海裡轉動地圖有困難。

5.3.2 用於安裝的觸覺導引圖應以使用者可以良好閱讀字母及觸覺圖形的方式放置。

5.3.3 對於包含空間重疊區域(如建築物一樓及二樓)訊息的導引圖及使用多個地圖顯

示一個大空間的導引圖，其比例尺及方向應統一。當每個樓層的地圖安裝在相應樓層上時，每個導引圖應被放置在相對應樓層的相同位置上，且沿相同之方向。不允許在一個觸覺導引圖中呈現建築物或地點的頂部是不同層，因為視障者無法明確地分配每層的高度。若在多層建築物中，由於房間佈置不同或房間訊息不同，應顯示多個樓層，因此需要為每個樓層分別製作單獨之地圖。若需要，可加建築物側視圖的斷面圖，包括指示多層樓從一層到另一層的動線、不同房間的佈置及上升超過一層的大廳等等。

5.3.4 小冊子中之觸　　覺導引圖可考慮使用者之友善方向，考慮門口、動線等等位置。

5.3.5 應以大點或三角記號清楚地表示起始位置。

6. 顯示方法

6.1 一般

顯示方法將取決於觸覺導引圖之目的及類型，無論它僅是草圖、小冊子中方便攜帶地圖或安裝在室內或室外的地圖，或是駐點(如建築物、到某處的訪問路線或如公園或花園概覽)的模型。

為代表一個大且複雜的建築物，建築物附近或公園周圍區域或清楚平面圖將需要不同量之訊息。因此，不同之規模應依地圖上可利用空間及提供用於導引或方位之額外訊息必要性，來決定使用觸覺圖形或僅有標記(需提供部分旅行路線之放大尺寸，如複雜之交叉路口)或樓梯方向(如向上或向下)、給出升降梯方向(當前往建築物不同地方時等)。

6.2 標題

標題應顯示於觸覺導引圖之上部。

6.3 註釋

註釋應靠近標題或圖例。

6.4 圖例

6.4.1 圖例應放置在易於理解的地方，當圖例僅包括少數項目時，應優先位於觸覺圖的左邊或標題下方地圖的上部。去除與原始地圖不相關部分之用線清楚界定的圖例可置於地圖區域內。小冊子形式的地圖中之註釋及圖例可以組合併放在另一頁中。小冊子內之圖例不應放置在地圖本身之背面。

6.4.2 圖例顯示應依字母順序先顯示〝觸覺標記〞，然後顯示〝點字縮寫〞。觸覺標記應依重要性順序顯示之。當使用凸起字符時，其應位於觸覺標記之左側，點字應位於觸覺標記之右側。點字及/或凸起字符縮寫之顯示順序應按字母順序排列。針對已安裝之地圖，首先要顯示的觸覺標記應是現在位置。

6.4.3 在圖例中顯示之觸覺標記及作為地圖內觸覺圖形一部分的形狀及尺度不應有差異，但尺度如樓梯寬度，可根據地圖的實際位置而有所偏差。

6.4.4 相關之點字、縮寫及觸覺圖形應易於識別。

6.5 地圖內之現在位置及額外導引資訊

6.5.1 現在位置/起點之觸覺標記應高於其他圓頂形狀或三角形形狀的標記。點字應盡可能靠近標記位置(參照附錄 A 範例 1 及附錄 C 範例 8)。

6.5.2 在觸覺導引地圖中，現在位置是地圖中最突出的標記，因其為使用者在地圖中規劃方位之起點。小冊子中的起點應與安裝類型中現在位置的處理方式相同。

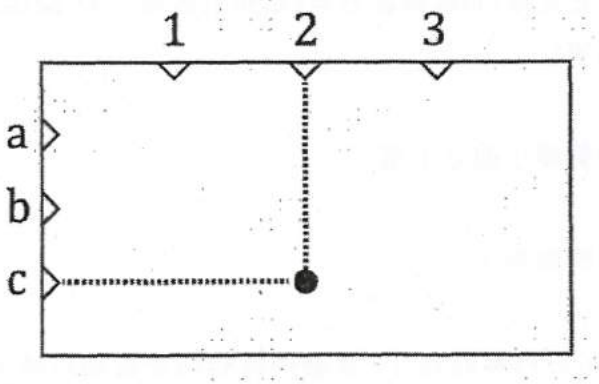
6.5.3 對於已安裝的導引地圖，觸覺圖形中的現在位置將在註釋或圖例中解釋。

6.5.4 應透過使用水平及垂直三等分區域(參照圖 3)的組合或透過坐標(參照圖 4)來解釋現在位置及目的地如觸覺導引圖上的其他安裝地點。

上左	上中	上右
左	中	右
下左	下中 •	下右

備考：圖 3 中黑點現在位置表示為〝下中〞。

圖 3　三分區域之例



說明

1 距左邊水平距離之 1/4

2 水平中心

3 距右邊水平距離之 1/4

a 距頂部垂直距離之 1/4

b 垂直中心

c 距底部垂直距離之 1/4

備考：圖 4 中黑點位置表示為 c2。

圖 4　座標之例

6.5.5 可使用具凹口之觸覺框架可與刻在軸上相關聯之數字或字母之刻度解釋座標位置。切口應具在觸摸時不會造成傷害之邊緣(參照圖 4)。

6.5.6 當在地圖區域或接近地圖處，有其他觸覺導引地圖位置提供進一步導引資訊時，在地圖上應使用特定之觸覺標記形狀如長點(參照附錄 B 範例 3)。當在真實地圖之外，則標記邊緣應具箭頭，以指引方向找到標記。

6.6 觸覺圖形

6.6.1 觸覺圖形原則

6.6.1.1 為優先考慮觸覺可讀性，可修改及變換觸覺圖形，且無需與實際位置成比例

6.6.1.2 在觸覺導引地圖中，如樓梯、手扶梯、電梯及廁所或地標設施的重要建築設施，可以比其他突起更高或者通過增加圖案密度來突出顯示，使地圖可更容易理解。

6.6.2 觸覺圖形形狀及高度

6.6.2.1 在導引圖中之觸覺圖形，如觸覺標記、字母及數字，應該謹慎使用，以便更清晰地使用更大、更自我解釋(直觀可識別)的觸覺圖形。

6.6.2.2 觸覺圖形及標記之凸起表面最小高度應為 0.5 mm，除非有非常平滑的表面可用於觸覺導引圖。在此情況下，單線及清晰結構的觸覺標記，高度可以降低至最小 0.3 mm。

6.6.2.3 然而，當在複雜之處(如建築物的大型入口大廳，如會議中心、火車站、機場的出入境大廳等)，需要高於水平 0.5 mm。

6.6.2.4 不可進入的區域，如公園內的禁區草坪及池塘，應藉由觸覺圖形規定之。

6.6.2.5 建築物入口及房間門口之位置應清晰顯示。

6.6.2.6 重疊的空間如一樓及二樓，應單獨顯示。

6.7 觸覺標記

6.7.1 觸覺標記原則

6.7.1.1 在一個觸覺導引圖中，應避免使用不同含義之類似觸覺標記。

6.7.1.2 觸覺標記在觸覺圖中通常是凸的，而不是凹的。凸標記比凹標記更容易觸覺識別。因此，在觸覺引導圖中使用凹標記時需更注意。

6.7.1.3 在觸覺導引圖中，可使用凹面表達。表示河流或池塘時，實際上低於其他地方，可使地圖有時更容易理解。建築間之道路可表示為低於建築物，以便更好理解。然而，當比例尺足夠大，且道路是非常重要時，道路可以凸起線表示。

6.7.1.4 當建構觸覺圖形時，應有效地使用易於透過觸摸識別的線、表面及其他觸覺標記。注意不要透過顯示過多的標記變化來防礙觸覺之可讀性。

6.7.1.5 對於透過觸覺線顯示各種設施，如建築物的輪廓、TWISs、在公園及道路上之走廊，可透過直線、點線及虛線易於識別及區分差異。

6.7.1.6 當在觸覺地圖中具足夠空間時，自我解釋的輪廓觸覺標記應優先使用。但在同一觸覺地圖中，不應有指向同一項目(如樓梯、手扶梯及電梯等)的標記。

6.7.1.7 由於許多觸覺導引圖是從平面圖或工程圖產生的，因此應非常注意從這些來源轉換或導出之許多觸覺標記。此類的視覺標誌(如顯示樓梯向上或向下的標牌)通常是非常抽象、結構太細及太複雜，無法做為視障者的觸覺地圖。透過減少或調適標牌至可清楚識別之標記，使其可透過手指觸摸讀取。

6.7.2 在觸覺標記觀察之訊息項目

6.7.2.1 房間門道

當由凸線分隔的空間表示為房間時，透過斷開線的一部分來表示門道。當斷開部分較長時，空間的變化有時難以識別，因此門扇可透過短線加上門打開的方向表示。在入口附近，房間的名稱應以點字指示。當房間狹窄時，可使用點字及/或凸起字符的縮寫(參照附錄 A 範例 5)。

6.7.2.2 樓梯/電梯/斜坡

設施中有高度之差異，如樓梯、手扶梯、坡道，期望使用可識別向上或向下之標記。標記設計在較高層上具有 V 形、三角形或觸覺點(參照附錄 A 範例 3 及 4、附錄 B 範例 5 及 6、附錄 C 範例 6 及 16)。在手扶梯時，除水平的差異，並期望使用方向的訊息。

6.7.2.3 標記以指示無法通行之區域

總空間可透過填充來傳達。帶點圖案或條紋圖案的空間(參照附錄 A 範例 6)。

備考：高密度點圖案表示關閉區域，低密度點圖案表示草坪區域。

6.7.2.4 指示方向箭頭

箭頭可有效地用於表示邊場中的方向或地標。形狀應簡單地由箭頭及箭頭軸組成，且具 90° 之指向線(參照附錄 A 範例 10 及 11)。

6.7.2.5 指示 TWSIs 或旅行規則之虛線

虛線適於表示 TWSIs，當使用幾個點時，應注意點之距離及直徑與點字直徑間有差異。在沒有 TWSIs 的地方，點線可用於表示導引路線或其他線路(參照附錄 A 範例 2)。

6.7.3 觸覺標記之形狀與高度

6.7.3.1 點

在觸覺導引圖中，應使用單個點來表示特別感興趣或重要的接入點。此類的點通常應以字母、數字或觸覺標記來區分彼此。

(a) 在觸覺地圖中，難以透過觸覺標記來指示如在公園或花園(如長椅)中休息的地方、進入游泳池的入口(如梯子)，或在河流或池塘上的碼頭的地方，應使用標示點以指示感興趣的點。

(b) 在觸覺導引圖中，可獲得訊息的點等應該用點表示，如公共汽車或電車站

等特殊點。當公共汽車或電車線路由一條線指示時，電車站應該用平坦小方形及公共汽車站使用短側向行程表示(參照附錄 B 範例 16 及 17，附錄 C 範例 14)。

(c) 當在觸覺導引圖中，需以放大尺寸比例描繪特定道路交叉區域時，應使用雙點線表示行人道路，點間具更寬之距離(參照附錄 B 範例 22)。交通燈可以由稍大的點表示。

(d) 在小冊子的觸覺地圖中，參考點(如旅行路徑的起點或駐點描述的開始)應使用更大的點表示。或具有細長尖端之等腰三角形表示行進的開始及方向。

6.7.3.2 線

地圖中之線條實現各種功能。當需要表示不同的功能時，應利用線的厚度、直徑、體積及結構，從非常薄、平滑、連續的線到點線，用於不同結構及/或迭代線。

(a) 在地板平面圖中，線條表示具可開門的房間牆壁。門扇可透過在門打開在 45°突出的細線來表示，滑動門由雙線表示(參照附錄 B 範例 12 及 13)。建築物的外壁可由更突出或平坦的寬線結構表示。在這種外壁結構中的窗戶可由非常細的線標記之。

(b) 在戶外區域如公園或花園，靠近建築物周圍附近應優先表示圍欄、圍牆或任何形式之邊界(參照附錄 C 範例 2)。

(c) 當 TWIS 表示觸覺導引圖中的最佳路徑時，應當採用虛線。決定點如行進路徑內之分支或轉折點，可以小粗糙方塊表示(參照附錄 B 範例 24)。在未由 TWSI 標記的觸覺導引圖中的行進路徑，應主要由細虛線表示。虛線應由 3 到 4 個點群組成，用以將這些線與 TWSI 的導引路徑區分開(參照附錄 B 範例 25)。

6.7.3.3 區域

無法通行之區域，如建築物中的禁區、公園內之草坪及池塘，應由明顯區分觸覺圖形顯示表面區域。

在具不同訊及息及最小水平的相鄰表面中，應考慮其高度差異。

(a) 平台、梯田和類似物應以凸起區域表示。在這種平台區域的頂部可增加更多之標記(如樓梯、坡道、電梯及欄杆等)。應避免用線標記平台或露台邊緣，因這樣的線可能表示在平台邊緣有柵欄或欄杆。

(b) 在大多數情況下，透過平坦的升高區域表示建築面積(無論房屋或工業區塊)，而非僅用線標記區域就足夠了。若需要，可標示各區域。

(c) 在觸覺街道地圖中，為便於定向及導引，在更大範圍內，複雜十字路口或具有許多均一區塊的長街道應由一些地標構成。如市政廳、教堂、醫院及紀念碑等突出或重要的建築物，應以上視圖形狀或輪廓視圖形式或以標示方式顯示。

(d) 當需要區分花園或公園(如草坪、花圃及池塘)中不同區域時，應給予這些區域不同的表面結構(如草坪以粗糙的表面、花圃以具有小點的表面及水域以波浪形或直線形表面，參照附錄 B)。

(e) 當在觸覺導引圖中表示 TWSI 時，注意字段應以虛線表示。

(f) 當使用具有不同光滑度/結構粗糙度的表面對比來區分不同區域(在花園或公園，如草坪、池塘、花圃及路徑等)時，每個區域不需要有額外高度。

6.8 點字及凸起字符

6.8.1 作為觸覺圖形中字符之點字應遵循 ISO 17049 中說明之規定。為將點字/或凸起字符顯示為觸覺圖形之一部分時，不應妨礙觸覺標記之可讀性。

6.8.2 當點字及凸起字符一起使用時，彼此不應妨礙各自之可讀性。

6.8.3 點字及/或凸起字符應水平顯示於觸覺導引圖中，其不應對角放置，亦不應彎曲或倒置配置。然而，當街道名稱跟隨道路時，此時街名可以不水平放置。若地圖中，道路旁邊有足夠之空間，其應該被水平放置且可清楚地分配給特定的道路。

6.8.4 大面積之說明點字及凸起字符應置於該區域內。當觸覺標記太靠近在一起時，可使用單引線，否則會喪失訊息。

6.8.5 用於解釋觸覺標記之點字及/或凸起字符應在同一水平面上，彼此間之間距為 6 mm，以獲得相互良好之可讀性。

6.8.6 當不涉及圖例時可酌情使用不同於印刷字體的點字及/或凸起字符。

6.9 點字及大印刷字體

對於殘餘視力小的人，黑色大印刷字體及明亮彩色印刷標記有助於顯示點字及觸覺標記。

(a) 當透過一組層狀顯示點字及大印刷字體，上層，由塑料製成之透明板或板，其上由點字及觸覺標記構成，下層具大印刷字體及彩色標記。當從頂部觀察它們時，兩層上的標記所在位置是一致的。此可透過在框架或小冊子上固定兩層來實現。

(b) 當點字及大印刷字體印在同一層時，應特別注意大印刷字體及彩色標記可耐頻繁之觸摸閱讀。當這些印刷模糊需定期維護時，應採用(a)中所述之兩層結構。

(c) 觸覺可讀性不應因顯示在同一表面上之印刷地圖而降低。

(d) 若將觸覺導引圖與印刷圖放置在一起時，則應考慮佈局、對比度及配色，以便弱視及色盲人士使用。

6.10 觸覺緊急導引地圖

觸覺導引地圖應額外符合下述要求。

(a) 觸覺導引地圖應簡單且提供最基本之資訊，如牆壁、通道、樓梯、出口門、耐火電梯及安全庇護等，其應在地圖中清楚命名。在使用小冊子情況時，到最近緊急出口的最短路線應加強標明且以突出、清楚可察覺導引線條標記。

(b) 觸覺緊急導引地圖可以聯合觸覺及視覺可讀格式提供。此可使視力正常者可

更容易幫助視力損傷及失明者，在他們面臨問題時提供協助。

(c) 觸覺導引圖應有多國語言版本，最少需要有中、英文。

(d) 觸覺緊急導引圖可以移動之小冊子，在坐著時候可以閱讀。觸覺緊急導引地圖應安裝於容易找到的地方，例 緊鄰門之開口處。

(e) 觸覺緊急導引圖亦應包含緊急聯絡電話及一些關於點字及/或凸起字體及大印刷字體的緊急情況時主要之行為建議。

(f) 應僅在兩個版本尺寸差異太大時，才同時使用觸覺及視覺版本之緊急地圖。

7. 觸覺導引地圖使用之材料

7.1 根據用於製造導引圖之材料及技術、細緻度、精密度及要顯示訊息量可顯著變化。能產生精細及精確結構之材料，如塑料搪瓷、硬塑料及青銅等，可提供良好之觸覺可讀性。

7.2 材料應具良好觸覺可讀性及表面不可使讀者手指及手受傷。

7.3 材料不得具會使讀者有眩光效果之閃亮表面。

7.4 材料不得因長期使用而變質及/或明顯損壞。

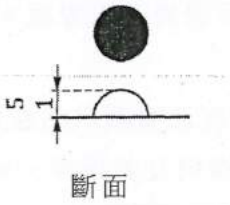
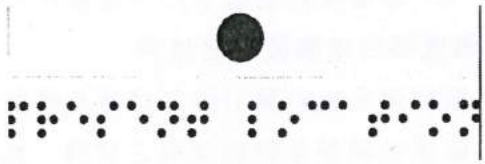
7.5 應定期清潔觸覺導引圖。

7.6 材料不應因太熱或寒冷天氣環境，而使地圖讀者感到太熱及/或太冷。

7.7 所使用之材料不應導致讀者產生過敏反應。

附錄 A
(參考)
日本觸覺標記範例

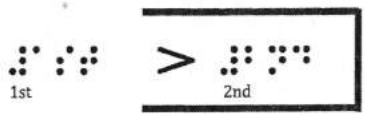
例 1.現在位置

觸覺標記	實施
	
描述	
對於觸覺圖形，觸覺圖形及另一個標記間之高度的邊緣應該顯著不同，如大約 1 mm 到 5 mm 高的半球。若在標記周圍具空間的話，原則上，〝現在位置〞應以點字顯示。	

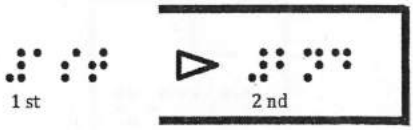
例 2.觸覺行走表面指示器

觸覺標記	實施
描述	
觸覺標記應為圓形點線。圓之尺度及間隔可依圖形比例大小及複雜度而定，但在同一觸覺地圖時，應予以標準化。此外，指示器及點之實際數量無須確認。	

例 3.樓梯

觸覺標記	實施
	
描述	
為傳達樓梯方向，應透過等腰三角形或沒有底邊之等邊三角形來顯示觸覺標記。 方向應配置成兩側相交為〝高〞，而無側邊的方向為〝低〞。在指示牆壁之標記及線間之間隔大於約 6 mm。為便於正確使用，應在圖例中包括解釋。〝尖端〞表示〝向上〞。	

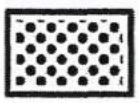
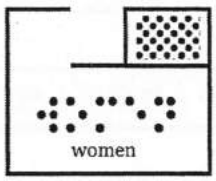
例 4.手扶梯

觸覺標記	實施
	
描述	
為傳達樓梯方向，應透過等腰三角形或等邊三角形來顯示觸覺標記。方向應排列使兩側相交為〝高〞，將無側邊的方向為〝低〞。在指示牆壁之標記及線間之間隔大約 6 mm。為便於正確使用，應在圖例中包括解釋，如〝尖端〞表示〝向上〞。	

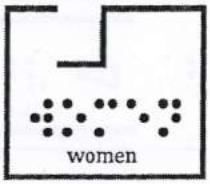
例 5.門口

觸覺標記	實施
描述	
透過打開區域周圍一部分的線來顯示建築物門口的觸覺標記。原則上，門及特殊標記不應用於顯示觸覺標記。	

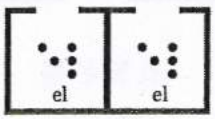
例 6.不可接近區域

觸覺標記	實施
	
描述	
不可接近區域應由包含點的表面圖案表示。圓之尺度及間隔可依比例大小及圖形複雜度而定，但在同一觸覺地圖時，表面標記應予以標準化。	

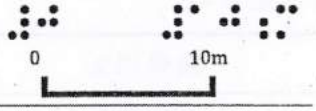
例 7.廁所

觸覺標記	實施
	
描述	
在適當區域中，顯示〝男性〞或〝女性〞。若所有點字無法在區域內寫入，則可以寫入點字縮寫。	

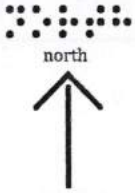
例 8.升降梯

觸覺標記	實施
	
描述	
觸覺標記應在點字適當區域內顯示。若觸覺標記無法寫在區域內所有點字中，則可寫入點字之縮寫，如〝el〞。透過打開設備可見輪廓的一部分來顯示門口。	

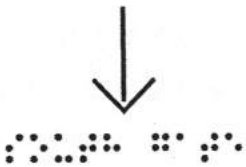
例 9.縮小比例

觸覺標記	實施
	
描述	
寫在點字中，其顯示在標準實線兩側之上側與量測及距離匹配。	

例 10.方向之實線箭頭

觸覺標記	實施
方向 	
描述	
將〝北方〞放在點字實線箭頭上方。	

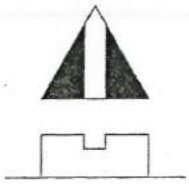
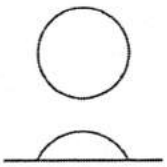
例 11.目的地實線箭頭

觸覺標記	實施
 往目的地	 南出口
描述	
在顯示觸覺導引圖外部設施訊息的情況下，將點字放在實線箭頭的頭部。	

附錄 B
(參考)
德國觸覺標記範例

以下概述之所有觸覺導引標記都是建議。尺度、形狀及線寬細節等僅為諮詢性質。其需適應導引地圖的總體概念及從實際平面圖或進入路線導出之導引要求，如樓梯數量及長度，相對於其他線之線寬及結構。

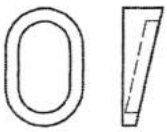
例 1.現在位置/起始點

觸覺標記	實施	描述
	其應是導引圖中最突出之標記：等邊三角柱，三角形一頂點的凹口表示行走方向。	每邊長大於 10 mm，凸起高度大於 4 mm。
	應選擇使用圓點。	直徑 8 mm 至 10 mm，最小處之凸起高度大於 3 mm。

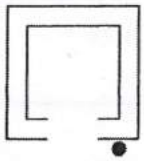
例 2.服務台

觸覺標記	實施	描述
	具點及襯線之訊息標記〝I〞。	〝I〞標記垂直高度大於 10 mm，凸起大於 1.2 mm。

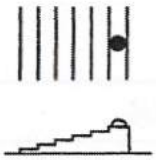
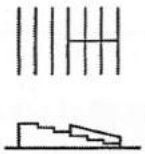
例 3.其他觸覺訊息點或帶有進一步導引訊息地圖之位置

觸覺標記	實施	描述
	拉長點狀代表其他帶有進一步導引訊息觸覺標記位置。	凸起拉長之大點，寬度大於 6 mm，長度大於 9 mm。標記圈應 1 mm 寬，中心低於圈 1 mm。 觸覺標記優先應當標題為桌面安裝，其上側具凸起高度大於 3 mm，下側具凸起高度 1 mm。或者，標記可具完整、平坦、粗糙之表面。

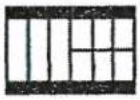
例 4.電梯

觸覺標記	實施	描述
	二個方形(一個置於另一個裡面)，開口表示門。門之一邊應有一個點/微小投影以代表按鈕處，其在地圖中應具非常大比例。電梯服務之樓層範圍可增加之，如-2 至+11。	內圈方形較外圈方形凸起 0.8 mm，外圈方形大於 (15×15) mm。
	交叉空白方形	具 2 mm 寬非結構化平滑線之交叉，其大於(10×10) mm。

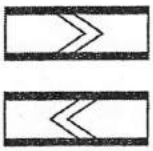
例 5.樓梯

觸覺標記	實施	描述
	樓梯從在地圖中顯示的實際樓層，向上到高樓層或從那裡下來。 為指示往上方向，樓梯的頂部(手扶梯、移動走道及斜坡都相同)應使用一個小點標記。	台階之平行線體積應大於 1 mm，觸覺標記寬度大於 7 mm，長度大於 10 mm (可變化)。 點字點尺寸(高度從 0.6 mm 到 0.8 mm，直徑從 1.2 mm 到 1.6 mm)。
	樓梯從地圖中實際樓層向下到較低樓層或從那裡上來。 為指示方向，樓梯底部(手扶梯、移動走道及斜坡都相同)應使用短線/線標記，結合觸覺標記中的最低三個台階。	

例 6.手扶梯

觸覺標記	實施	描述
	點表示手扶梯移動方向之較高側。	扶手為 2 個主導寬線及台階為較薄/較細線。扶手寬度大於 1.5 mm，扶手距離大於 6 mm，台階距離大於 0.6 mm。
	短線表示手扶梯移動方向之較低側。	

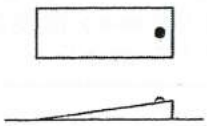
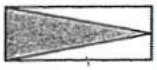
例 7.移動走道

觸覺標記	實施	描述
	當移動走道往上或往下到另一樓層，其應個別用點或線標記之。	2 條寬線。應以 2 個在扶手間之 V 形箭頭表示移動方向。

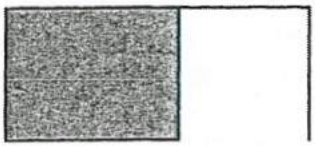
例 8.手扶梯，移動走道之移動指示

觸覺標記	實施	描述
	手扶梯往上移動至高樓層	台階之平行線體積應大於 1.5 mm，觸覺標記寬度 10 mm，長度大於 15 mm (可變化)。
	手扶梯往下移動至低樓層	V 形記號在標記上方，線寬大於 0.8 mm，台階及扶手優先使用對比顏色。

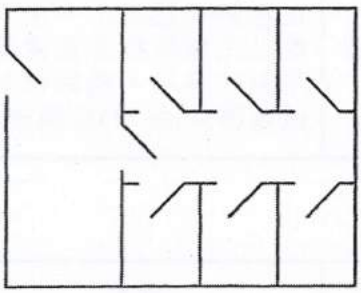
例 9.坡道

觸覺標記	實施	描述
	右邊較高之坡道輪廓。	以輪廓方式表示坡道，高側應較低側高 2 mm。地圖真實樓層，以點表示坡道上端或以短線表示坡道下端。
	一平標記使用在四方形或長方形內使用一個粗糙三角形表示。從真實樓層往上或往下用中間三角形的點或短線表示。	中間三角形(灰色部分)凸起 0.8 mm，且具粗糙結構。

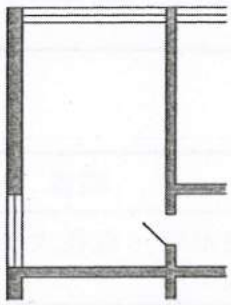
例 10.樓層平面禁止進入區域

觸覺標記	實施	描述
	空白凸起區域到建築物外牆部分	凸起區域高度大於 1.5 mm (灰色區域)

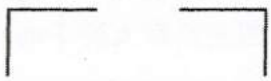
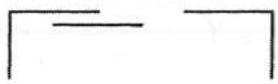
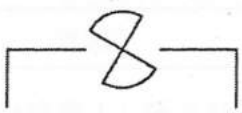
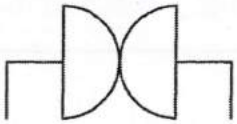
例 11.廁所

觸覺標記	實施	描述
	可縮小到帶有門及用點字及凸起刻字名字的小隔間。	表示艙室相對於門之位置比用全名標記建築物更重要。字母或數字可能就足夠了，此需在圖例中解釋。

例 12.房間

觸覺標記	實施	描述
	具開放的門及門扇的房間，細線表示外牆的窗戶(若規模足夠大，窗戶可以透過比外牆線更薄的線條呈現)	外牆寬度大於 2 mm，窗戶寬 0.8 mm。

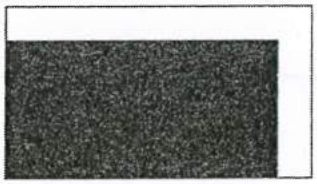
例 13.具不同門扇配置之門

觸覺標記	實施	描述
	門開口	開口在牆上
	具門扇之門開口。門扇指出門之開口方向。	門扇短線在 45°
	具雙門扇之門開口	
	滑門	與牆壁平行線表示滑門扇。滑門門扇遮住門一半開口。
	具四片門扇之旋轉門	二片門扇投影在約與門開口 30°處
	擺門	具門扇的門及弧度顯示門扇擺動方向及範圍

例 14.建築物主入口

觸覺標記	實施	描述
	在進入路線之建築物主要入口標記	在建築物標記中，主入口應以三角形投影在建築物內方式表示，建築物主要區域應具(紋理)粗糙表面

例 15.二側具人行道之建築物

觸覺標記	實施	描述
	當在街道時，街道輪廓應具避難所及/或中間帶表示人行道。	人行道寬度大於 5 mm，人行道高於道路約 0.5 mm。建築物相對高於人行道標記約 0.5 mm 至 0.8 mm。

例 16.電車線及電車站

觸覺標記	實施	描述
	具平點之平滑非結構化線表示電車站。	電車站，直徑大於 4 mm 之平點。

例 17.公車線與公車站

觸覺標記	實施	描述
	具短側向行程之點線表示公車站。	側向行程大於 3 mm。

例 18.電車及公車路線及其停靠站

觸覺標記	實施	描述
	行駛同一街道電車及公車路線可以結合線表示。	交替平滑未建構(電車)集點線(公車)與其停靠站。

例 19.地下(捷運)路線入口

觸覺標記	實施	描述
	入口樓梯端應以樓梯或凸起標記(暗區)	2 個方形，1 個空白，1 個黑色，凸起大於 1.2 mm。

例 20.火車/鐵路路線

觸覺標記	實施	描述
	當鐵路路線接近入口時，因其通常可方便辨識個人位置，故應標記之。	線寬 2 mm，長度大於 3.5 mm，線之間隙 1.5 mm。

例 21.出租車站

觸覺標記	實施	描述
	沿路邊/人行道，非常接近線之 4 至 5 個點。	點直徑 2.5 mm，點間距離 4 至 5 mm。

例 22.行人穿越

觸覺標記	實施	描述
	2 條平行點線穿越道路。依地圖比例，交通號誌燈可以較大平點於地圖上表示。	點直徑 2 mm 至 2.5 mm。點間距離約 2 mm 至 2.5 mm，線距離 3 mm 至 3.5 mm，交通號誌平點直徑 3 mm 至 4 mm，凸起大於 2 mm。若使用聲音交通號誌，則在交通號誌點中加一直徑 0.5 mm 至 1 mm 之小點。

例 23.TWSIs–注意場域

觸覺標記	實施	描述
	用以劃界線或區域，以警告或指示決定點。	在擴展規模呈現帶點區域。在狹窄的展示中(特別是與樓梯上視圖相結合)，注意區域標記應具有略微粗糙之表面。

例 24.TWSIs–導引路徑

觸覺標記	實施	描述
	具粗小四方形決定點(導引路徑分叉或轉彎點之非常細點線。	點直徑 0.5 mm 至 1 mm(小於點字點)，決定點大於 (2×2) mm。

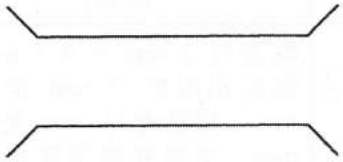
例 25.無 TWSI 標記之導引路徑

觸覺標記	實施	描述
....	由 TWSI 標記導引路徑之細間斷點線，每一群點線為 3 至 4 個點，群間具小間隙。	點直徑 0.5 mm 至 1 mm (小於點字點)，群間間隙 3 mm。

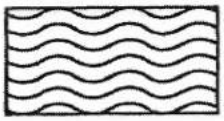
例 26.人行道

觸覺標記	實施	描述
	點鬆線	點直徑大於 2 mm，點間距離大於 3 mm。

例 27.橋

觸覺標記	實施	描述
	當橋僅能藉台階或樓梯通過時，應於樓梯上視圖以線標記台階。	橋寬依街道或人行道寬度而定。

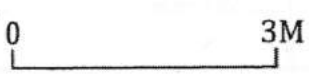
例 28.水

觸覺標記	實施	描述
	用於池塘、小溪、河流、湖泊。	波形區域(波紋)或非常細之窄直線。

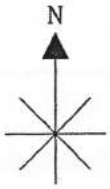
例 29.表示旅行目的地或方向之箭頭

觸覺標記	實施	描述
	優先用以指示行進超過地圖邊緣或從外部進入地圖之方向訊息。	為清楚起見，僅能使用開口箭頭來給出方向訊息。

例 30.比例尺

觸覺標記	實施	描述
	距離最好以 m 為單位，取決於應用於地圖尺度之大小(大寫〝M〞僅能用於凸字)。	

例 31.表示北方之箭頭

觸覺標記	實施	描述
	若可能，指針應於地圖右上角或接近比例尺訊息附近。	應以封閉之三角形指針箭頭表示北方。標記大小大於 15 mm。

附錄 C
(參考)
瑞典觸覺標記範例

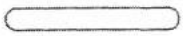
例 1.導引帶(代表觸覺標記及無障礙步行路徑)

觸覺標記	實施	描述
	代表觸覺標記及無障礙步行道	具白色觸覺點之黑色可視線，5 mm 寬。 或者，具黑色觸覺點之白色可視線。點直徑 1 mm，高度 0.5 mm。圖例長度 22 mm。

例 2.牆/路邊石(代表建築物周圍外牆、建築物內牆，以及森林、交通島及走道周圍之路邊石)

觸覺標記	實施	描述
	代表感興趣之牆壁或路邊石為觸覺方位	具黑色輪廓之白色觸覺線，1.5 mm 寬。 圖例中長度 20 mm。

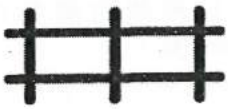
例 3.外牆/扶手(代表牆、欄杆或柵欄)

觸覺標記	實施	描述
	代表牆壁、欄杆或柵欄，對於觸覺方位比牆壁/路邊石觸覺元件較大興趣	具黑色可視輪廓之白色紋理觸覺線，3 mm 寬。 圖例中長度為 20 mm。

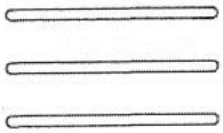
例 4.電車軌道

觸覺標記	實施	描述
	代表電車軌道	兩條平行無紋理觸覺黑線，寬度為 1 mm，中心線之間為 4 mm。圖例中長度 22 mm

例 5.鐵路軌道

觸覺標記	實施	描述
	代表鐵路軌道，可用月台與數字結合	兩條平行無紋理觸覺黑線，寬度為 1 mm，中心線之間為 4 mm。肋條連接線與肋骨中心間為 8 mm。圖例中長度 21 mm。

例 6.樓梯(圖例中由 3 條線/台階組成)

觸覺標記	實施	描述
	代表台階。線條數目不代表樓梯或台階數目。	具無紋理黑色可視輪廓之白色觸覺線，1 mm 寬，圖例中長度為 20 mm。地圖上之線條/台階數目是可變的。線條中心線間距離 5 mm。

例 7.行人過路處(由傳說中的三條線組成)

觸覺標記	實施	描述
	代表行人過路處，不一定是安全/監督過境	具無紋理黑色可視輪廓之黑色觸覺線，3 mm 寬，圖例中長度為 20 mm。地圖上之線條/台階數目是可變的。線條中心線間距離 7 mm。

例 8.觸覺導引圖位置

觸覺標記	實施	描述
	代表觸覺導引圖位置。可優先使用線條做成(開放圓圈)	直徑 8 mm 之紅色觸覺點。可位於地圖最高觸覺高度。

例 9.系柱/柱(代表障礙物/定向點，如系柱、柱子或桿子)

觸覺標記	實施	描述
	代表障礙物/方位點，應小心使用，僅代表有興趣導引之物體。	具黑色可視輪廓之白色全圓觸覺線，直徑 4 mm。

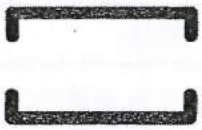
例 10.長椅(代表擺放之座位、長凳、室內或室外)

觸覺標記	實施	描述
	代表長椅或當有興趣之擺放座位。	具圓角之無紋理黑色觸覺長方形，(15×6) mm 寬。

例 11.天氣保護庇護所(代表平台、公共汽車站、電車站或計程車站的庇護所)。

觸覺標記	實施	描述
	代表平台、公共汽車站、電車站或計程車站的庇護所	具無紋理黑色觸覺線，線寬 2 mm。總大小(25×12) mm。由 1 條 25 mm 長線及在長線二端及中點之 3 條 12 mm 短線組成。

例 12.住房(代表閱讀風雨棚、防風罩、玻璃牆)

觸覺標記	實施	描述
	代表閱讀風雨棚、防風罩、玻璃牆	

例 13.軌道交點

觸覺標記	實施	描述
	代表軌道交叉點，以提供需要注意火車或電車。	黑色觸覺交叉線，寬 (13×13) mm，線 2 mm 寬，端點為圓形。

例 14 具閘門軌道交點

觸覺標記	實施	描述
	代表具閘門軌道交點，未提供需要注意連接通過火車或電車之匣門或障礙物。	黑色觸覺符號，由 8 mm 圓圈，具圓端(8×4) mm 四方形及具圓端之 10 mm 長，1 mm 寬直線組成。組合後長度約為(28×8) mm。

例 15.比例尺

觸覺標記	實施	描述
0 5 m	比例尺範例，具相關大小，如 1 m 至 5 m。	具端線及黑色可視輪廓之白色觸覺線。線寬 1 mm。可視文字在上，點字在每一端點下方。

例 16.斜坡及移動走道

觸覺標記	實施	描述
< < <	代表斜坡及移動走道	

參考資料

[1] ISO 17840-1:2015 Road vehicles – Information for first and second responders – Part 1: Rescue sheet for passenger cars and light commercial vehicles

[2] ISO 23599 Assistive products for blind and vision-impaired persons – Tactile walking surface indicators

相對應國際標準

ISO 19028:2016 Accessible design – Information contents, figuration and display methods of tactile guide maps

ICS 11.180.15; 13.180

中華民國國家標準

CNS

無障礙設計－公共設施中之聽覺引導信號

Accessible design – Auditory guiding signals in public facilities

CNS 草-制
1071033:2019
S3

中華民國　年　月　日制定公布
Date of Promulgation: - -

中華民國　年　月　日修訂公布
Date of Amendment: - -

本標準非經經濟部標準檢驗局同意不得翻印

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前言

本標準係依據 2016 年發行之第 1 版 ISO 19029，不變更技術內容，制定成為中華民國國家標準者。

本標準係依標準法之規定，經國家標準審查委員會審定，由主管機關公布之中華民國國家標準。

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本標準並未建議所有安全事項，使用本標準前應適當建立相關維護安全與健康作業，並且遵守相關法規之規定。

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1. 適用範圍

本標準規定視力損傷及失明人士之聽覺引導信號之聲音特性，以提供特定公共設施之位置及方向資訊。公共設施包括火車站、機場、港口、公共汽車站、政府機關、圖書館、社區中心、公園、學校、醫院、劇院、大型超市、及其廁所樓梯等設施。

例 作為聽覺引導信號，從火車站驗票口發出之鐘聲，包括視力損傷及失明人士的行人能夠透過偵測鐘聲位置來知道驗票口位置。

備考 1.聽覺引導信號亦有助於被人看見。

本標準亦規定提供聽覺引導信號設備之設計或使用。

本標準未規定警報之特性，如警報聲音或緊急信號。

備考 2.聽覺危險信號由 ISO 7731 規定。

本標準未規定視力損傷及失明人士佩戴之個人移動設備的聽覺引導信號特性。

2. 用語與定義

下列用語及定義適用於本標準。

2.1 聽覺引導信號(auditory guiding signal)

提供特定公共設施位置及方向資訊之聲音信號。

2.2 諧音(harmonic tone)

聲音由基頻部分及其多個頻率成分組成。

例：具有諸如音調、三角波聲、矩形波聲及鋸齒波聲等周期性波形之聲音。

2.3 聲音信號產生器(sound signal generator)

產生提供給揚聲器之電子類比信號之設備。

2.4 目標(goal)

聽覺引導信號(2.1)預定要引導的點。

例：設施入口、火車站驗票口、洗手間及樓梯起點等。

2.5 發射角(emission angle)

聲音衰減小於發射軸 10 dB 之角度。

3. 要求及建議

3.1 聲音特徵

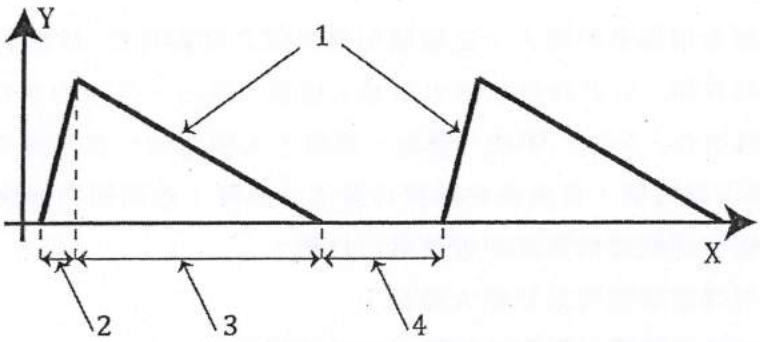
3.1.1 波封(envelope)

聽覺引導信號之起音(attack)部分持續時間應大於 0 ms 且不應大於 5 ms。

備考 1.不長於 5 ms 之起音部分使聽者能夠容易偵測聲音的方向。

備考 2.衰減部分對聲音定位沒有影響。

聽覺引導信號間之間隔應不超過 2 s。



說明

1 信號

2 起音

3 衰減

4 間隔

X 時間

Y 振幅

圖 1 信號之波封

3.1.2 頻率成分(frequency component)

最低頻率成分不應高過 1 kHz。

備考 1.若聲音為諧音，則最低頻率等於基頻。

最高頻率成分不應低於 8 kHz。

備考 2.最高頻率成分不低於 8 kHz 可使聽者輕易偵測聲音的方向。

若聲音為諧音，其於頻帶中應有所有諧波順序。

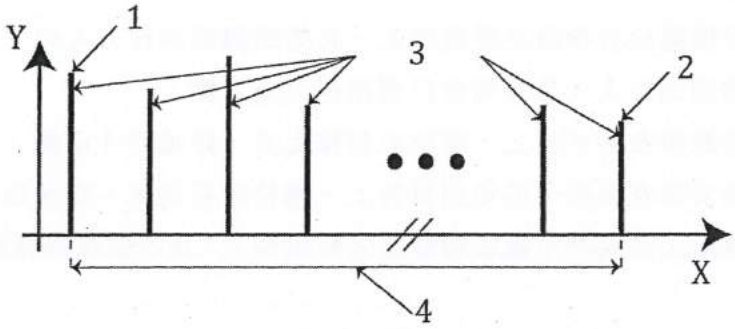
聽覺引導信號不應使用僅有一個頻率成分之聲音。

備考 3.若聲音之頻率成分過窄或過差，則無法滿足要求。

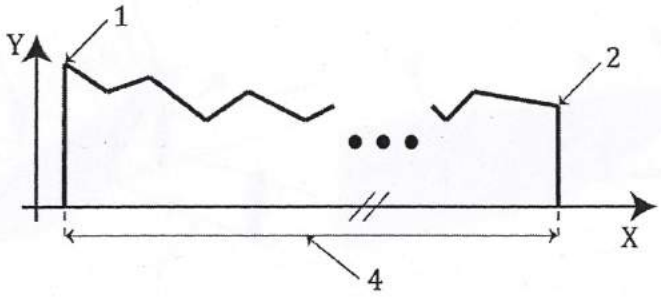
例 1.鋸齒波聲音於其頻帶中具有所有諧波。

若聲音不是諧音，於其頻帶中，其應具有盡可能多的頻率成分，及其應具有使用者可將其與環境噪聲區分開之頻譜。

例 2.聽覺引導信號之非諧音包括諧音及脈衝聲等之組合。



(a) 諧音



(b) 非諧音

說明

1 最低頻率成分

2 最高頻率成分

3 諧波

4 頻帶寬

X 頻率

Y 功率(power)

圖 2 頻率成分

3.2 設備

3.2.1 聲音信號產生器

聲音信號產生器應能產生具 3.1.2 頻率成分之聽覺引導信號。

若聽覺引導信號以數位記錄、重現及/或傳送，則取樣辨識率不應小於 8 位元，且不應高於 16 位元。

若聽覺引導信號被記錄為壓縮數據，則壓縮比不應該高到使聲音質量劣化。

3.2.2 揚聲器

揚聲器應能發出具有 3.1.2 中提供的頻率分量的聽覺引導信號。

例： 具有約 10 cm 直徑並安裝在適當的盒中的通用全頻揚聲器在 100 Hz 至 10 kHz 的範圍內具有幾乎平坦的頻率特性。

3.2.3 揚聲器配置

揚聲器及目標應位於相同之垂直線上，且揚聲器面向行人人流。

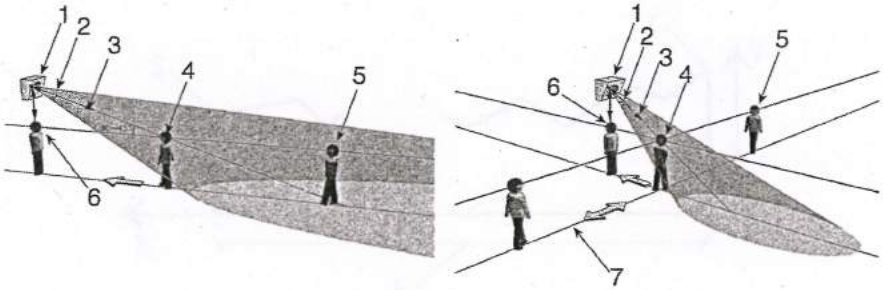
例 1.揚聲器面向行人人流及到達目標路徑之交叉點。

例 2.揚聲器懸掛在天花板上，應位於目標上方，距地面 3 m 處。

例 3.揚聲器安裝在地板上的短垂直桿上，應位於目標處，距地面 0.8 m 處。

干擾聲音傳播之障礙物不應在揚聲器之發射軸上，且不應在揚聲器發射角度 3 m 範圍內。

例 4.干擾聲音傳播的障礙物包括招牌、牆壁及桿子等。



(a) 一致　　(b) 非一致

說明

1 揚聲器

2 發射角

3 發射軸

4 傾聽點

5 使用者

6 目標

7 使用者人流

圖 3　使用者人流及目標動線(a)一致，(b)不一致時，揚聲器之配置

3.3 環境噪音

3.3.1 信號雜訊比

在傾聽點之信號雜訊比不應低於 10 dB。

為量測信號雜訊比，應量測信號聲壓及環境噪音聲壓。

信號為具標準頻率加權〝A〞及標準指數時間加權〝FAST(F)〞之最大聲壓。

環境噪音為具標準頻率加權〝A〞之最大聲壓。

3.2.2 不同目標之聽覺引導信號

若在同一位置可聽到不同目標之聽覺引導信號，則每一聲音避免同時發聲。

3.3.3 聲音反射及混響

聲音反射及混響應儘可能降低。

備考 1. 若聽覺引導信號聲音反射及/或混響干擾聽覺，則於天花板或牆壁上可放置吸音物。

備考 2. 期望透過考慮環境聲音環境來設計空間。

3.3.4 聽覺引導信號之操作

聽覺指導信號應持續工作。

在公共設施，若無使用者存在之特定時間範圍內時，聽覺引導信號可以加以控制。

揚聲器及/或其容器外觀，應具有指示其是用於移動輔助之聽覺引導信號設備。

參考資料

[1] ISO 7240-16 Fire detection and alarm systems – Part 16: Sound system control and indicating equipment ·

[2] ISO 11429 Ergonomics – System of auditory and visual danger and information signals

[3] ISO 15006 Road vehicles – Ergonomic aspects of transport information and control systems – Specifications and compliance procedures for in-vehicle auditory presentation

[4] ISO/TR 16352 Road vehicles – Ergonomic aspects of in-vehicle presentation for transport information and control systems – Warning system

[5] ISO 11064-6 Ergonomic design of control centres – Part6 : Environmental requirements for control centres.

[6] ISO 23600 Assistive products for persons with vision impairments and persons with vision and hearing impairments – Acoustic and tactile signals for pedestrian traffic lights

[7] IEC 60073 Ed. 6.0:2002 (b) Basic and safety principles for man-machine interface, marking and identification – Coding principles for indication devices and actuators

[8] IEC 60268-5 Sound system equipment – Part 5: Loudspeakers

[9] MLIT/Addendum to the "Guidelines to Improve Barrier-Free Access for Public Transport

[10] Passenger Facilities":2002

[11] BLAUERT J. Spatial Hearing. The MIT Press, Cambridge, revised edition, 1997

相對應國際標準

ISO 19029:2016 Accessible design – Auditory guiding signals in public facilities

標準檢驗局內部公務使用

INTERNATIONAL STANDARD ISO 19026

First edition
2015-12-15

Accessible design — Shape and colour of a flushing button and a call button, and their arrangement with a paper dispenser installed on the wall in public restroom

Conception accessible — Forme et couleur d'un bouton de rinçage et d'un bouton d'appel, et leur combinaison avec un distributeur de papier installé sur le mur de toilettes publiques

經濟部標準檢驗局
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 7, *Accessible design*.

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Introduction

Regarding public restrooms, products for the facility have been improved and new functions have been added in toilet compartments which make public restrooms more accessible to users. On the other hand, types of operating buttons have been diversified and they are placed in random locations. Also, operating methods have been diversified and the difficulty of discrimination and the use of the buttons have been raised as an issue. As users use toilet compartments alone in most cases unless s/he needs an attendant, it is impossible to ask someone the whereabouts of a flushing button and a call button or ask for help. Especially, persons with visual disabilities have difficulty to find a flushing button and a call button when the arrangement of these buttons differs with places. This problem is not limited only to persons with disabilities, but also to older persons. This International Standard aims to solve problems which older persons and persons with disabilities encounter when they use public restrooms.

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Accessible design — Shape and colour of a flushing button and a call button, and their arrangement with a paper dispenser installed on the wall in public restroom

1 Scope

This International Standard specifies shapes and colours of a flushing button and a call button of lavatory which are installed on the wall and their arrangement with a paper dispenser. This International Standard is only applicable in case of installing a flushing button and/or a call button on the wall of seat-type lavatory in public restrooms (general toilet compartments and toilet compartments with various functions) used by an unspecified large number of people, except restrooms with a big paper holder where it is difficult to place a flushing button and a call button above the holder, and Type A toilet with lateral transfer from both sides of ISO 21542.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 21542:2011, *Building construction — Accessibility and usability of the built environment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
public restroom
restroom used by an unspecified large number of people, installed in highly public buildings and facilities such as railroad stations, airports, parks, assembly halls, hospitals, department stores, hotels, and offices

3.2
general toilet compartment
compartment set up with seat-type lavatory without special consideration for wheelchair users

3.3
toilet compartment with various functions
large compartment set up with seat-type lavatory with consideration for wheelchair users and babies and/or small children

3.4
flushing button
push-button switch of toilet flushing equipment

3.5
call button
push-button switch for assistance alarm

3.6
paper dispenser
equipment to house toilet paper

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標準檢驗局內部公務使用

4 Figuration of a flushing button and a call button

The figuration of a flushing button shall be a round or oval shape. The figuration of a call button shall be easily distinguishable from the flushing button (for example, quadrangle, rectangle, or triangle) by touch. The sizes of a flushing button and a call button shall be easy to push by a finger, as well as a palm or top of a hand.

The height of a button should be stuck out from the surrounding surface so that persons with visual disabilities can recognize the button by the touch.

5 Colour and contrast of a flushing button and a call button

The colours of a flushing button and a call button and its contrast with the surrounding colours are defined as follows.

NOTE The surrounding mentioned in this International Standard is the area adjacent to a flushing button and a call button.

5.1 Colours of buttons

The colours of a flushing button and a call button shall be different enough to be distinguishable from each other.

NOTE A call button is usually coloured in red because it is used for the purpose of assistance alarm.

5.2 Contrast between the colours of a flushing button and a call button and the surrounding colours

The contrast between the colours of a flushing button and a call button and the surrounding colours shall be retained. (See visual contrast in ISO 21542:2011, B.7).

6 Arrangement of a flushing button, a call button, and a paper dispenser

Arrangement of a flushing button, a call button, and a paper dispenser is defined as follows:

a) a flushing button, a call button, and a paper dispenser shall be arranged in a way that most users can operate and users with visual disabilities can recognize easily. Various postures such as sitting and standing shall be taken into consideration;

b) a flushing button, a call button, and a paper dispenser shall be arranged in a group on either side of the wall;

c) a flushing button shall be installed on the upper side of a paper dispenser. A call button shall be placed at the same height as a flushing button and placed toward the rear of a toilet seat;

d) a flushing button, a call button, and a paper dispenser should be established in the position that satisfies the conditions given in Figure 1 and Table 1;

e) if other pieces of equipment such as a handrail, a remote controller for washing equipment with warm water, and/or a wash basin are installed on the same surface of the wall with a flushing button, a call button, and a paper dispenser, those pieces of equipment shall be arranged in a way that they do not interfere the use and operation of a flushing button, a call button, and a paper dispenser;

f) even if the dimensions do not conform to Figure 1 and Table 1 due to the figuration of a paper dispenser or the surface condition of the side wall of the compartment, the positional relationship described in c) shall be maintained;

g) another call button or a pull cord should be placed at the minimum height of 100 mm and towards the front side of the flushing button in places where users can operate it easily even in a fallen posture.

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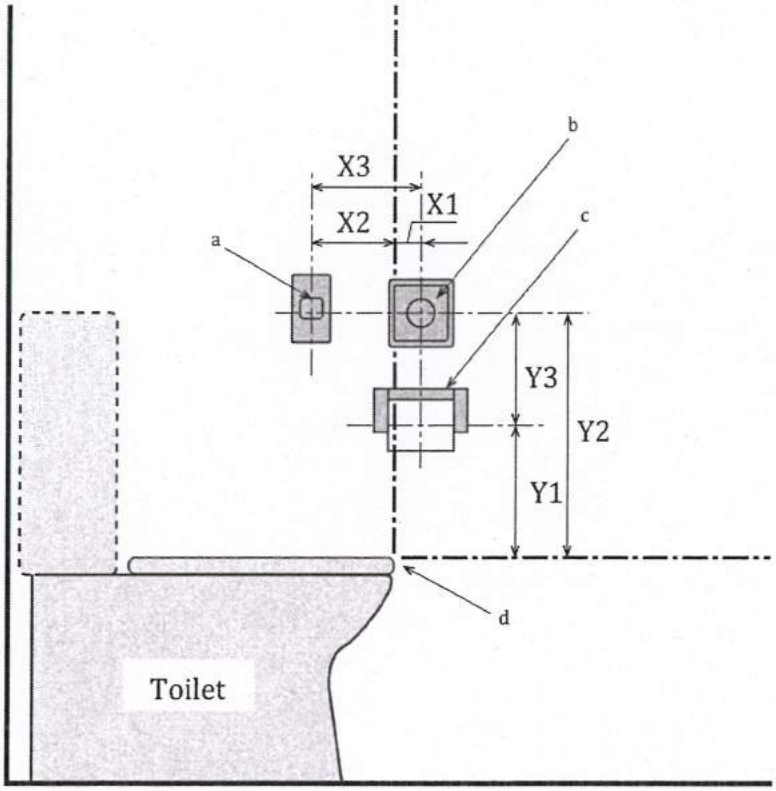

Key

a Call button.

b Flushing button.

c Paper dispenser.

d Tip of the upper surface of a toilet seat.

Figure 1 — Arrangement of a flushing button, a call button, and a paper dispenser

Table 1 — Arrangement and sizes of a flushing button, a call button, and a paper dispenser

Dimensions in millimetres

Equipment	Horizontal distance from the tip of the upper surface of a toilet seat (base point)	Perpendicular distance from the tip of the puper surface of a toilet seat (base point)	Distance between the two
Paper dispenser	X1: Toward the head of a toilet seat: Approx 0 to 100	Y1: Toward the head of a toilet seat Approx 150 to 400	—
Flushing button		Y2: Toward the head of a toilet seat: Approx 400 to 550	Y3: Approx 100 to 200 (Perpendicular distance from a paper rolling equipment)
Call button	X2: Toward the rear of a toilet seat: Approx 100 to 200		X3: Approx 200 to 300 Horizontal distance from a flushing button

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INTERNATIONAL STANDARD

ISO 19027

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另有電子檔

Design principles for communication support board using pictorial symbols

Principes de conception pour le conseil de support de communication utilisant des symboles illustrés

Reference number
ISO 19027:2016(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 7, *Accessible design*.

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Introduction

This International Standard provides design principles for usable communication support boards that assist in transcending regional/cultural and linguistic barriers and is of substantial benefit for those persons who is to rely on a visual strategy to express their communicative intent.

A communication support board is a tool designed for the use of visual symbols (such as pictorial symbols) to facilitate communication and social interaction when expressive/receptive communication is limited due to physical or linguistic barriers.

Pictorial symbols, as visual expressions internationally, remove communication barriers in daily life when the characteristics of the pictorial symbols are easy to understand and able to be applied regardless of regional/cultural differences.

There are several user groups of pictorial symbols ranging from those who have poor or no communication abilities to those who require enhanced communication support.

It is important that the symbols used for the communication board correspond with the symbols visible in the environment to facilitate communication for the individual using the communication board in society.

In addition, the usage of communication support boards encourages inclusiveness in society for the user.

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Design principles for communication support board using pictorial symbols

1 Scope

This International Standard specifies basic configurations for communication support boards, which are necessary to facilitate communication. A variety of communication support boards can be designed for specific communication purposes.

This International Standard specifies basic elements common to different types of formats/media, such as simple boards, book style or digital media. This International Standard does not regulate any specific design or any specific pictorial symbols for communication support boards.

As for design principles of pictorial symbols, this International Standard introduces examples of design principles applicable when designing and developing pictorial symbols.

NOTE Examples of basic pattern used to create pictorial symbols are shown in Annex A. Examples of communication support boards using pictorial symbols are shown in Annexes B and C.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
graphical symbol
visually perceptible figure with a particular meaning used to transmit information independently of language

[SOURCE: ISO 17724:2003]

2.2
pictorial symbol
visual figure which comprises representational and abstract symbols, sometimes used in multiple combinations

2.3
communication support board
tool to support persons who have difficulties communicating

Note 1 to entry: It can be used in various situations and places, such as for private, public and educational usage.

Note 2 to entry: This includes difficulties communicating orally or when language is a barrier to express communicative intent.

3 Basic configuration of a communication support board

3.1 Board

a) **Size**

Size should be suitable for the intended users and intended usage.

b) **Material**

A communication support board can be made of paper or plastic.

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In case of paper, surface lamination is recommended to facilitate writing necessary matters and erasing such when needed.

c) **Formats/media**

There are various types of formats/media that can be used:

1) a single page communication support board;

2) a book-style is more practical especially when several pages are required;

3) digital media.

When the communication support board is composed of several pages, it is recommended to be classified by category, such as transport facilities, food and drink, sequences of daily life, etc.

NOTE Examples of communication support boards are given in Annex C.

d) **Background colour**

It is advisable to use white background. However, a coloured background of a board, exclusive of the symbols, can be used for effect.

When multiple symbols are being displayed on a single board, then it is advisable to use white background for the board, to contrast with the background of individual symbols which are mostly in black.

NOTE Examples of coloured backgrounds are given in Figure C.6.

3.2 Indication item

a) **Title**

A title should be located at the upper part of a communication support board so that the intended use might be easily understood. It should be presented in the first screen in digital media. The title can consist of pictorial symbols and/or text.

b) **Typeface**

A typeface for use on a communication support board should be carefully chosen, based on the following guidelines:

1) sans serif typeface or typeface with very small serifs;

2) regular or bold weight.

NOTE Examples of typefaces are shown in Annex E.

c) **Language**

When text is needed, it should be written in the official language/languages of the country. In order to facilitate the usage of a communication support board, text could be translated in English. In case of using multi-languages, it should be limited to four languages on a single board.

In digital media, change of multiple languages should be realized by changing screen or configuration.

d) **Pictorial symbols**

1) The design of symbols on one board should be consistent.

2) Symbols should be in contrast to the background and responsive to safety colours.

3) Pictorial symbols should be clear, crisp and bold.

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When using pictures or photos in any case, they should be of high quality.

e) **Layout of pictorial symbols**

1) Framing pictorial symbols within the same category in one box should be distinguished from other information (e.g. text or symbols) and arranged sequentially.

2) In order to make each symbol clear and recognizable, the number of pictorial symbols should be appropriate according to size of formats/media.

NOTE Examples are shown in Figure C.4.

3) Pictorial symbols, regarding safety and emergency, which have high priority, should be arranged in the uppermost section of a communication support board.

4) Combination of pictorial symbols and graphical symbols can be used.

5) Combination of pictorial symbols, photos and illustrations can be used.

6) Animation features can be used in digital media.

7) Pictorial symbols to indicate common answers and phrases on individual boards, such as 'Yes', 'No' and 'No idea', should be placed to facilitate conversation.

NOTE Examples of combination of pictorial symbols, photos and illustrations are given in Annex B.

f) **Captions**

When using captions to explain the meaning of pictorial symbols, they should be located at upper or lower areas of pictorial symbols.

g) **Blank space**

Blank space to write supplemental issues can be provided at the front or the back of communication support board.

h) **Publisher**

Information about the publisher and where inquiries can be made should be placed at the lower part or at the back of a communication support board. In digital media, it should be presented on the last screen.

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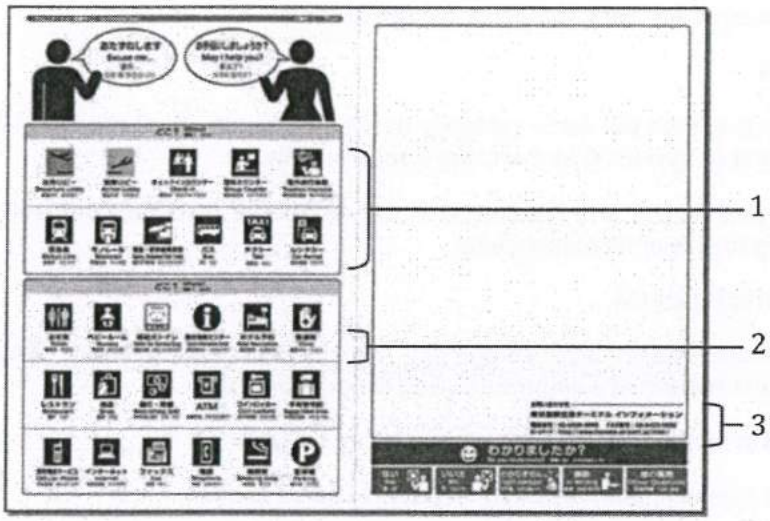
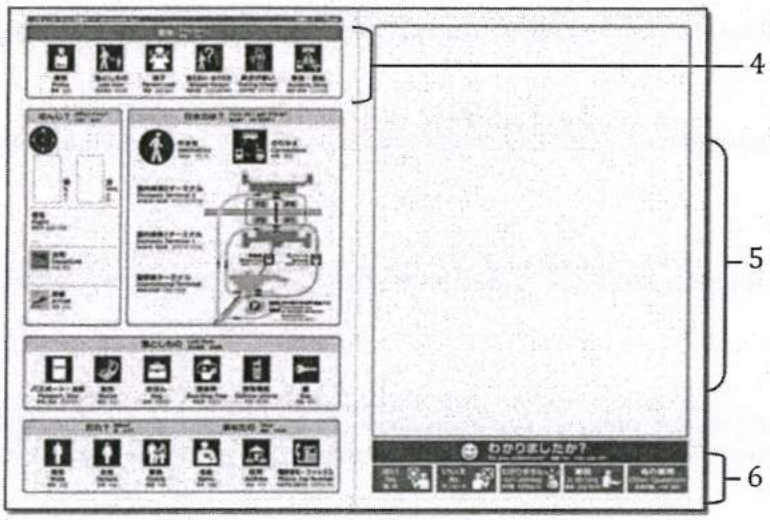


Left side Right side

Front page



Left side Right side

Back page

Key

1 combination of pictorial symbols and graphical symbols

2 captions to explain the meaning of pictorial symbols

3 information about the publisher and where inquiries can be made

4 high priority pictorial symbols shoul be arranged in the uppermost section

5 blank space to write supplemental issues

6 common answer and phrases

Figure 1 — Layout sample

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4 Principles of designing pictorial symbols

The following principles relate to the design of pictorial symbols.

a) **Consistency**

When creating new pictorial symbols, consistency should be maintained with existing pictorial symbols and pictorial symbols of the same category. If conventional symbols, which are widely used in society, are applicable as pictorial symbols, it is imperative that harmonization between them should be examined. If the symbols are accepted as International Standards, then special consideration should be made to avoid confusion with other pictorial symbols (see Figures 2 and 3).

NOTE See ISO 7001.

Figure 2 — Telephone

Figure 3 — Telephone

b) **Solid colour or silhouette**

In principle, a pictorial symbol should be drawn in white on black background (see Figures 4 and 5). However, drawing in black on white background can be used.

Figure 4 — Black background

Figure 5 — Objects drawn in white (Pharmacy)

c) **Simple expressions**

A pictorial symbol should be drawn simply and clearly. It should express essential characteristics so as to be readily identified by the observer to facilitate communication (see Figures 6 and 7).

Figure 6 — Dog

Figure 7 — Have a stomach ache

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d) **Contrast expressions**

Paired concepts (e.g. big and small) can be illustrated together to enhance comprehensibility (see Figures 8 and 9).

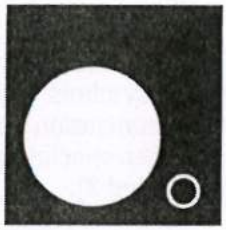

Figure 8 — Big

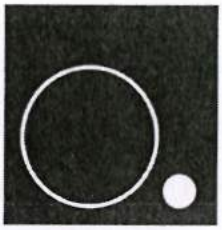

Figure 9 — Small

e) **Clarification of main themes**

When a part of a group is illustrated in a pictorial symbol, the principal objects should be the focus in white, while the other objects can be drawn with white lines (see Figures 10 and 11).

Figure 10 — Friend

Figure 11 — Riding teacher

f) **Detailed expressions**

It is important to pay attention to typical characteristics for communication purposes, such as a pedal of a bicycle, an engine of a motorbike, stems of a persimmon and a tomato when illustrating similar objects in a category (see Figures 12, 13, 14 and 15).

Figure 12 — Bicycle

Figure 13 — Motorcycle

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Figure 14 — Persimmon

Figure 15 — Tomato

g) **Thickness of lines**

For one pictorial symbol, preferably no more than two kinds of thickness should be used to draw lines (see Figures 16 and 17). Details of drawing pictorial symbols are shown in Annex A.

Figure 16 — Amusement park

Figure 17 — Supermarket

h) **Natural description**

Pictorial symbols representing living creatures or nature should maintain the essential characteristics (see Figures 18 and 19).

Figure 18 — River

Figure 19 — Bird

Pictorial symbols of human characteristics should be representative of natural human forms (see Figures 20 and 21).

Figure 20 — Man

Figure 21 — Running

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i) **Motion expressions**

As a technique to express motion in pictorial symbols, arrows can be used (see Figures 22 and 23). Animation features can be used in digital media.

Figure 22 — To take

Figure 23 — To put

j) **Combinations of symbols**

When designing pictorial symbols, already established pictorial symbols can be combined in the same frame, such as "children" combined with "school" means "pre-school" (see Figure 24). Other combined examples are shown as Figures 25, 26, 27 and 28.

Figure 24 — Pre-school

Figure 25 — School-friend

Figure 26 — Wheelchair dancing

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Figure 27 — Got an idea

Figure 28 — Parking garage

k) **Identification of locations**

Drawing symbols of the items or activities within a stylized format of a building helps to identify the location where these items can be obtained and to differentiate the items from these locations.

NOTE Examples of items from locations are as follows:

— medication from pharmacy (Figure 5);

— shopping cart/grocery from supermarket (Figure 17);

— outdoor parking from a parking garage (Figure 28).

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Annex A
(informative)

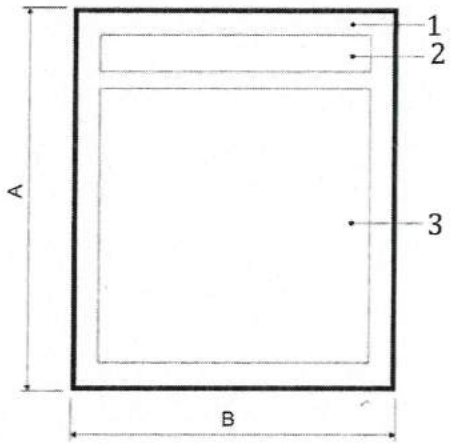
Example of creation of original forms of pictorial symbols — Basic pattern

A.1 General

This Annex specifies basic patterns used to create new pictorial symbols.

A.2 Basic pattern

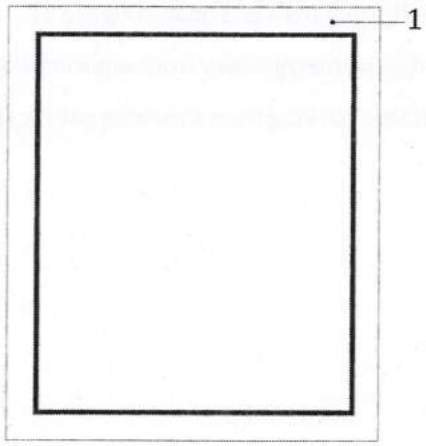
Basic patterns are depicted in Figures A.1 and A.2.



Key

1 basic area
2 text area
3 subject area

Figure A.1 — Basic pattern



Key

1 frame

Figure A.2 — Basic pattern with frame

A.3 Creation principles

A.3.1 Basic area

Using the basic pattern for the creation of pictorial symbols, specific formats are identified (see Figures A.1 and A.2). The pictorial symbols should be drawn in a square A × B with the border of at least 1 % of A.

A.3.2 Basic area with text

Text can be included in the basic area and should be placed above the pictorial symbol.

A.3.3 Basic area with added frame

A frame can be added around the basic area.

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A.3.4 Line width of pictorial symbols

The basic line width for the creation of pictorial symbols should be a minimum of 1 mm. For practical use to strengthen intelligibility, visibility, readability and processing technology, the line width can be changed.

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Annex B
(informative)

Combination of pictorial symbols, photos and illustrations

To facilitate communication, pictorial symbols can be used in combination with photos and illustrations. Symbols can also be replaced with photos and illustrations (see Figures B.1, B.2, B.3, and B.4).

Figure B.1 — We are looking for spiders and ants

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Figure B.2 — Doctor photo

Figure B.3 — Currency illustration

Figure B.4 — Currency photo

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Annex C
(informative)

Classification 1 of communication support boards

This Annex provides design examples of communication support boards as described in this International Standard.

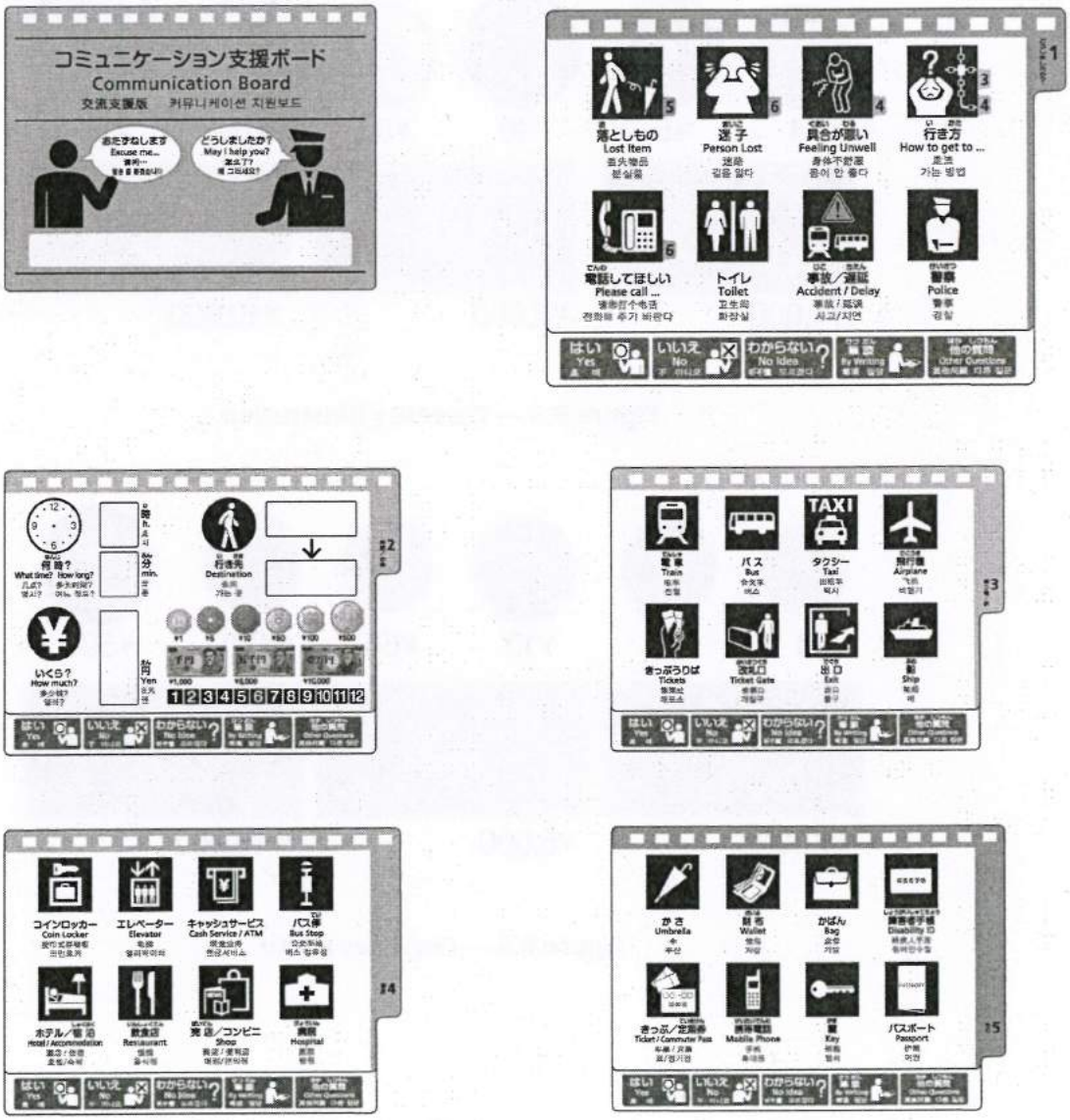

Figure C.1 — Examples of communication support boards in public transportation, Japan

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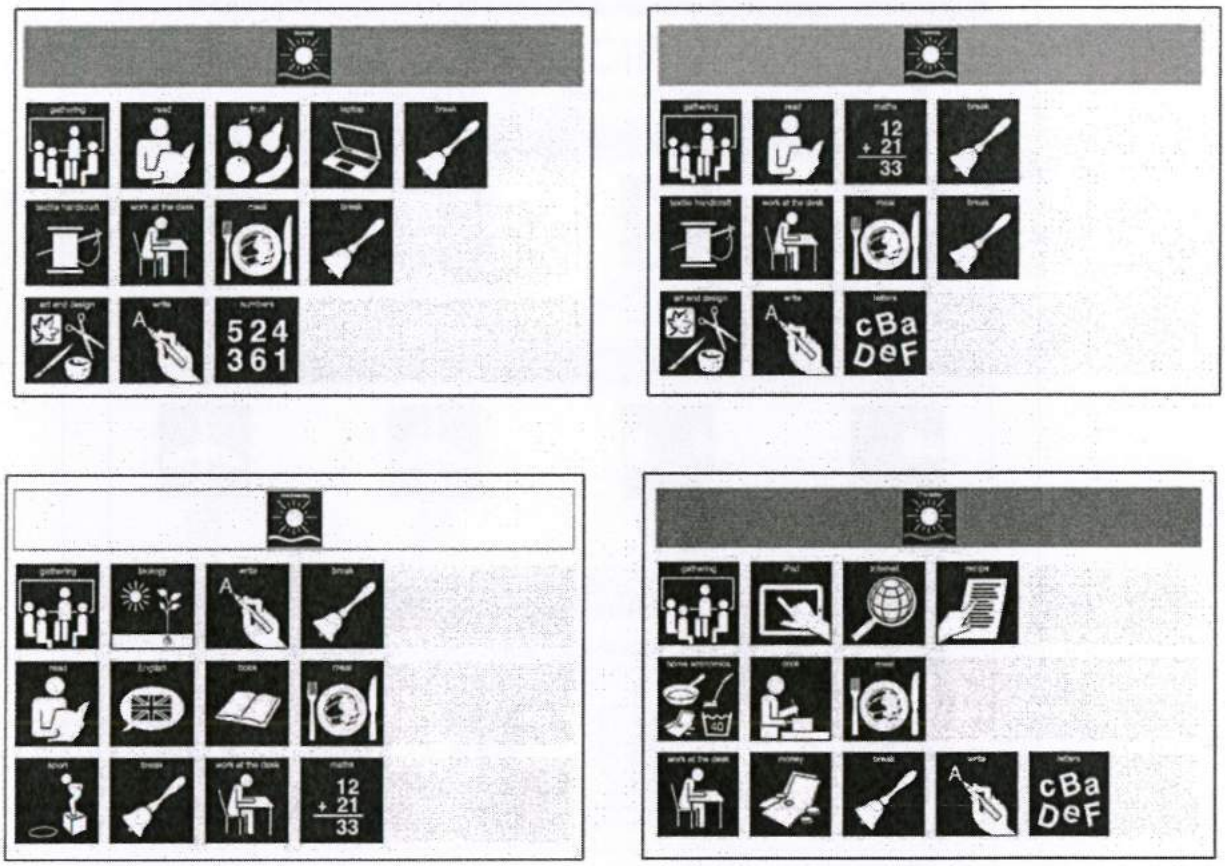

Figure C.2 — Examples of communication support boards, school schedule, Monday to Thursday, Sweden

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Figure C.3 — Examples of communication support boards at check-in counters of the airport, Japan

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Figure C.4 — Example of communication support board for choosing recess activities, Sweden

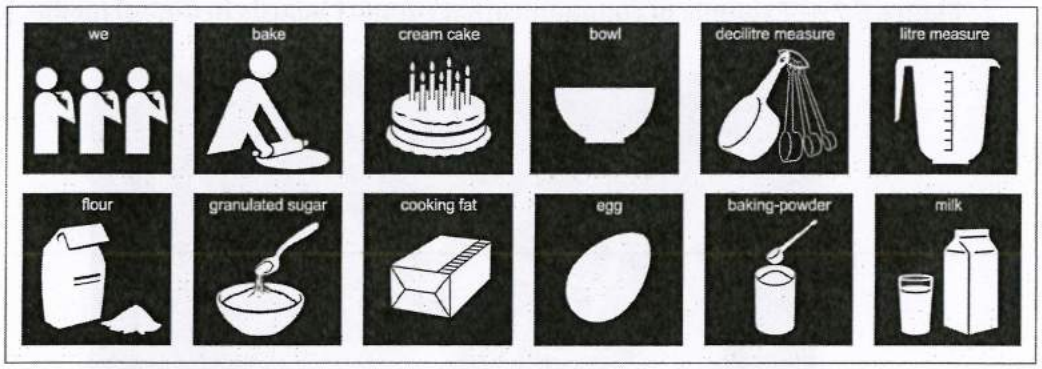

Figure C.5 — Example of communication support board for baking cake, Sweden

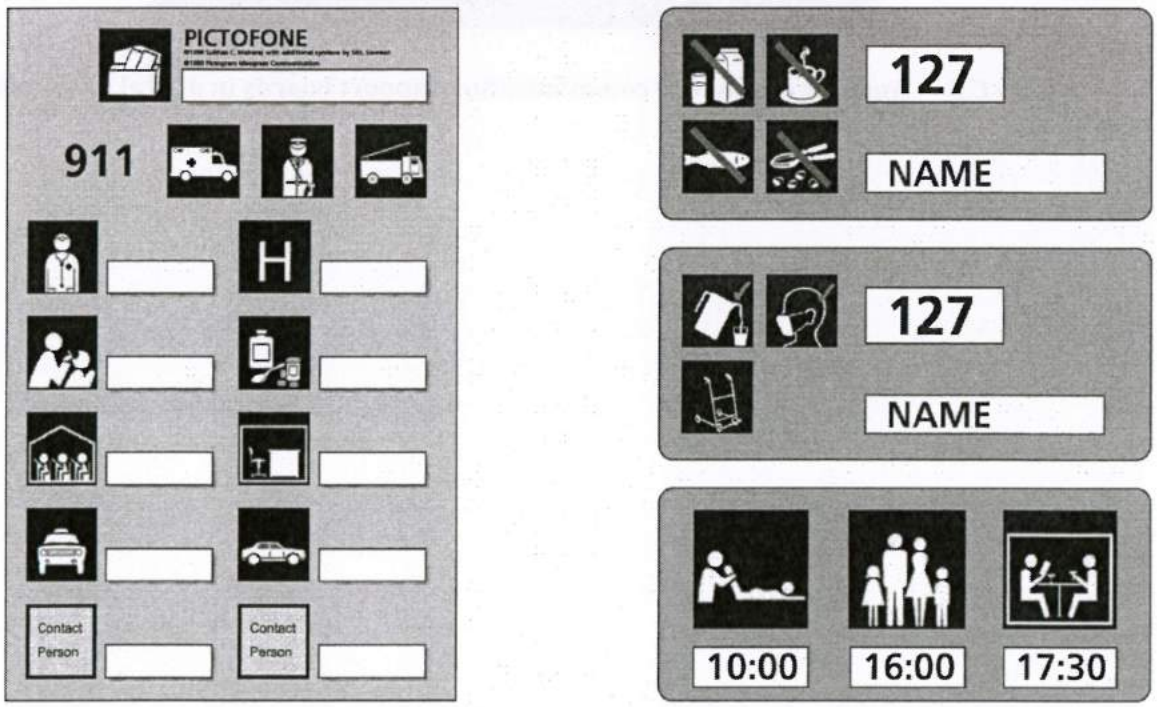

Figure C.6 — Examples of communication support boards at hospitals in the community and in health facilities, Canada

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Figure C.7 — Example of communication support boards in digital media, Japan

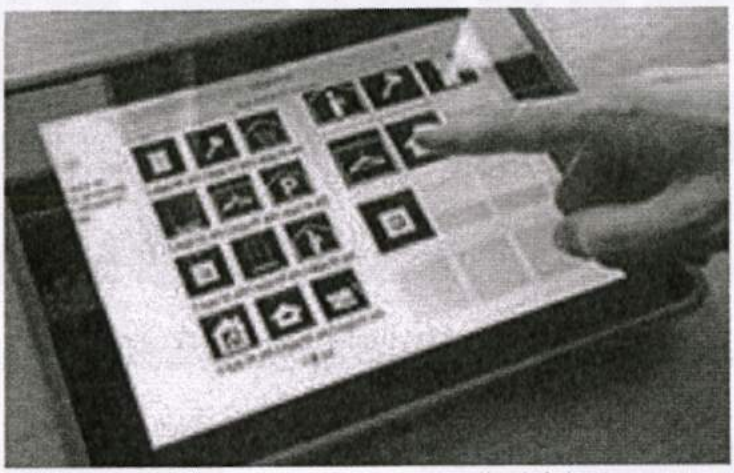

Figure C.8 — Another example of communication support boards in digital media, Japan

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Annex D
(informative)

Classification 2 of communication support boards

This Annex provides design examples of communication support boards not using the principles of designing pictorial symbols presented in this International Standard.

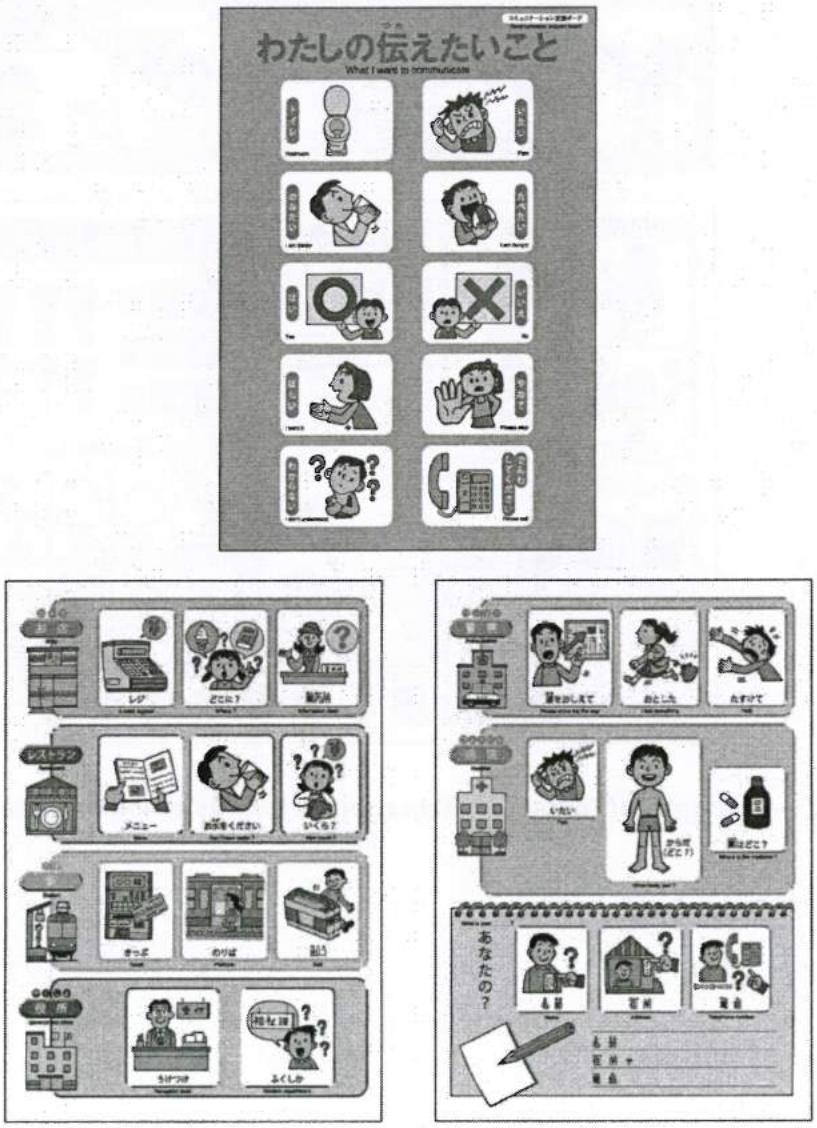

Figure D.1 — Examples of communication support boards at public institutions, Japan

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Figure D.2 — Examples of communication support boards at police stations and police boxes, Japan

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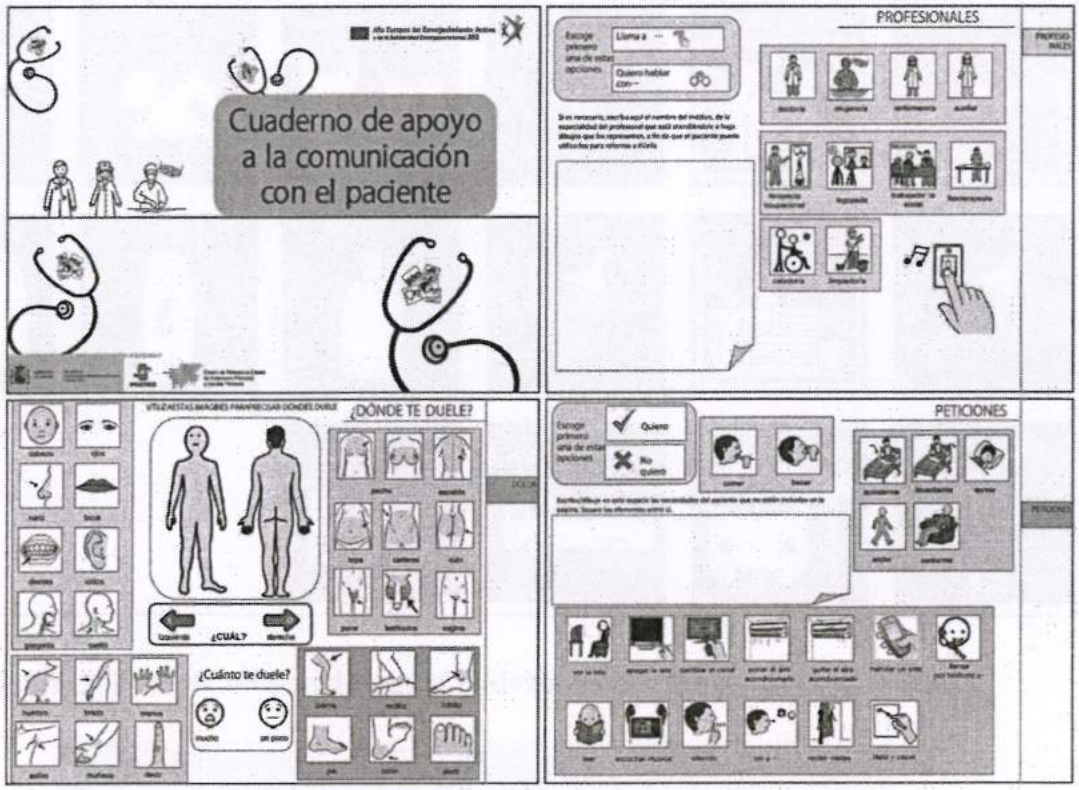

Figure D.3 — Examples of communication support boards in Spanish hospitals

Figure D.4 — Examples of communication support board in Malaga (Spain)

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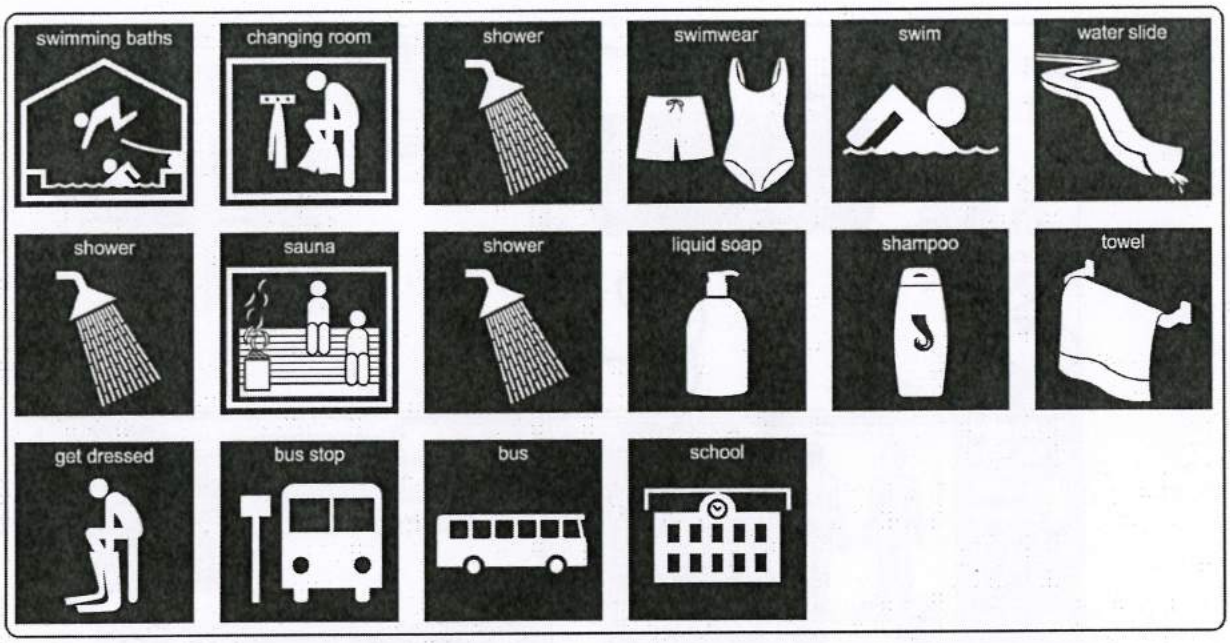

Figure D.5 — Example of communication support board for swimming, Sweden

Figure D.6 — Example of presentation of pictorial symbols, illustrations and photos on PDA

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Annex E
(informative)

Examples of typefaces

This Annex provides examples of sans serif typefaces that are easy to read.

ABCDEFGHIJKKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz 0123456789

ABCDEFGHIJKKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz 0123456789

コミュニケーション支援ボード 名前住所電話日月火水木金土 あいうえおかきくけこ

コミュニケーション支援ボード 名前住所電話日月火水木金土 あいうえおかきくけこ

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另有電子檔

Accessible design — Information contents, figuration and display methods of tactile guide maps

Conception accessible — Sommaire des informations, méthodes de figuration et d'affichage des plans de guide tactile

Reference number
ISO 19028:2016(E)

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Foreword

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The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 7, *Accessible design*.

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Introduction

As the number of older population and social participation of persons with disabilities is increasing, the improvement of the social infrastructure for these people is an urgent issue. Devices for mobility assistance to facilitate social participation of persons with seeing impairment and blindness have rapidly disseminated. Among others, a tactile guide map is a convenient tool for providing location information which is necessary for mobility of such people. Although the number of their installation has steadily increased, it has become obvious that, in the meantime, inappropriate or misleading tactile guide maps have been increasing, which has caused the users a big problem. To solve the problem, this International Standard provides the principal and standardized specifications concerning information contents, figuration and display methods of tactile guide maps.

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Accessible design — Information contents, figuration and display methods of tactile guide maps

1 Scope

This International Standard specifies information contents, figuration and display methods of tactile guide maps providing location information of buildings, including those for the general public, public transport and parks, and also the surroundings in the close vicinity, including access routes to them in order to enable persons with seeing impairment and blindness to move safely and smoothly in those facilities.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17049, *Accessible design — Application of braille on signage, equipment and appliances*

ISO 21542:2011, *Building construction — Accessibility and usability of the built environment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
tactile guide map
information map that provides persons with seeing impairment and blindness with location information of inside and outside of buildings including those for the general public, public transport and parks, which is made recognizable using, for example, convex (raised) lines and/or convex or concave (engraved) surfaces, *tactile marks* (3.6), braille and/or *raised characters* (3.10), and/or large print, having two types: an installed type in facilities, etc. and a portable booklet format

3.2
title
concise text in braille and/or *raised characters* (3.10) indicating the content of a *tactile guide map* (3.1)

3.3
commentary
information in braille and/or *raised characters* (3.10) to give general description of a *tactile guide map* (3.1), cautions and usage of *tactile marks* (3.6)

3.4
lettering
letters, numbers, words, or a combination of them to label items of interest in a *tactile guide map* (3.1)

3.5
legend
index with explanation of *tactile marks* (3.6) and/or abbreviations of braille, and/or *raised characters* (3.10) used for *tactile figures* (3.7)

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3.6
tactile marks
convex or concave marks used for a *tactile guide map* (3.1) to provide information on facilities and equipment

3.7
tactile figure
aggregated relief-like figure composed of convex lines and/or convex or concave surfaces, *tactile marks* (3.6), braille and/or *raised characters* (3.10)

3.8
printed characters
characters written in pencil, with a pen, and in print, not in Braille

3.9
large print
letters with high readability for people with residual vision

3.10
raised characters
specially designed raised/embossed characters composing letters and numbers readable by touch

3.11
tactile readability
ease of reading braille and other tactile information by touch

[SOURCE: ISO 17049:2013, 2.5]

3.12
pictogram
graphical composition that may include a symbol plus other graphic elements, such as a border, background pattern or colour that is intended to convey specific information

[SOURCE: ISO 17840-1:2015, 2.14]

3.13
tactile walking surface indicator
TWSI
standardized walking surface used for information by persons with seeing impairment and blindness

4 Information contents to be displayed on tactile guide maps

4.1 Composition of a tactile guide map

A tactile guide map shall be composed of the following contents:

a) title;

b) commentary;

A commentary can be omitted when a tactile guide map does not need any description of the content. For a tactile map in a booklet form, a commentary may be placed separately.

c) legend;

A legend can be omitted if a tactile guide map only contains common and easily recognizable tactile marks without need of explanation and does not use abbreviations in braille and raised characters.

d) tactile figures;

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e) other information contents:

1) scale;

When appropriate, to facilitate navigation, a scale to indicate distances in the map should be added.

2) north direction.

When appropriate, north direction should be indicated.

4.2 Principles for information contents

4.2.1 Tactile guide map shall be confined to the minimum information required to grasp the locality and/or path of travel.

The amount of information given in a tactile guide map will largely be determined by the purpose of the tactile map. The information given differs whether the map is for indicating a route of travel or to give an overview of an area. All information that does not serve the intended purpose of the tactile guide map shall be omitted.

EXAMPLE The information of the number of steps in each stairway is often given in the "orientation and mobility maps", which are specialized for training of the persons with seeing impairment and blindness, while in the common tactile maps, such information is usually omitted.

4.2.2 When selecting information to be displayed on the map, the contents which support safe and smooth movements of persons with seeing impairment and blindness shall be prioritized.

4.2.3 Tactile readability shall be considered of prior consideration.

The tactile readability of tactile information in guide maps is influenced by a variety of factors, which shall be considered in their mutual interdependence, which, in turn, will widely influence the selection, size and shape of tactile figures and marks.

When a visual guide map displaying the identical range to a tactile guide map is available, the maps shall maintain mutual consistency, though the amount of information may be different.

4.2.4 All types of tactile marks (whether tactile figures or lettering) contained in a tactile guide map shall be easily identifiable and be explained in the legend or by lettering in the respective area of the map.

4.2.5 Pictograms commonly used for sighted people in technical drawings or in wayfinding signage shall be avoided because they are too complicated and finely structured to be read by finger touch.

4.2.6 Printed characters may be also used along with tactile figures on a tactile guide map.

4.2.7 Instead of lettering points of installed guide maps, electronic tags giving out audio information about the particular points in the map can be used.

4.2.8 The date of production and the contact information should be displayed.

5 Figuration of tactile guide maps

5.1 Dimensions

The physical size of a tactile guide map shall correlate with the amount of information required for the purpose to be achieved by the tactile guide map in relation to the size of the location or area to be depicted in the map.

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The size of an installed tactile guide map should be within 600 mm in grip distance for desk installation (see Figure 1) and for wall installation (see Figure 2). When a tactile guide map is prepared in a booklet form, extra attention should be paid so that the folds do not hinder tactile reading.

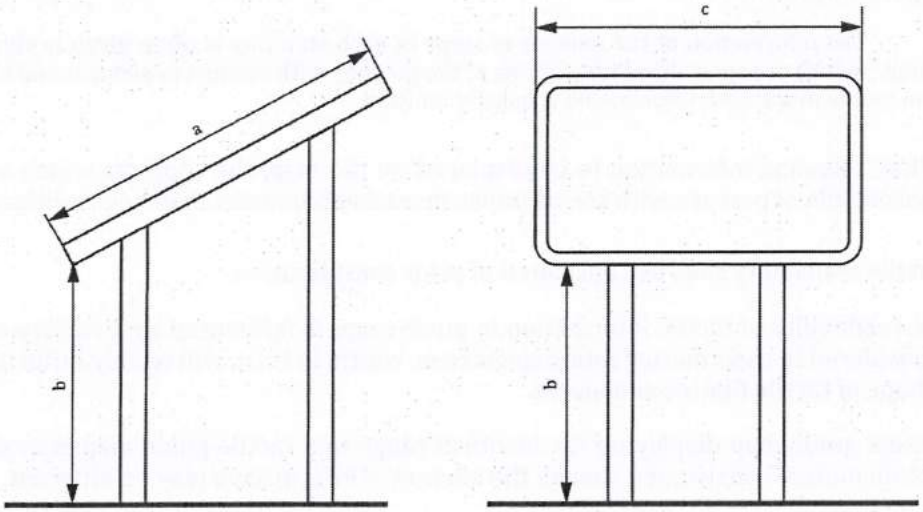
5.2 Location of installed tactile guide maps

For a tactile guide map installed on the wall, which is perpendicular to the floor, the centre line height should be preferably 1 400 mm from the floor level.

These dimensions do not apply to guide maps which are set horizontally to the floor or inclined to angles close to horizontal installation (see Figure 1). In either case, a location that does not hinder tactile readability shall be chosen.

The clearance of the lowest part of the desk installation shall be 900 mm to enable wheelchair users to access. See ISO 21542:2011, 40.14.

Great care shall be taken to ensure that people with seeing impairment and blindness can find the installed tactile guide maps, e.g. by using tactile walking surface indicator (TWSIs) or similarly appropriate tactile guidance and/or audio guidance to lead them there or by installing floor plans at fixed places next to elevators, stairs, etc.



a Within 600 mm.

b 900 mm.

c Approximately 1 000 mm.

Figure 1 — Examples of figurations of desk installation type

When deciding the height of installation, the target group for a particular map should be taken in consideration, which may lead to other decisions concerning installation height of the map (e.g. when the target group are children).

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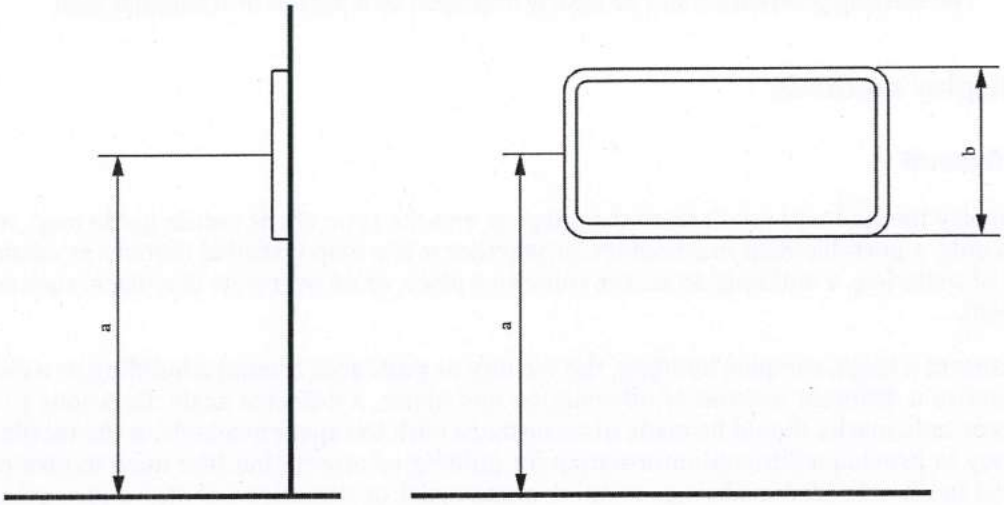

a Preferably 1 400 mm.

b Within 600 mm.

NOTE The frames of tactile guide maps are not included in the given measures of tactile maps.

Figure 2 — Examples of figurations of wall installation type

5.3 Directions of a tactile guide map

5.3.1 When installing a guide map, marks of directional reference and present location indicated in a tactile guide map shall strictly comply with the actual directions and present location in the place where the map is to be installed. For example, locations of a particular office depicted in the map to the right-hand side in a building shall be found on the right-hand side of the actual building.

NOTE When tactile guide maps are placed at an angle (e.g. 180° or any other angle to the actual directions), blind people face problems since they cannot see other landmarks as, e.g. flights of stairs, lifts, etc., which would enable them to adjust the faulty direction given in the map. Some people have difficulties in turning the map round in the mind.

5.3.2 Tactile guide maps for installation shall be placed in the way that a user can read the lettering and tactile figures well.

5.3.3 For guide maps which contain information on spatially overlapping area, such as the first floor and the second floor of a building, and guide maps which display one large space using multiple maps, the scale size and the direction shall be unified. When the maps of each floor are to be installed on respective floors, each guide map should be placed in the same location of respective floors and in the same direction.

Presenting two levels of a building or a place on top of each other in one tactile guide map is not permissible, because the elements to each level cannot be assigned by the blind reader unambiguously. If in a multi-storey building, several storeys should be displayed for reason of different layout of rooms or for information on rooms, separate individual maps for each storey are required. If needed, a cross section in side view of the building could be added, comprising several storeys to indicate transfer routes from one storey to another, different room arrangements, halls rising over more than one storey, etc.

5.3.4 Tactile guide maps in a booklet form may employ user-friendly directions, considering locations of doorways, flow-lines and so on.

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5.3.5 The starting position should be clearly indicated by a big dot or triangular sign.

6 Display methods

6.1 General

The display method will result from the purpose and the type of the tactile guide map, whether it is a sketch only, a portable map in a booklet, or whether it is a map installed indoors or outdoors or it is a model of a site (e.g. a building, an access route to a place, or an overview of a place, such as of a park or a garden).

To represent a large, complex building, the vicinity or park area around a building or a clear floor plan will require a different amount of information and hence, a different scale. Decisions to apply tactile figures or only marks should be made in accordance with the space available in the tactile map and the necessity to provide additional information for guiding or orientation (the need to give part of a path of travel in an extended scale, e.g. complex crossroads) or directions of stairs (e.g. going upward or downward), giving directions of a lift (when going to different parts of a building, etc.).

6.2 Title

A title shall be displayed in the upper part of a tactile guide map.

6.3 Commentary

Commentary should be placed close to the title or the legend.

6.4 Legend

6.4.1 The legend shall be placed where it can be easily understood, and when the legend comprises only of a few items, it should be preferably located to the left of tactile figures or the upper part of a map under the title. A legend clearly delimited by a line can be placed in the area of the map, where irrelevant parts of the original maps are cancelled. Commentary and a legend for maps in a booklet form can be combined and put in another page. A legend in a booklet type should not be placed on the back side of the map itself.

6.4.2 The display of a legend shall be in the order of displaying "tactile marks" first and then "abbreviations of braille" in alphabetical order. Tactile marks shall be displayed in order of importance. When raised characters are used, they should be located left to the tactile marks and braille should be located right to the tactile marks. The display order of abbreviations of braille and/or raised characters shall be in alphabetical order. For installed maps, tactile marks of the present location should be the first item to be displayed.

6.4.3 The dimensions and shapes of tactile marks displayed in the legend and the ones used as part of tactile figures in the map shall not be different, but dimensions, such as width of stairs, may deviate in accordance with the actual location/position of the map.

6.4.4 Corresponding braille, abbreviations and tactile figures should be easily recognizable.

6.5 Present location and additional guiding information within the map

6.5.1 The tactile mark of the present location/starting point should be expressed higher than other marks in dome shape or triangle shape. Braille should be placed adjoining to the mark as near as possible (see Annex A, EXAMPLE 1; Annex C, EXAMPLE 8).

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6.5.2 In tactile guide maps, the present location shall be the most prominent mark in the map since it is the starting point for the user to organize orientation in the map. The starting point in the booklet type should be treated the same way as the present location in the installed type.

6.5.3 For an installed guide map, the present location in the tactile figures shall be explained in the commentary or in the legend.

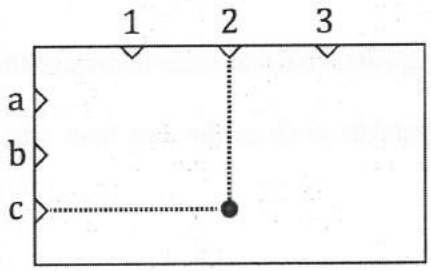
6.5.4 The present location and destinations, such as other installation sites of the tactile guide map, should be explained by using a combination of the horizontally and vertically trisected area (see Figure 3) or by using coordinates (see Figure 4).

6.5.5 For explaining the location by coordinates, tactile frames with notches can be used as graduations on axes with associated numbers or letters. Notches shall have an edge that will not cause harm when touched (see Figure 4).

upper left	upper middle	upper right
left	center	right
lower left	lower middle ●	lower right

NOTE The location expressed by a bullet in Figure 3 is explained as "lower middle".

Figure 3 — Example of trisected area



Key

1 one-fourth of the horizontal distance from the left

2 horizontal centre

3 one-fourth of the horizontal distance from the right

a one-fourth of the vertical distance from the top

b vertical centre

c one-fourth of the vertical distance from the bottom

NOTE The location expressed by a bullet in Figure 4 is explained as c2.

Figure 4 — Example of coordinates

6.5.6 When the location of other tactile guide maps which provide further guiding information is within the area of the map or close to it, such information points/maps shall be indicated in the map by a special tactile mark shaped like a long dot (see Annex B, EXAMPLE 3) and, when outside the actual map, the mark shall be placed in the margin with an arrow to indicate its direction where to find it.

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6.6 Tactile figures

6.6.1 Principles of tactile figures

6.6.1.1 In order to prioritize tactile readability, tactile figures can be modified and transformed and do not need to be proportional to actual sites.

6.6.1.2 In tactile guide maps, important building components, such as stairs, escalators, elevators and toilets or landmark facilities, can be raised more than other places or highlighted by increasing the density of patterns so that the map may be more understandable.

6.6.2 Shapes and elevation of tactile figures

6.6.2.1 Tactile figures in guide maps, such as tactile marks, letters and numbers, should be used sparingly in favour of greater clarity and the usage of bigger, more self-explaining (intuitively recognizable) tactile figures.

6.6.2.2 The minimal elevation of raised surfaces of tactile figures and marks shall be 0,5 mm except very smooth surfaces are available for tactile guide maps. In that case, single lines and clearly structured tactile marks may be reduced to a height of elevation of 0,3 mm at a minimum.

6.6.2.3 When, however, in complex places (e.g. a large entrance hall to a building, such as a conference centre, a railway station, an arrival or departure hall of an airport, etc.), higher levels of elevation than 0,5 mm may be needed.

6.6.2.4 Non-accessible areas, such as off-limits lawns and ponds in parks, shall be specified by tactile figures.

6.6.2.5 The location of building entrances and room doorways shall be displayed clearly.

6.6.2.6 Spatially overlapping spaces, such as the first floor and the second floor, shall be displayed separately.

6.7 Tactile marks

6.7.1 Principles of tactile marks

6.7.1.1 In one tactile guide map, the use of similar tactile marks in different meanings shall be avoided.

6.7.1.2 Tactile marks are usually convex in tactile maps and not concave. Convex marks are much easier to recognize tactually than concave marks. Therefore, the latter marks need more attention and care when used in tactile guide maps.

6.7.1.3 In tactile guide maps, concave expressions may be used. Expressing rivers or ponds, which are actually lower than other places, makes the map sometimes more understandable. The road between buildings can be expressed lower than buildings for better understanding. However, the road may be expressed in a convex line when the scale is large enough and the road is of major importance.

6.7.1.4 When constructing a tactile figure, lines, surface and other tactile marks that are easy to recognize by touch shall be used effectively. Attention shall be paid not to hinder tactile readability by displaying an excessive number of variation in marks.

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6.7.1.5 For displaying a variety of facilities by tactile lines, such as outlines of buildings, tactile walking surface indicators, pathways in parks and roads, the differences shall be easily recognizable and distinguished by straight, dotted and dashed lines.

6.7.1.6 When there is sufficient space in a tactile map, self-explaining profiled tactile marks should be preferred. However, there shall be no mixture of marks in the same tactile map referring to the same item (e.g. stairs, escalator, elevator, etc.).

6.7.1.7 Since many tactile guide maps are produced from floor plans or technical drawings, great attention should be paid to the fact that many tactile marks are transferred or derived from those sources. Such signage of sighted people (e.g. the signage showing stairs going upward or downward) are often very abstract and too finely structured, as well as too complex to be employed in tactile maps for blind people. They shall be simplified by reducing or adapting that signage to clearly identifiable marks, which can be read by finger touch.

6.7.2 Information items to be observed in tactile marks

6.7.2.1 Doorways of rooms

When expressing the space partitioned by convex lines as a room, doorways are expressed by breaking a part of the line. When a broken part is long, the change of the space is sometimes unrecognized. Door blades can be indicated by short lines projecting into the direction the door opens. Around the entrance, the name of a room should be indicated in braille. When a room is narrow, an abbreviation in braille and/or raised characters can be used (see Annex A, EXAMPLE 5).

6.7.2.2 Stairs/escalators/ramps

In facilities which have differences in level, such as stairs, escalators, ramps, it is desirable to use marks identifiable whether upward or downward. Devised marks have v-shaped, triangle or tactile dot on a higher level (see Annex A, EXAMPLES 3 and 4; Annex B, EXAMPLES 5 and 6; Annex C, EXAMPLES 6 and 16). In case of escalators, not only differences in level but also information on usable direction should be more desirable.

6.7.2.3 Marks to indicate non-accessible areas

The total space can be conveyed by filling up the space with a dot pattern or stripe pattern (see Annex A, EXAMPLE 6).

NOTE High-density dot pattern means the off-limit area, and low-density dot pattern means the lawn area.

6.7.2.4 Arrows to indicate directions

Arrows can be used effectively to express directions or landmarks in the margin. The shape should be simply composed of arrows and arrow shafts, and the pointing lines should have an angle of 90° (see Annex A, EXAMPLES 10 and 11).

6.7.2.5 Dotted lines to indicate TWSIs or travel rules

Dotted lines are suitable to express TWSIs. When few dots are used, the attention should be paid to make differences between the distance and diameter of dots and the diameter of braille. Where there are no TWSIs, dot lines can be used to express guiding routes or as other lines (see Annex A, EXAMPLE 2).

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6.7.3 Shapes and elevation of tactile marks

6.7.3.1 Dots

In tactile guide maps, single dots should be used to indicate access points or points of special interest or importance. Such points should generally be labelled by a letter, a number or a tactile mark to distinguish them from each other.

a) Labelled dots should be used in a tactile map to indicate points of interest, which will otherwise be difficult to indicate by tactile marks, like places where to rest in a park or garden (e.g. benches), access point to enter a swimming pool (e.g. a ladder), or a jetty at a river or a pond.

b) In tactile guide maps, special points such as bus or tram stops, points where to get information, etc. should be indicated by dots. When a bus or tram line is indicated by a line in the road, tram stops should be indicated by small flat squares and bus stops by short lateral strokes (see Annex B, EXAMPLES 16, 17 and 18; Annex C, EXAMPLE 4).

c) When in a tactile guide map a particular road crossing area needs to be depicted in an extended scale, the pedestrian crossing should be indicated by a double dot line with a wider distance between the dots (see Annex B, EXAMPLE 22). The traffic lights could be indicated by a somewhat bigger dot.

d) In a tactile map in a booklet format, a reference point (e.g. the starting position for a path of travel or the beginning of a description of a site) should be indicated by a bigger dot. Alternatively, an isosceles triangle with the elongated pointed tip could indicate the beginning and direction for travelling.

6.7.3.2 Lines

Lines in maps fulfil various functions. When several different functions need to be indicated, the thickness, diameter, volume and structure of the lines should be used, ranging from very thin, smooth, continuous lines to dotted lines for differently structure and/or iterated lines.

a) In a floor plan, lines indicate inner walls for rooms with opening for doors. Door blades can be indicated by thin lines projecting at an angle of 45° in the direction the door opens, sliding doors by a double line (see Annex B, EXAMPLES 12 and 13). The outer walls of the building may be indicated by more prominent or flattened wider line structures. Windows can be marked in such outer wall structures by very thin lines.

b) In outdoor areas, such as parks or gardens, the close vicinities around buildings lines shall preferably be employed to indicate fences, enclosing walls or boundaries of any kind (see Annex C, EXAMPLE 2).

c) When TWSIs indicate an optimal path in a tactile guide map, a thin dotted line should be employed. Decision points, such as branching or turning points within the path of travel, can be indicated by small rough squares (see Annex B, EXAMPLE 24). A path of travel in a tactile guide map that is not marked by TWSIs shall mainly be indicated by a fine dotted line. The dotted line should consist of groups of three to four dots to distinguish such lines from TWSIs guiding paths (see Annex B, EXAMPLE 25).

6.7.3.3 Areas

Non-accessible areas, such as restricted areas in the buildings, off-limits lawns and ponds in parks, shall be shown as surface area specified by tactile figures, clearly differentiated.

In adjoining surfaces with different information and minimal levels, differences in heights should be taken into account.

a) Platforms, terraces and alike shall be indicated by a raised area. Further marks (e.g. stairs, ramps, elevators, railing, etc.) can be added on top of such platform areas. Marking platform or terrace

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edges by lines shall be avoided because such a line could suggest there is a fence or railing at the platform edge.

b) In most cases, it will be sufficient to indicate built areas (whether blocks of housing or industrial areas) by flat elevated areas instead of marking the areas by lines only. If required, individual areas can be labelled.

c) In a more extended scale, the representation of complex crossroads or longer streets with several uniform blocks in tactile street maps should be structured by some landmarks in order to facilitate orientation and guiding. More prominent or important buildings like town halls, churches, hospitals, monuments or alike should be shown in a top view shape or as a profile view; or alternatively, they can be labelled.

d) When different areas in a garden or park (e.g. lawns, flower beds, ponds) need to be distinguished, such areas should be given a different surface structure (e.g. lawn: a rougher surface, flower beds: a surface with tiny dots, water: a wavy or straight lined surface — see Annex B).

e) When TWSIs are represented in tactile guide maps, attention fields should be indicated by a dotted area. In very narrow scale maps, warning fields can be reduced to rougher surface areas labelled by letters or numbers, which shall be explained in the legend.

f) When a surface contrast with different degrees of smoothness/roughness of structure are used to distinguish different areas (in a garden or park, e.g. lawn, ponds, flower beds, paths, etc.) no extra elevation for each area is required.

6.8 Braille and raised characters

6.8.1 Braille employed as one of the characters in a tactile figure shall follow the specification described in ISO 17049. For displaying braille and/or raised characters as a part of tactile figure, readability of tactile marks shall not be obstructed.

6.8.2 When braille and raised characters are used together, either one shall not obstruct the readability of the other.

6.8.3 Braille and/or raised characters should be displayed horizontally in the tactile guide map; they shall not be placed diagonally, nor in curved or upside-down arrangement. However, when the names of streets follow the roads, those can be placed not horizontally. It should be placed horizontally if there is enough space in the map next to the road and it can be clearly assigned to the particular road.

6.8.4 Braille and raised characters that explain a large area shall be placed inside the area. Single lead lines can be used when tactile marks are too close together and the information would otherwise get lost.

6.8.5 Braille and/or raised characters to explain tactile marks should be in the same horizontal level with the space of 6 mm between them for attaining mutual good readability.

6.8.6 When appropriate, words commonly used but different from printed characters can be used for explanation in braille and/or raised characters, without referring to a legend.

EXAMPLE 1 "Information" — "info".

EXAMPLE 2 "Rest room", "washroom", "lavatory", "toilet" — "WC".

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6.9 Braille and large print

For people with a small residual vision, it will be helpful to display braille and tactile marks together with black large print and brightly coloured printed marks.

a) When braille and large print are displayed by a set of layers, the upper one, the transparent sheet or board made of plastics on which braille and tactile marks are constructed, and the lower one, the base on which large print and coloured marks are exhibited, the marks on both layers shall be congruent in position when looking at them from the top. This can be attained by fixing both layers in a frame or a booklet.

b) When braille and large print are on the same layer, special care should be taken for large print and coloured marks to withstand frequent reading by touch. When blurring of those prints necessitates regular maintenance, the two layer construction described in a) shall be employed.

c) Tactile readability shall not be decreased by a printed map that is displayed on the same surface.

d) In case of placing a tactile guide map along with a printed one, the layout, the contrast and the colour scheme shall be considered for accessibility of persons with low vision and persons with colour blindness.

6.10 Tactile emergency guide maps

Tactile emergency guide maps shall meet the following additional requirements.

a) Tactile emergency guide maps shall be simple and provide the most essential information, such as walls, passages, stairs, exit doors, a fire-resistant elevator, a safe shelter, etc., which shall be clearly named in the map. In case of a booklet type, the shortest route to the nearest emergency exit shall be highlighted and marked by a prominent, clearly perceptible guide line.

b) Tactile emergency guide maps should be available in a joint tactile and visually readable format. This should make it easier for sighted people to assist persons with seeing impairment and blindness to interpret such maps when they face problems.

c) Tactile emergency guide maps should be prepared in multi-language versions, at minimum, in a local language version and an English version.

d) Tactile emergency guide maps should be available in a booklet type which can be mobile and read while sitting. Installed tactile emergency guide maps shall be placed where they can be easily found, e.g. next to the opening side of doors.

e) Tactile emergency guide maps shall also contain emergency phone numbers and some major behavioural recommendations for emergency situations in braille and/or raised lettering, and large print.

f) Separate tactile and visual versions of emergency maps should only be used when both versions are too different in sizes.

7 Materials used for tactile guide maps

7.1 Depending on the materials and technique applied to manufacture guide maps, the degree of fineness, precision, as well as the amount of information to be displayed can vary substantially. Materials that can produce fine and accurate structures, such as plastic hoils, hard plastic, bronze, etc., provide good tactile readability.

7.2 Materials shall have good tactile readability and the surface shall not hurt fingers and hands of the readers.

7.3 Materials should not have shining surfaces that could cause a glaring effect to the readers.

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7.4 Materials should not get deteriorated and/or remarkably damaged by a long-term use.

7.5 Tactile guide maps should be cleaned regularly.

7.6 Materials should not get too hot and/or cold for the reader of the map to touch due to hot or cold weather environment.

7.7 The material used shall be selected so that no allergic reactions of the reader will result from it.

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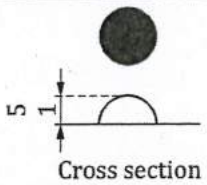
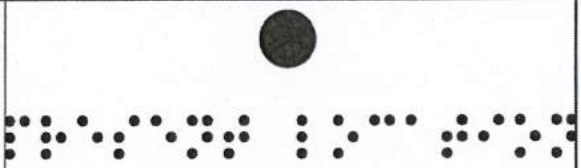
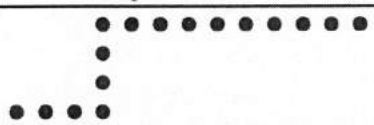
Annex A
(informative)

Japanese examples of tactile marks

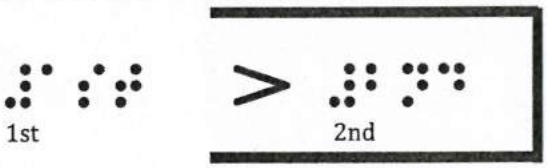
EXAMPLE 1 Present location.

Tactile mark (side view)	Implementation
	
Description	
For a tactile figure, the margin of the height between the tactile figure and another mark should be different, obviously, such as a hemisphere that is about 1 mm to 5 mm high. In case of having space around a mark, in principle, "the present location" should be displayed in braille.	

EXAMPLE 2 Tactile walking surface indicator.

Tactile mark	Implementation
	
Description	
A tactile mark should be a round dotted line. The dimension and the interval of the circles can be transformed depending on the scale size and the complexity of the figure, but on the same tactile guide map, they should be standardized. In addition, actual number of indicators and dots need not be conformed.	

EXAMPLE 3 Stairs.

Tactile mark	Implementation
	
Description	
To convey directions of stairs, tactile marks should be displayed by isosceles triangles or equilateral triangles without the base. The direction should be arranged so that two sides intersect as "high" and the direction without sides as "low". A space of more than about 6 mm between marks and lines that indicate the wall should be left. To facilitate proper use, an explanation should be included in the legend, e.g. 'the sharp end denotes "up".'	

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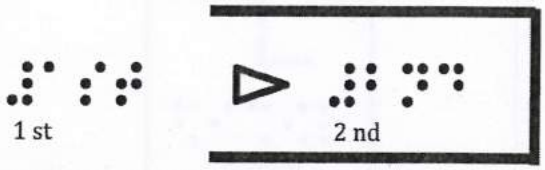
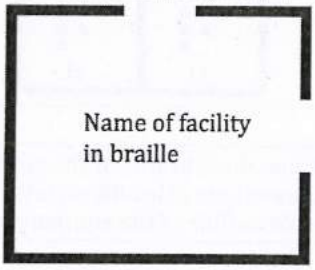
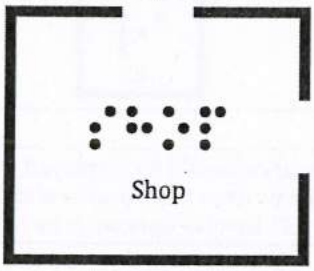
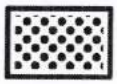
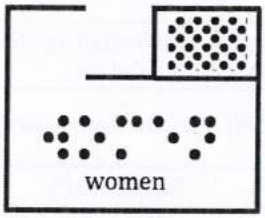
EXAMPLE 4 Escalators.

Tactile mark	Implementation
	
Description	
To convey directions of stairs, tactile marks should be displayed by isosceles triangles or equilateral triangles. The direction should be arranged, so that two sides intersect as "high" and the direction without sides as "low". A space of more than about 6 mm between marks and lines that indicate the wall should be left. To facilitate proper use, an explanation should be included in the legend, e.g. 'the sharp end denotes "up".'	

EXAMPLE 5 Doorways.

Tactile mark	Implementation
	
Description	
Display tactile marks of doorways of buildings by opening a part of lines surrounding the domain. In principle, doors and special marks should not be used to display tactile marks.	

EXAMPLE 6 Non-accessible area.

Tactile mark	Implementation
	
Description	
Non-accessible areas should be represented by surface patterns consisting of dots. The dimension and the interval of the circles can be transformed depending on the scale size and the complexity of the figure but surface marks should be standardized on the same tactile map.	

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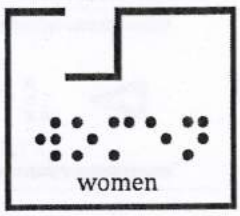
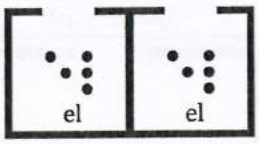
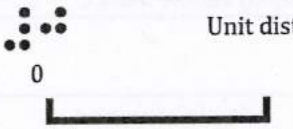
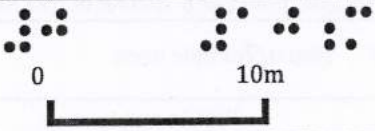
EXAMPLE 7 Toilet.

Tactile mark	Implementation
	
Description	
Within the appropriate domain, display "Men" or "Women". If all braille cannot be written within the domain, the abbreviations in braille can be written.	

EXAMPLE 8 Lift (elevator).

Tactile mark	Implementation
	
Description	
Tactile marks should be displayed within the appropriate domain in braille. If the tactile marks cannot be written in all braille within the domain, the abbreviations of braille should be written, such as "el". Display doorways by opening a part of the visible outline of the equipment.	

EXAMPLE 9 Reduced scale.

Tactile mark	Implementation
	
Description	
Write in braille, which displays the measure and the distance matching on the upper side of both sides of a standard solid line.	

EXAMPLE 10 Solid lined arrow for directions.

Tactile mark	Implementation
direction	north
Description	
Put "north" in braille up at the head of a solid lined arrow.	

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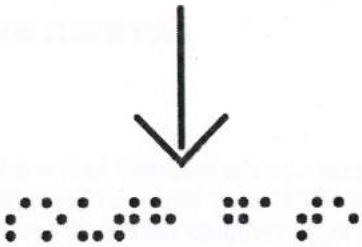
EXAMPLE 11 Solid lined arrow for destination.

Tactile mark	Implementation
Toward the destination	 South gate
Description	
In case of displaying information of facilities outside of a tactile guide map, put braille down at the head of a solid lined arrow.	

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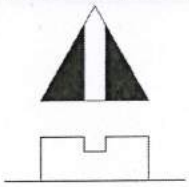
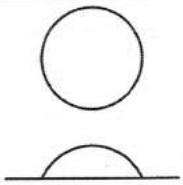
Annex B
(informative)

German examples of tactile marks

All tactile guide marks outlined below are suggestions. Dimensions, shapes, details to the width of line, etc. are only of advisory nature. They need to be adapted to the overall conception of the guide map and the guiding requirements derived from the actual floor plan or access route, e.g. number and length of stairs, width and structure of lines in relation to other lines.

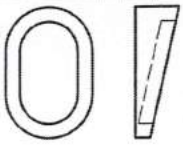
EXAMPLE 1 Present location/starting point.

Tactile mark	Implementation	Description
	It should be the most prominent mark in the guide map: equilateral triangular column, preferably with notch going to one point of triangle to show walking direction.	Length of each side more than 10 mm, height of elevation more than 4 mm
	A round dot should alternatively be used.	Diameter from 8 mm to 10 mm, elevation more than 3 mm at minimum

EXAMPLE 2 Information desk.

Tactile mark	Implementation	Description
	Information mark "I" with dot and serifs	Vertical height of "I" mark more than 10 mm, elevation more than 1,2 mm

EXAMPLE 3 Position of other tactile information points or maps with further guiding information.

Tactile mark	Implementation	Description
	Elongated dot shape showing the position of other tactile mark with further guiding information	Raised elongated big dot, width more than 6 mm, length more than 9 mm. The rim of the mark should be 1 mm wide, central part 1 mm lower than the rim. Preferably, the tactile mark should be titled like a desk installation with the upper side having an elevation of more than 3 mm and the lower side 1 mm. Alternatively, the mark can have a full, flat, rough surface.

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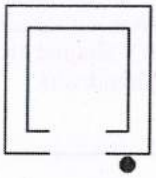
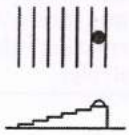
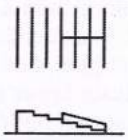
EXAMPLE 4 Elevator.

Tactile mark	Implementation	Description
	Two squares (one placed inside the other) with opening showing door(s). One side of door opening should have a dot/tiny projection to indicate the call button in very large scale maps. The range of floors where the elevator serves, could be added, e.g. –2 to +11.	Inner square raised to outer square by 0,8 mm, size of outer square more than (15 × 15) mm
	Crossed blank square	Cross more than (10 × 10) mm, with unstructured smooth lines of 2 mm width

EXAMPLE 5 Stairs.

Tactile mark	Implementation	Description
	Stairs going upward from the actual floor level displayed in the map to an upper floor level or coming down from there. In order to indicate the upside direction, the top part of stairs (escalators, moving walkways and ramps are the same) should be marked by a tiny dot.	Parallel lines for steps more than 1 mm in volume, width of tactile mark more than 7 mm, length more than 10 mm (may vary). Dot in size of a braille dot (elevation from 0,6 mm to 0,8 mm, diameter from 1,2 mm to 1,6 mm)
	Stairs going downward from the actual floor in the map level to a lower floor level or coming up from there. In order to indicate the direction, the bottom part of stairs (escalators, moving walkways, ramps are the same) should be marked by a short dash/line, combining the lowest three steps in the tactile mark.	

EXAMPLE 6 Escalator.

Tactile mark	Implementation	Description
	Dot indicates the upper side of escalator for direction of movement of escalator.	Two dominant broad lines for handrails and thinner/finer lines for steps. Handrails width more than 1,5 mm, distance of handrails more than 6 mm, distance of steps more than 0,6 mm
	Short dash indicates the lower side of escalator for direction of movement of escalator.	

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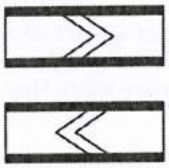
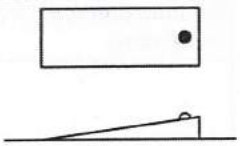
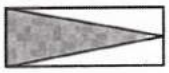
EXAMPLE 7 Moving walkways/travellator.

Tactile mark	Implementation	Description
	When moving walkways are going up or down to another floor level, they should be marked by a dot or dash, respectively.	Two broad lines. Direction of movement should be marked by two V-shaped arrows between the handrails.

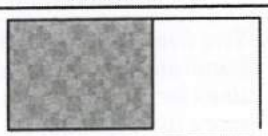
EXAMPLE 8 Giving indication of the movement of escalators, moving walkways.

Tactile mark	Implementation	Description
	Escalator to higher floor moving upwards	Parallel lines for steps should be 1,5 mm in volume. Width of tactile mark 10 mm, length more than 15 mm (may vary)
	Escalator from higher floor moving downwards	V-shaped sign on top of mark. Width of lines more than 0,8 mm, preferably in contrasting colour to steps and handrails

EXAMPLE 9 Ramp.

Tactile mark	Implementation	Description
	Profiled ramp with right-hand side raised	Elevated part of the ramp in the profiled type should be raised by more than 2 mm to lower end. Dot may be used to indicate upper side or short dash to indicate lower end in relation to the actual floor level of the map.
	A flat mark uses a rough triangle in a square or rectangle. The point or dash of middle triangle also indicates whether the ramp goes down or up from the actual floor level.	Central triangle (marked grey) raised by 0,8 mm and should have a rough structure.

EXAMPLE 10 Non-accessible area in floor plan.

Tactile mark	Implementation	Description
	Blank raised area to the level of outer walls of the building	Elevation of raised area more than 1,5 mm (grey area in sketch)

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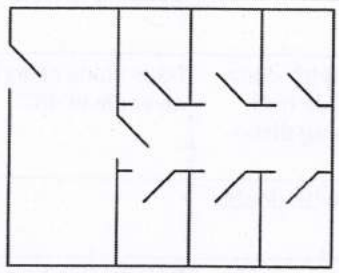
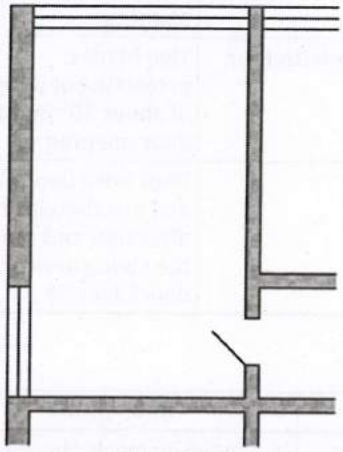
EXAMPLE 11 Restroom (toilet).

Tactile mark	Implementation	Description
	It may be reduced to small compartment with doors and name of establishment in braille or raised lettering.	To indicate the position of the cabins in relation to the door is of greater importance than to label the establishment with a full name. A letter or number may be sufficient, which needs to be explained in the legend.

EXAMPLE 12 Room.

Tactile mark	Implementation	Description
	Room with opening for door and door blade, fine lines for windows in outer wall (If scale is sufficiently large, windows could be presented by a thinner line than the line for outer walls.)	Outer wall width more than 2 mm, window width 0,8 mm

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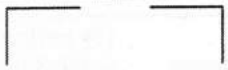
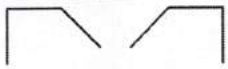
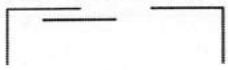
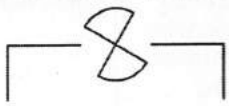
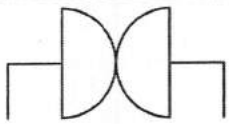
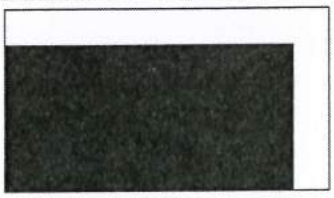
EXAMPLE 13 Doors with various blade arrangements.

Tactile mark	Implementation	Description
	Door opening	Opening in wall
	Door opening with door blade. Door blade indicates the opening direction of a door	Door blade short line at an angle of 45°
	Door opening with double door blades	
	Sliding door(s)	Parallel line to wall indicates sliding door blade. Door blade of sliding door covers half of the door opening.
	Revolving door with four door blades	Two blades projecting at an angle of about 30° into the door opening
	Swing door(s)	Door with door blade(s) and arc showing the direction and range of the swing area of the door blade(s)

EXAMPLE 14 Main entrance to building.

Tactile mark	Implementation	Description
	Building mark with main entrance in an access route. In a floor plan, the main entrance should be indicated by lettering the respective door(s).	In a building mark, the main entrance should be shown by a triangle projecting into the building. The remaining area of the building should have a (textured) rough surface.

EXAMPLE 15 Building with side walk at two sides.

Tactile mark	Implementation	Description
	When in a street, the profile of the street should be with refuge and/or median strip displayed sidewalk can be indicated.	Width of sidewalk more than 5 mm, elevation of sidewalk to road more than 0,5 mm. Elevation of building to sidewalk in mark should be 0,5 mm to 0,8 mm above the sidewalk.

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EXAMPLE 16 Tram line with tram stops.

Tactile mark	Implementation	Description
	Smooth unstructured line with flat dots showing tram stops	Tram stops, flat dots with diameter of more than 4 mm

EXAMPLE 17 Bus line with bus tops.

Tactile mark	Implementation	Description
	Dot line with short lateral strokes showing bus stops	Lateral strokes more than 3 mm

EXAMPLE 18 Tram and bus lines with stops.

Tactile mark	Implementation	Description
	Tram and bus lines going in one street can be displayed by a combined line.	A combination of alternating smooth unstructured (tram) and dotted (bus) lines with respective stop marks

EXAMPLE 19 Entrance to underground (metro) line.

Tactile mark	Implementation	Description
	The stair side of the entrance should be marked either by stairs or it can be raised (dark area in sketch).	Two squares, one blank and one dark raised by more than 1,2 mm

EXAMPLE 20 Train/rail lines.

Tactile mark	Implementation	Description
	When railway lines are close to access route, they should be marked, since they usually can be used to conveniently identify one's position.	Width of line 2 mm, length more than 3,5 mm, gaps in line 1,5 mm

EXAMPLE 21 Taxi rank.

Tactile mark	Implementation	Description
	Very loose line of 4 dots to 5 dots along a road side/sidewalk	Diameter of dots 2,5 mm, distance between dots from 4 mm to 5 mm

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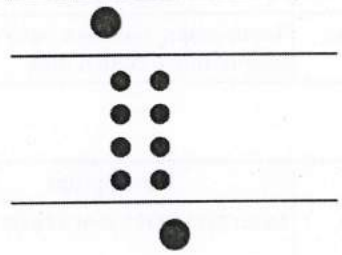
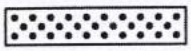
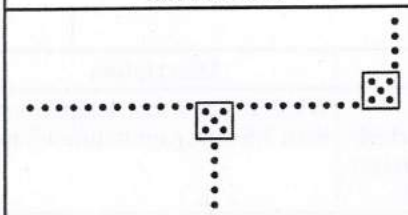
EXAMPLE 22 Pedestrian crossing.

Tactile mark	Implementation	Description
	Two parallel lines of dots across the road. Depending on the scale of the map, traffic lights can be included by a bigger flat dot.	Dots from 2 mm to 2,5 mm, distance of dots to each other about 2 mm to 2,5 mm, distance of lines from 3 mm to 3,5 mm, flat dot from 3 mm to 4 mm in diameter for traffic lights, raised more than 2 mm. When acoustic traffic lights are available, they can be indicated by a tiny dot in the middle of the traffic lights dot, size from 0,5 mm to 1 mm.

EXAMPLE 23 TWSIs — attention field.

Tactile mark	Implementation	Description
	It is used for demarcation lines or areas, for warnings or to indicate decision points.	In extended scale presentation, area with dots. In narrow presentation (especially in combination with a top view of stairs), the attention field mark should have a slightly rough surface.

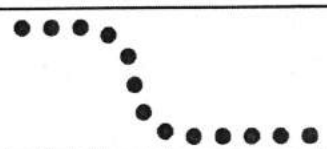
EXAMPLE 24 TWSIs — guiding path.

Tactile mark	Implementation	Description
	Very fine line of dots with rough small squares showing decision points (e.g. branching or turning points of guide path)	Diameter of dots from 0,5 mm to 1 mm (smaller than braille dots), decision point more than (2 × 2) mm

EXAMPLE 25 Guiding path without TWSI marking.

Tactile mark	Implementation	Description
	Fine interrupted line of dots as in guide path marked by TWSI, but interrupted by small gaps between groups of from 3 dots to 4 dots.	Diameter of dots from 0,5 mm to 1 mm (smaller than braille dots), width of gaps between groups 3 mm

EXAMPLE 26 Footpath.

Tactile mark	Implementation	Description
	Loose line of dots	Dots more than 2 mm, distance between dots more than 3 mm

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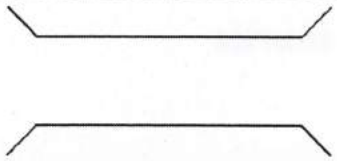
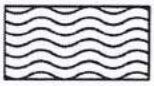
EXAMPLE 27 Bridge.

Tactile mark	Implementation	Description
	When the bridge can be passed only via steps or stairs, the steps should be marked by lines as in top view of stairs.	Width of bridge depends on width of street or footpath.

EXAMPLE 28 Water.

Tactile mark	Implementation	Description
	It is used for ponds, creeks, rivers, lakes.	Area with waved (corrugated) or very fine, narrow straight lines

EXAMPLE 29 Arrows showing destination or direction for travelling.

Tactile mark	Implementation	Description
	It is used preferably for indicating directional information going over the margin out of the map or coming from outside into the map.	For clarity, only open arrows should be used to give directional information.

EXAMPLE 30 Scale.

Tactile mark	Implementation	Description
	Distances preferably in metres depending on size of scale applied for map. (Capital "M" may be used only in raised lettering.)	

EXAMPLE 31 Arrow showing the north direction.

Tactile mark	Implementation	Description
	If possible, the pointer should go into the top right hand corner of the map, or alternatively, close to the scale information.	The pointer arrow showing the North should be a closed triangle. Size of mark more than 15 mm.

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Annex C
(informative)

Swedish examples of tactile marks

EXAMPLE 1 Guidance strip (representing tactilely marked and obstacle free walking paths).

Tactile mark	Implementation	Description
	Representing tactilely marked and obstacle free walking paths	Black, 5 mm wide, visual line with white tactile dots. Alternatively, black tactile dots on white visual line. Dots are 1 mm in diameter, 0,5 mm in height. Length in legend 22 mm

EXAMPLE 2 Wall/kerbstone (representing outer wall around building, and inner wall within building, as well as kerbstone around plantation, traffic island and pavement).

Tactile mark	Implementation	Description
	Representing wall or kerbstone of interest for tactile orientation	White tactile line with black visual contour, 1,5 mm in width. Length in legend 20 mm

EXAMPLE 3 Outside wall/handrail (representing wall, railings, or fence).

Tactile mark	Implementation	Description
	Representing wall, railings, or fence, of larger interest for tactile orientation than the wall/kerbstone tactile element	White textured tactile line with black visual contour, 3 mm in width. Length in legend 20 mm

EXAMPLE 4 Tram track.

Tactile mark	Implementation	Description
	Representing tram tracks	Two parallel tactile black lines without texture, 1 mm in width, 4 mm between centres of lines. Length in legend 22 mm

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EXAMPLE 5 Railway track.

Tactile mark	Implementation	Description
	Representing railway tracks, to be used in combination with platforms and numbers	Two parallel tactile black lines without texture, 1 mm in width, 4 mm between centres of lines. Ribbons connecting lines with 8 mm between centres of ribbons. Length in legend 21 mm

EXAMPLE 6 Stairs (composed by three lines/steps in legend).

Tactile mark	Implementation	Description
	Representing stairs. Number of lines do not represent stairs or levels.	White tactile line without texture with black visual contour, 1 mm in width, length in legend 20 mm. Number of lines/steps on map varies. 5 mm between centres of lines

EXAMPLE 7 Pedestrian crossing (composed by three lines in legend).

Tactile mark	Implementation	Description
	Representing pedestrian crossings, not necessarily safe/supervised crossings	Black tactile line without texture with black visual contour, 3 mm in width. Length in legend 20 mm. Number of lines on map varies. 7 mm between centres of lines

EXAMPLE 8 Position of tactile guide map.

Tactile mark	Implementation	Description
	Representing the position of the tactile guide map. May preferably be made of a line (an open circle)	Red tactile dot, 8 mm in diameter. Should be given the highest tactile level on the map

EXAMPLE 9 Bollard/Post (representing obstacle/point of orientation as bollard, post, or pillar).

Tactile mark	Implementation	Description
	Representing bollard or post, to be used with care, only to represent objects of interest for guidance	White tactile full circle with black visual contour, 4 mm in diameter

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EXAMPLE 10 Bench (representing place to seat, bench, indoor or outdoor).

Tactile mark	Implementation	Description
	Representing bench or place to seat, when of interest	Black tactile rectangle without texture, (15 × 6) mm in width with rounded angles

EXAMPLE 11 Weather protection shelter (representing shelter at platform, at bus stop, at tram stop, or at taxi stand).

Tactile mark	Implementation	Description
	Representing weather protection shelter, when of interest	Black tactile symbol without texture. Line 2 mm in width. Total size (25 × 12) mm. Consists of one longer line, 25 mm, and three shorter lines, 12 mm in length, at each end and in the middle of the longer line

EXAMPLE 12 Shelter (representing shelter for reading, wind shelter, wall made of glass).

Tactile mark	Implementation	Description
	Representing shelter, when of interest	

EXAMPLE 13 Intersection of tracks.

Tactile mark	Implementation	Description
	Representing intersection of tracks in order to give awareness of need for attention for trains or trams	Black tactile cross, (13 × 13) mm in width. Line 2 mm in width with rounded edges

EXAMPLE 14 Intersection of tracks with gates.

Tactile mark	Implementation	Description
	Representing intersection of tracks with gates in order to give awareness of need for attention for gates or barriers in connection with passing trains or trams	Black tactile symbol without texture made by an 8 mm circle, a (8 × 4) mm rectangle with rounded edges, and a 10 mm line, 1 mm in width with rounded end. Combined length approximately (28 × 8) mm

EXAMPLE 15 Scale.

Tactile mark	Implementation	Description
0 5 m	Scale example. With relevant scale, e.g. 1 m to 5 m	White tactile line with ending lines, with black visual contour, 1 mm in width. Visual text above and braille text under each end

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EXAMPLE 16 Ramp, moving walkway.

Tactile mark	Implementation	Description
	Representing ramp and moving walk-way	

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[1] ISO 17840-1:2015, *Road vehicles — Information for first and second responders — Part 1: Rescue sheet for passenger cars and light commercial vehicles*

[2] ISO 23599, *Assistive products for blind and vision-impaired persons — Tactile walking surface indicators*

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INTERNATIONAL STANDARD

ISO 19029

First edition
2016-02-01

另有電子檔

Accessible design — Auditory guiding signals in public facilities

Produits assistive pour des personnes avec l'incapacité — Conception accessible — Signaux de guidage auditifs dans les équipements publics

Reference number
ISO 19029:2016(E)

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information.

The committee responsible for this document is ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 7, *Accessible design*.

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Introduction

When the persons with seeing impairment and blindness walk and travel independently, the auditory guiding signals in public facilities for mobility assistance are very beneficial for them to know the location (i.e. direction and distance).

This International Standard provides the guidelines of sound characteristics and specifications of sound equipment of the auditory guiding signals in public facilities for mobility assistance of mainly the persons with seeing impairment and blindness. The provided sound characteristics and specifications of sound equipment enable the user to detect the sound location correctly even in the noisy environment.

This International Standard is useful for the sound designers who design the auditory guiding signals in public facilities, and the designers who plan the public facilities.

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Accessible design — Auditory guiding signals in public facilities

1 Scope

This International Standard specifies the sound characteristics of auditory guiding signals for persons with seeing impairment and blindness to provide the location and direction information of particular public facilities. The public facilities include facilities such as railway stations, airports, ports, bus terminals, government offices, libraries, community centres, parks, schools, hospitals, theatres, large supermarkets, and its toilets, stairs, etc.

EXAMPLE As an auditory guiding signal, a chime sound is emitted from the ticket gate of a railway station. Pedestrians, including persons with seeing impairment and blindness, are able to know the location of the ticket gate by detecting the location of the chime sound.

NOTE 1 The auditory guiding signals are also helpful for sighted persons.

This International Standard also specifies the design or usage of the equipment that provides auditory guiding signals.

This International Standard does not specify the characteristics of the alerts, such as alarm sounds or emergency signals.

NOTE 2 The auditory danger signals are covered by ISO 7731.

This International Standard does not specify the characteristics of auditory guiding signals coming from the personal mobile equipment that is worn by persons with seeing impairment and blindness.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
auditory guiding signal
sound signal that provides the location and direction information of particular public facilities

2.2
harmonic tone
sound that consists of the fundamental frequency component and its multiple frequency components

EXAMPLE Sounds that have a periodical waveform such as musical tone, triangle wave sound, rectangle wave sound, and saw-teeth wave sound.

2.3
sound signal generator
equipment that generates the electric analogue signal to be provided to the loudspeaker

2.4
goal
point that *auditory guiding signal* (2.1) intends to guide

EXAMPLE Entrance of the facility, ticket gate of the railway station, restroom, beginning point of stairs, etc.

2.5
emission angle
angle in where sound attenuation is less than 10 dB from that of emission axis

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3 Requirements and recommendations

3.1 Sound characteristics

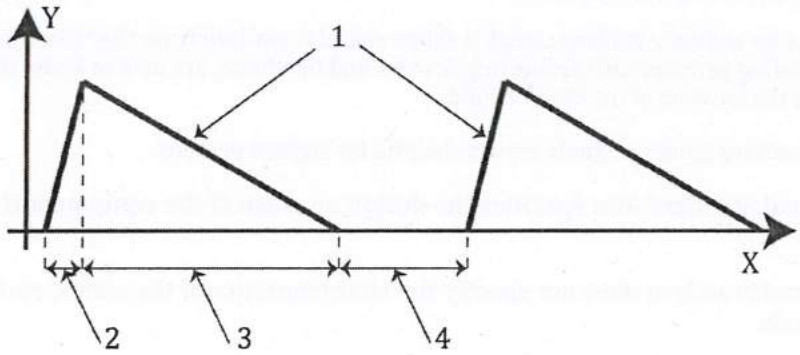
3.1.1 Envelope

The duration of attack part of auditory guiding signals shall be longer than 0 ms and shall not be longer than 5 ms.

NOTE 1 The attack part that is not longer than 5 ms enables the listener to detect the direction of sound easily.

NOTE 2 The decay part does not have an influence upon the sound localization.

The interval between auditory guiding signals should be no longer than 2 s.



Key

1 signal
2 attack
3 decay
4 interval
X time
Y amplitude

Figure 1 — Envelope of signal

3.1.2 Frequency component

The lowest frequency component shall not be higher than 1 kHz.

NOTE 1 If the sound is harmonic tone, the lowest frequency is equal to the fundamental frequency.

The highest frequency component shall not be lower than 8 kHz.

NOTE 2 The highest frequency component that is not lower than 8 kHz enables listener to detect the direction of sound easily.

If the sound is harmonic tone, it should have all order of harmonics in its frequency band.

The sound that has only one frequency component shall not be used as auditory guiding signals.

NOTE 3 If the sound has narrow or poor frequency components, it does not satisfy the requirements.

EXAMPLE 1 A sow-teeth wave sound has all harmonics in its frequency band.

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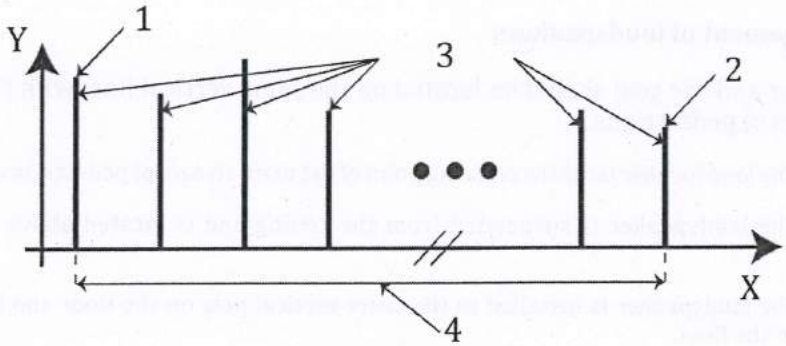
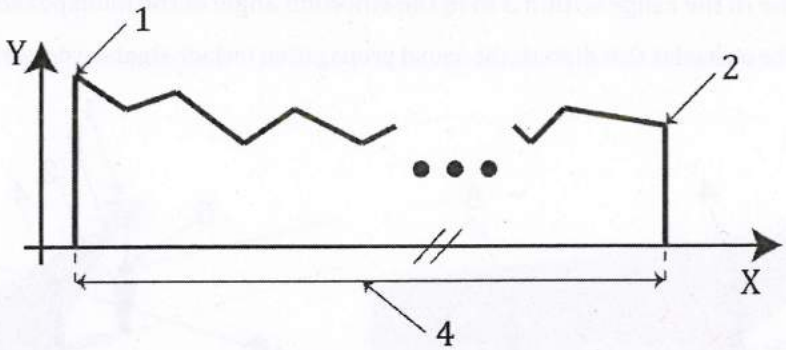
If the sound is not harmonic tone, it should have frequency components as many as possible in its frequency band, and it should have the spectrum that the user can distinguish it from ambient noise.

EXAMPLE 2 The non-harmonic sound for auditory guiding signals include combination of harmonic tones, impulse sound, etc.



a) Harmonic tone



b) Non-harmonic tone

Key

1 lowest frequency component
2 highest frequency component
3 harmonics
4 frequency band width
X frequency
Y power

Figure 2 — Frequency components

3.2 Equipment

3.2.1 Sound signal generator

The sound signal generator shall be able to generate the auditory guiding signal that have the frequency component provided in 3.1.2.

If the auditory guiding signal is recorded, reproduced, and/or transferred digitally, the sampling resolution shall not be less than eight bits, and should not be less than 16 bits.

If the auditory guiding signal is recorded as compressed data, the compression ratio should not be so high as to degrade sound quality.

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3.2.2 Loudspeaker

The loudspeaker shall be able to emit the auditory guiding signal that have the frequency component provided in 3.1.2.

EXAMPLE The general full-range loudspeaker that has about 10 cm diameter and is installed in an appropriate box has nearly flat frequency characteristics in the rage of 100 Hz to 10 kHz.

3.2.3 Arrangement of loudspeakers

The loudspeaker and the goal should be located on the same vertical line, with the loudspeaker facing the main stream of pedestrians.

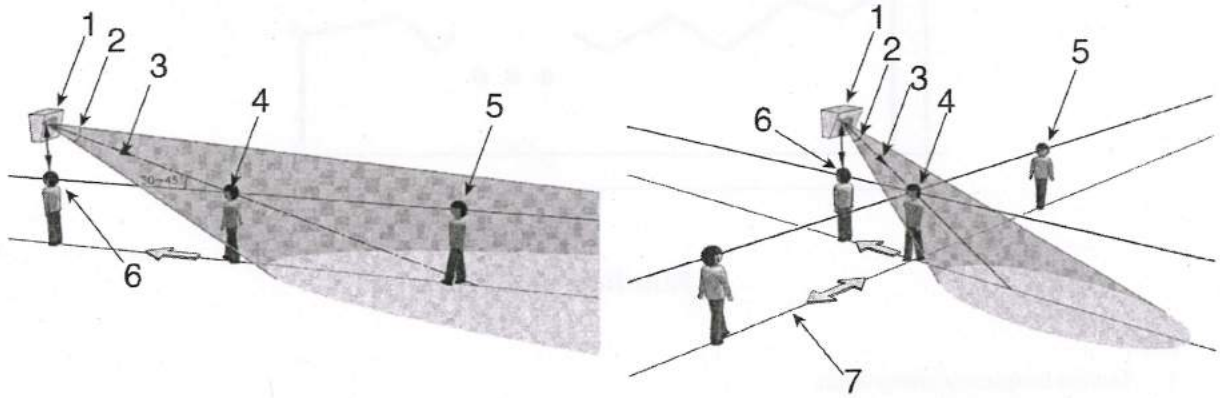
EXAMPLE 1 The loudspeaker faces the crossing point of the main stream of pedestrians and the path to the goal.

EXAMPLE 2 The loudspeaker is suspended from the ceiling and is located above the goal at 3 m height from the floor.

EXAMPLE 3 The loudspeaker is installed in the short vertical pole on the floor and is located on the goal at 0,8 m height from the floor.

The obstacles that disturb the sound propagation shall not be on the emission axis of the loudspeaker, and should not be in the range within 3 m in the emission angle of the loudspeaker.

EXAMPLE 4 The obstacles that disturb the sound propagation include signboards, walls, poles, etc.



a) Identical **b) Not identical**

Key

1 loudspeaker
2 emission angle
3 emission axis
4 listening point
5 user
6 goal
7 main stream of users

Figure 3 — Arrangement of loudspeaker in the cases that main stream of users and course of goal is identical (a) and not identical (b)

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3.3 Ambient sound environment

3.3.1 Signal-to-noise ratio

The signal-to-noise ratio shall not be less than 10 dB at the listening point.

In order to measure the signal-to-noise ratio, sound pressure level of signal and sound pressure level of ambient noise shall be measured.

Maximum sound pressure level with a standard frequency weighting "A" and a standard exponential time weighting "FAST (F)" shall be used for signal.

Time-average sound pressure level with a standard frequency weighting "A" should be used for ambient noise.

3.3.2 Auditory guiding signals for different goals

If the auditory guiding signals for different goals can be heard at one place, they should not sound each other simultaneously to avoid overlap.

3.3.3 Sound reflection and reverberation

The sound reflection and reverberation should be reduced as much as possible.

NOTE 1 If the sound reflection and/or reverberation disturb the listening of auditory guiding signals, the sound absorbents can be put on the ceiling and/or wall.

NOTE 2 It is desirable to design the space by taking the ambient sound environment into consideration.

3.3.4 Operation of auditory guiding signals

The auditory guiding signals shall work constantly.

NOTE If there is the specific time range when no user is in the public facilities, the auditory guiding signals can be controlled.

The loudspeaker and/or its container should have the appearance that indicates that it is the equipment of the auditory guiding signals for mobility assist.

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