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Head-face dimensions of adults

成年人头面部尺寸

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1 Scope

The document gives the basic statistical values of the head and face dimensions of adults aged 18 to 70, the two-dimensional distributions of head length against head breadth and of morphological face length against face breadth, and the regression equations linking the other head and face parameters to the head and face main parameters.

It applies to the design, manufacture and selection of products for the adult head and face.

2 Normative references

Dated references apply only in the edition bearing that date; undated references apply in their latest edition, including all amendment sheets.

One document is cited: GB/T 5703-2023 Basic human body measurements for technological design.

3 Terms and definitions

The terms and definitions of GB/T 5703-2023 apply, together with the eighteen that follow.

3.1 glabella-vertex-cervical - the arc length from the glabella over the vertex to the cervicale.

3.2 transversal circumference - the circumference from the vertex as starting point, passing through the gnathion, back to the starting point.

3.3 vertex-pupil height - the vertical distance from the vertex to the endocanthion.

3.4 transversal arc - the arc length from the tragion on one side over the vertex to the tragion on the other side.

3.5 total head height - the vertical distance from the vertex to the gnathion.

3.6 pronasale opisthocranion distance - with the head positioned in the Frankfurt plane, the perpendicular distance from the most forward point above the nose tip to the opisthocranion.

3.7 tragion opisthocranion distance - the perpendicular distance from the point at the upper edge of the tragus cartilage, where the base of the crus of the helix passes into the skin of the side of the skull, to the opisthocranion.

3.8 subnasale gnathion distance - in the mid-sagittal plane, the straight-line distance from the deepest point of the angle formed by the nasal septum and the skin of the upper lip to the lowest point of the chin in the mid-sagittal plane.

3.9 interpupillary distance - the straight-line distance between the left and right pupil points with both eyes looking straight ahead.

3.10 physiognomic ear breadth - the straight-line distance from the preaurale to the postaurale.

3.11 tragion zygion distance - the straight-line distance from the point at the upper edge of the tragus cartilage, where the base of the crus of the helix passes into the skin of the side of the skull, to the deepest point of the nasal bridge.

3.12 tragion gnathion distance - the straight-line distance from the same tragus point to the lowest point of the chin in the mid-sagittal plane.

3.13 bitragion frontal arc - the arc length from the tragion on one side over the glabella to the tragion on the other side.

3.14 bitragion-submandibuler arc - the arc length from the tragion on one side, passing under the jaw immediately above the upper edge of the laryngeal prominence, to the tragion on the other side. The English term is printed as bitragion-submandibuler in the original.

3.15 auricular height - the vertical distance from the vertex to the tragion.

3.16 physiognomic ear length - the straight-line distance from the superaurale to the subaurale.

3.17 vertex glabella distance - the perpendicular distance from the vertex to the glabella.

3.18 vertex pronasale distance - the perpendicular distance from the vertex to the pronasale.

4 Head and face measurement items and dimensions

4.1 Measurement items. The human head and face measurement items number 29; diagrams of them are in Annex A, and the regression equations linking each item to the

head and face main parameters are in Annex B.

4.2 Head and face dimension data. Table 1 holds the male data and Table 2 the female data, both in millimetres. Each table lists, for the 29 items, the mean, the standard deviation and the 5th, 50th and 95th percentiles. A footnote defines the percentile as a position index and a boundary value denoted PK, such that K % of the observations of the population or sample are less than or equal to it and (100 - K) % are greater; when body dimensions are expressed in this way they are called body dimension percentiles.

4.2.1 Male data, Table 1, quoted as mean / standard deviation / P5 / P50 / P95 in mm: head circumference 571 / 18.4 / 543 / 570 / 600; morphological face length 120 / 7.8 / 108 / 119 / 133; head length 188 / 7.5 / 175 / 187 / 200; head breadth 158 / 7.1 / 147 / 158 / 170; head sagittal arc 349 / 18.7 / 320 / 350 / 380; bitragion arc, that is transversal arc, 360 / 16.1 / 334 / 360 / 386; total head height 232 / 12.6 / 210 / 231 / 253; pronasale to opisthocranion distance 209 / 7.1 / 198 / 209 / 221; tragion to opisthocranion distance 88 / 5.3 / 79 / 88 / 96; bitragion breadth 150 / 5.9 / 142 / 150 / 159; face breadth 151 / 6.5 / 142 / 151 / 161; bigonial breadth 124 / 5.6 / 116 / 124 / 133; nose height 52 / 3.0 / 48 / 52 / 58; nose breadth 40 / 1.0 / 38 / 40 / 41; subnasale to gnathion distance 71 / 4.9 / 64 / 71 / 80; interpupillary distance 61 / 2.1 / 55 / 61 / 68; physiognomic ear breadth 36 / 1.5 / 34 / 36 / 38; physiognomic ear length 68 / 2.2 / 65 / 68 / 72; glabella-vertex-cervical arc 455 / 22.4 / 420 / 455 / 491; transversal circumference 665 / 26 / 622 / 666 / 706; vertex-pupil height 118 / 10.6 / 101 / 119 / 134; auricular height 130 / 7.0 / 118 / 130 / 141; tragion to nasal root length 125 / 3.0 / 120 / 125 / 130; tragion to gnathion length 145 / 3.5 / 139 / 144 / 150; bitragion frontal arc 309 / 9.9 / 295 / 309 / 325; bitragion submental arc 337 / 11.4 / 320 / 337 / 355; bitragion submandibular arc 324 / 12.0 / 306 / 324 / 344; vertex to glabella distance 89 / 10.8 / 71 / 90 / 106; vertex to pronasale distance 154 / 11.2 / 135 / 154 / 172.

4.2.2 Female data, Table 2, in the same order of columns and in mm: head circumference 552 / 16.1 / 528 / 552 / 577; morphological face length 111 / 7.0 / 100 / 110 / 122; head length 178 / 6.8 / 167 / 178 / 189; head breadth 151 / 6.6 / 141 / 151 / 162; head sagittal arc 335 / 20.0 / 303 / 335 / 367; bitragion arc, that is transversal arc, 349 / 15.4 / 324 / 349 / 375; total head height 227 / 11.6 / 206 / 227 / 246; pronasale to opisthocranion distance 200 / 6.6 / 189 / 200 / 211; tragion to opisthocranion distance 83 / 4.3 / 76 / 83 / 90; bitragion breadth 142 / 4.5 / 135 / 142 / 149; face breadth 144 / 3.8 / 138 / 144 / 150; bigonial breadth 118 / 4.3 / 111 / 118 / 125; nose height 49 / 2.8 / 45 / 48 / 53; nose breadth 37 / 1.1 / 35 / 37 / 39; subnasale to gnathion distance 65 / 4.4 / 59 / 65 / 72; interpupillary distance 58 / 2.0 / 52 / 58 / 66; physiognomic ear length 64 / 2.2 / 61 / 64 / 68; physiognomic ear breadth 35 / 1.5 / 33 / 35 / 38; glabella-vertex-cervical arc 439 / 20.9 / 405 / 440 / 473; transversal circumference 631 / 23.7 / 593 / 631 / 670; vertex-pupil height 119 / 10.1 / 101 / 119 / 134; auricular height 127 / 5.8 / 117 / 127 / 136; tragion to nasal root length 117 / 3.0 / 113 / 117 / 122; tragion to gnathion length 139 / 4.2 / 132 / 139 / 146; bitragion frontal arc 291 / 6.9 / 280 / 291 / 303; bitragion submental arc 325 / 11.4 / 306 / 325 / 343; bitragion submandibular arc 303 / 11.0 / 285 / 303 / 321; vertex to glabella

distance 93 / 10.8 / 74 / 94 / 110; vertex to pronasale distance 155 / 11.3 / 135 / 156 / 173. In Table 2 items 17 and 18 are printed as ear length then ear breadth, the reverse of the order used in Table 1.

5 Two-dimensional distribution of human head and face dimensions

5.1 The two-dimensional distribution tables are set out on the coverage rates of the two-dimensional distributions of head length and head breadth, and of morphological face length and face breadth, for adult men and adult women.

5.2 Head length, head breadth, morphological face length and face breadth are banded in 5 mm steps. In use the bands may be merged as needed, the coverage rate calculated and the sizes set.

5.3.1 Head length against head breadth. Table 3 for men and Table 4 for women give the percentage of the population in each cell, in mm. In Table 3 head breadth runs from 140 to 180 in 5 mm rows and head length from 165 to 210 in 5 mm columns; the largest cells are head breadth 155 with head length 185 at 6.58 and head length 190 at 6.47, and head breadth 160 with head length 185 at 6.43 and head length 190 at 6.32. In Table 4 head breadth runs from 130 to 170 and head length from 160 to 200; the largest cells are head breadth 150 with head length 180 at 8.37 and head length 175 at 7.94, and head breadth 155 with head length 175 at 7.13.

5.3.2 Morphological face length against face breadth. Table 5 for men and Table 6 for women give the percentage of the population in each cell, in mm. In Table 5 face breadth runs from 135 to 170 in 5 mm rows and morphological face length from 100 to 145 in 5 mm columns; the largest cells are face breadth 150 with face length 120 at 9.76 and face length 115 at 9.10, and face breadth 155 with face length 120 at 7.10. In Table 6 face breadth runs from 135 to 160 and morphological face length from 90 to 135; the largest cells are face breadth 145 with face length 110 at 15.29 and face length 105 at 11.81, and face breadth 140 with face length 110 at 9.17.

A Annex A (informative) Diagrams of the head and face measurement items

A.1 Figures A.1 and A.2 show the head measurement landmarks, in front view and side view. The landmarks are keyed by their conventional abbreviations: al alare; ch cheilion; en endocanthion; eu euryon; ex exocanthion; tr trichion; ft frontotemporale; g glabella; gn gnathion; go gonion; li labiale inferius; ls labiale superius; n nasion; obi lower ear attachment point; obs upper ear attachment point; pu pupil; pra preaurale; se sellion; sa superaurale; sba subaurale; sto stomion; v vertex; zy zygion; I inion; sn subnasale; op opisthocranion; pa postaurale; prn pronasale; t tragion.

A.2 Figure A.2 shows the measurement items themselves, keyed 1 to 29 in the same order