

Ergonomics Requirement Specification for External Machine Manufacturers

Our Requirements to New Machines

Anthropometric Data

Introduction

- › The distribution of the body measurements shows a Gaussian distribution.
- › For use, the measurements are taken in each case by gender in percentiles.
- › For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.

Overview

1 Body Weight

2 Seated

3 Standing

4 Sources and References

Body Weight [kg]

The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	64	79	100	52	66	87
Euro (n.a.)						
Italy	60	75	93	48	59	78
Japan	54	67	84	43	51	64
Korea	55	70	87	45	55	71
Thailand	51	64	82	42	53	69
USA	63	80	115	49	66	103
China	48	59	75	42	52	66
Mexico	55	72	97	48	61	88
Malaysia (n.a.)						

Overview

1 Body Weight

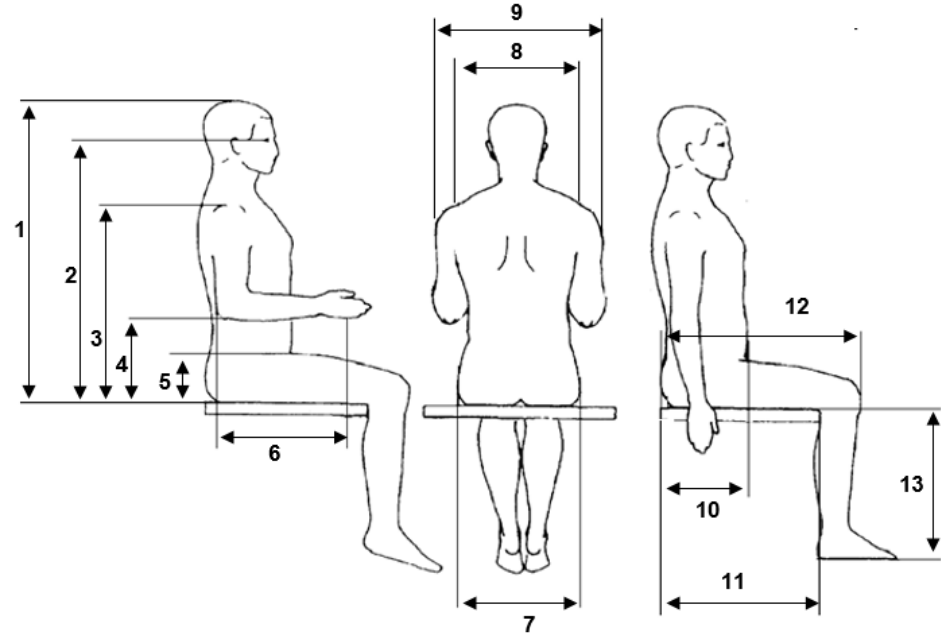
2 Seated

3 Standing

4 Sources and References

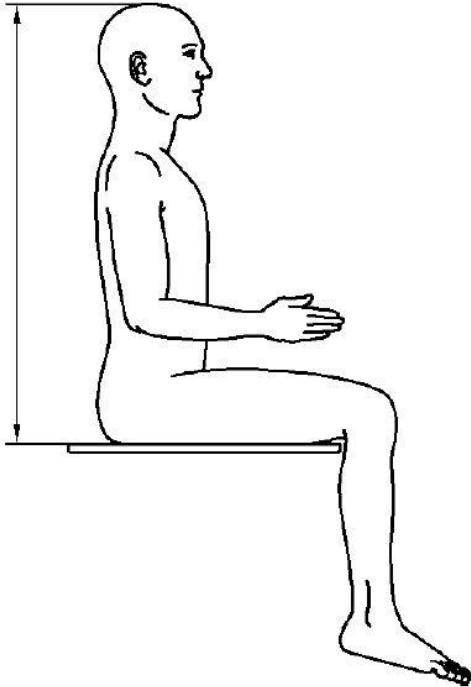
Measurements for Sitting Operations

- 1 Height, sitting
- 2 Eye Height, sitting
- 3 Shoulder Height, sitting
- 4 Elbow Height, sitting
- 5 Thigh Height
- 6 Ellbow Grip Reach
- 7 Hip Breadth, sitting
- 8 Shoulder Breadth (biacromial)
- 9 Shoulder Breadth (bideltoid)
- 10 Distance from Back to Stomach, sitting
- 11 Buttock Popliteal Length
- 12 Buttock Knee Length
- 13 Lower Leg Length including Foot



1. Height, sitting [mm]

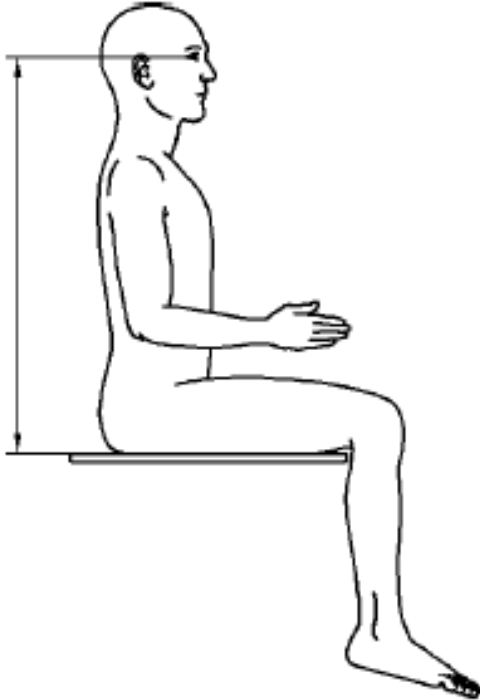
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	855	910	965	810	860	910
Euro	790 (P5)		905 (P50)		985 (P95)	
Italy	820	882	946	775	835	894
Japan	856	909	964	800	850	898
Korea	869	922	974	811	858	905
Thailand	813	870	925	778	823	925
USA	856	919	985	809	861	925
China	858	908	958	809	855	901
Mexico	825	877	927	790	831	879
Malaysia	776	857	929	757	820	876

2. Eye Height, sitting [mm]

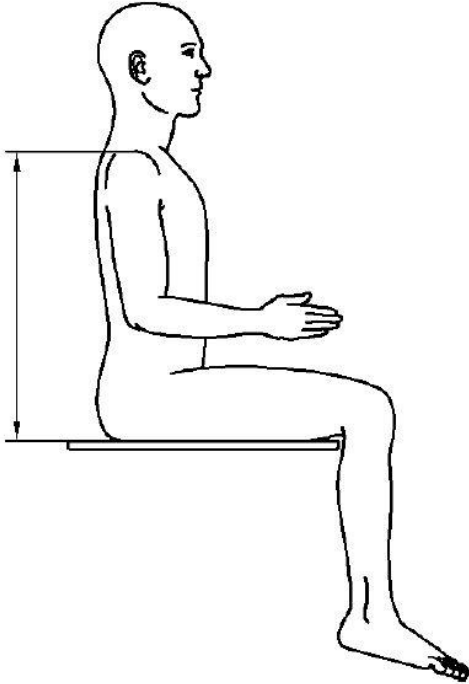
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	740	795	855	705	755	805
Euro	680 (P5)		790 (P50)		860 (P95)	
Italy (n.a.)						
Japan	738	789	842	687	735	780
Korea	755	805	857	701	747	792
Thailand	705	758	810			
USA	739	801	867	701	753	811
China	749	798	847	695	739	783
Mexico (n.a.)						
Malaysia	654	731	803	621	696	760

3. Shoulder Height, sitting [mm]

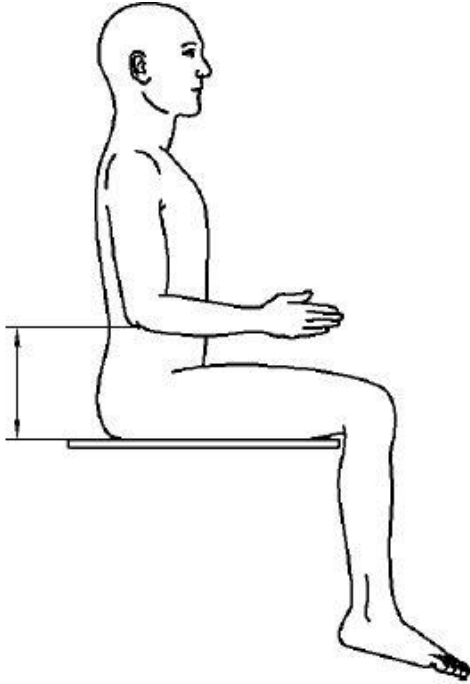
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	570	625	670	540	590	630
Euro	510 (P5)		623 (P50)		695 (P95)	
Italy	520	571	631	501	549	602
Japan	542	585	633	504	546	586
Korea	522	596	640	516	556	597
Thailand	509	546	588			
USA	549	601	656	523	566	615
China	557	598	641	518	556	594
Mexico	535	582	638	511	552	591
Malaysia	510	580	637	498	551	614

4. Elbow Height above Sitting Level [mm]

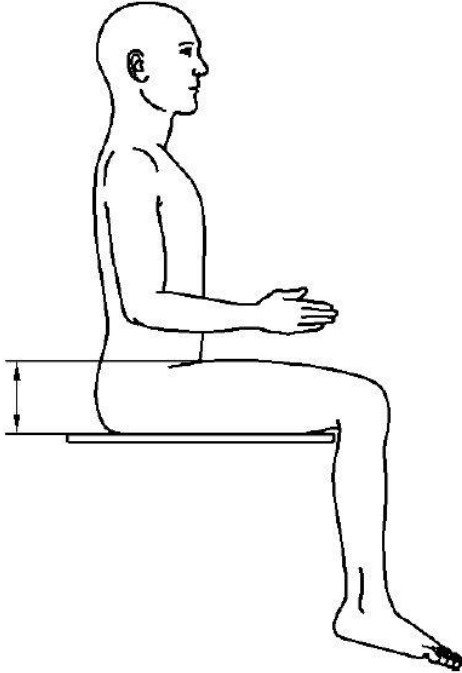
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	210	240	285	185	230	275
Euro	190 (P5)		243 (P50)		280 (P95)	
Italy (n.a.)						
Japan (n.a.)						
Korea (n.a.)						
Thailand (n.a.)						
USA (n.a.)						
China (n.a.)						
Mexico (n.a.)						
Malaysia (n.a.)						

5. Thigh Height [mm]

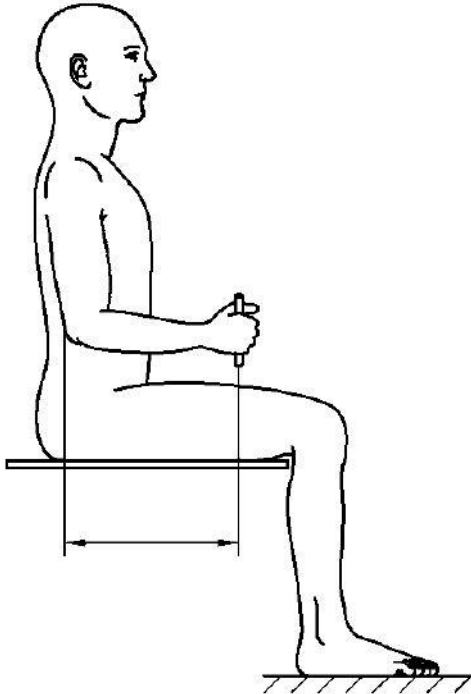
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	130	150	180	125	145	175
Euro	112 (P5)		146 (P50)		170 (P95)	
Italien	116	138	160	110	134	159
Japan	129	149	171	114	131	152
Korea	128	153	179	117	137	159
Thailand	124	139	163	117	137	159
USA (n.a.)						
China	112	130	151	113	130	151
Mexiko	127	150	178	126	150	185
Malaysia (n.a.)						

6. Elbow Grip Reach [mm]

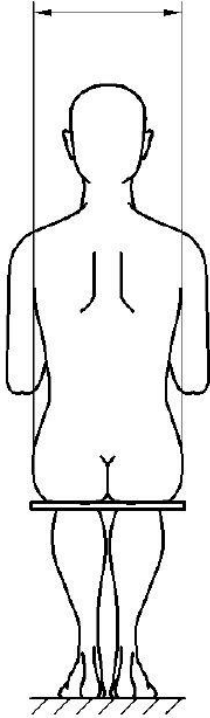
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	325	350	390	295	315	350
Euro	298 (P5)		338 (P50)		403 (P95)	
Italy (n.a.)						
Japan	311	335	362	282	305	331
Korea	300	327	356	275	302	329
Thailand				268	292	318
USA (n.a.)						
China (n.a.)						
Mexico (n.a.)						
Malaysia (n.a.)						

7. Hip Breadth, sitting [mm]

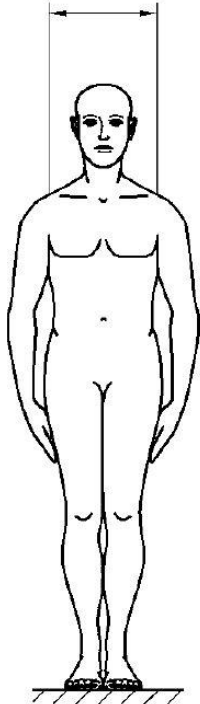
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	350	375	420	360	390	460
Euro	333 (P5)		368 (P50)		440 (P95)	
Italy	305	343	397	312	355	417
Japan	327	358	393	327	359	398
Korea	315	346	385	317	347	383
Thailand	310	343	382	310	350	400
USA	329	372	435	348	403	557
China	295	321	355	310	344	382
Mexico	328	372	423	347	392	472
Malaysia (n.a.)						

8. Shoulder Breadth (biacromial) [mm]

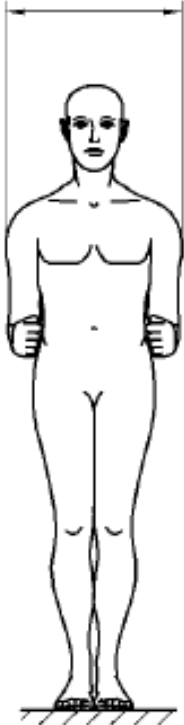
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	370	405	435	345	370	400
Euro	320 (P5)		380 (P50)		425 (P95)	
Italy	344	395	435	308	345	379
Japan	374	401	431	335	358	383
Korea	359	397	430	331	360	388
Thailand	330	370	420	305	342	390
USA	383	418	455	343	375	412
China	344	375	403	320	351	377
Mexico (n.a.)						
Malaysia (n.a.)						

9. Shoulder Breadth (bideltoidal) [mm]

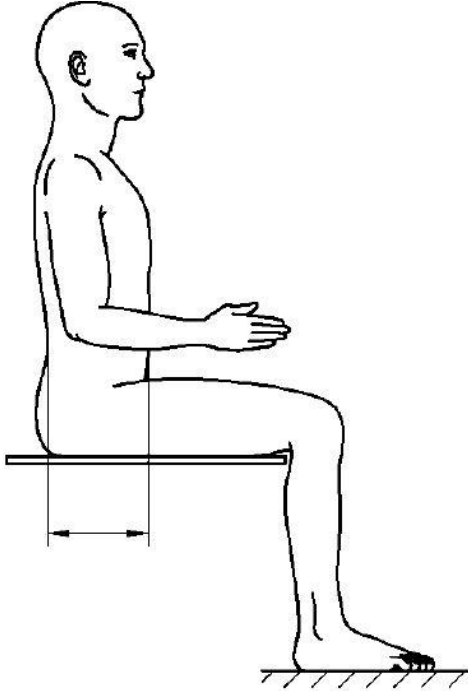
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	440	480	525	395	435	485
Euro	395 (P5)		474 (P50)		485 (P95)	
Italy	421	459	500	368	406	459
Japan	423	457	500	377	405	444
Korea	425	465	506	381	417	458
Thailand	407	446	489	362	397	448
USA	440	486	550	385	426	493
China	398	431	469	363	397	438
Mexico	422	472	544	389	435	521
Malaysia (n.a.)						

10. Distance from Back to Stomach [mm]

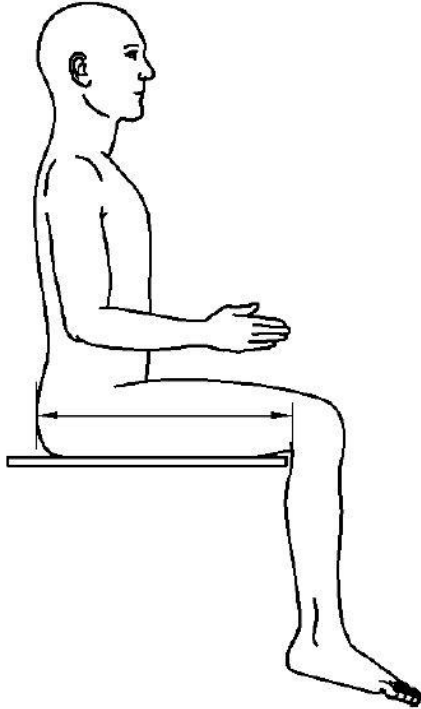
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	200	280	330	205	250	325
Euro	195 (P5)		237 (P50)		350 (P95)	
Italy	194	243	307	175	225	320
Japan	187	234	290	171	204	268
Korea	184	230	287	169	210	280
Thailand (n.a.)						
USA (n.a.)						
China (n.a.)						
Mexico (n.a.)						
Malaysia (n.a.)						

11. Buttock Popliteal Length [mm]

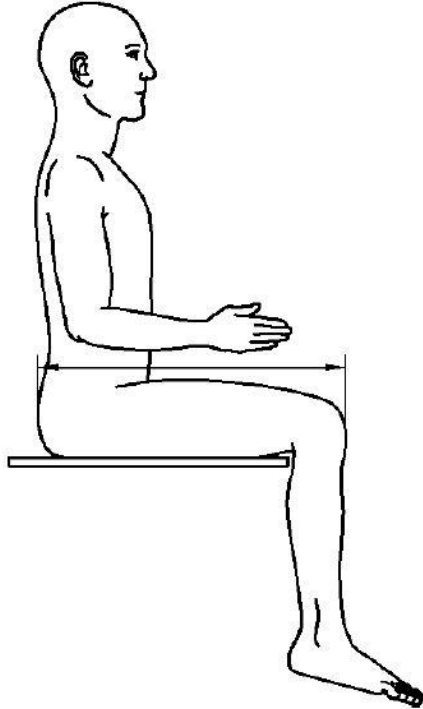
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Deutschland	450	495	540	435	485	530
Euro	430 (P5)		499 (P50)		560 (P95)	
Italien	434	480	529	427	475	520
Japan	429	465	507	412	448	483
Korea	424	466	511	410	445	483
Thailand	416	472	522	437	473	515
USA (n.a.)						
China	421	457	494	401	433	469
Mexiko	432	475	526	434	470	513
Malaysia	433	478	526	403	456	511

12. Buttock Knee Length, sitting [mm]

The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.

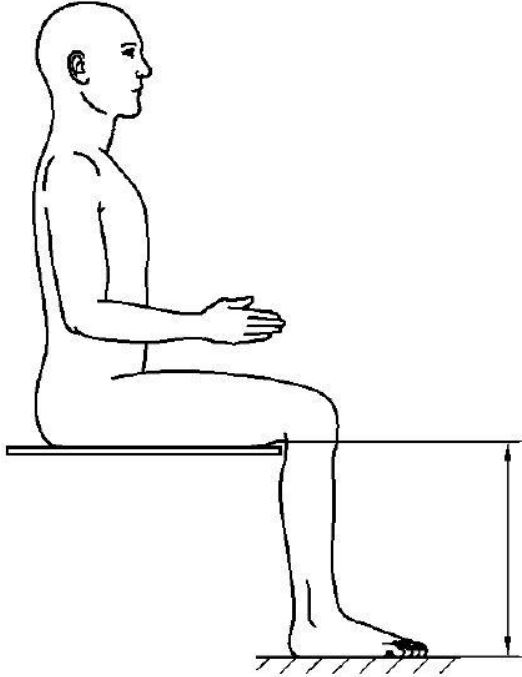


Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Deutschland	565	610	655	545	590	640
Euro	543 (P5)		604 (P50)		664 (P95)	
Italy (n.a.)						
Japan	525	565	608	497	532	570
Korea	530	570	616	504	541	581
Thailand	520	565	611	507	545	587
USA	562	610	673	533	584	648
China	515	554	595	495	529	570
Mexico	537	582	640	534	572	625
Malaysia (n.a.)						

USA: Data distinguishes from ISO 7250-1 or has been replaced

13. Lower Leg Length including Foot [mm]

The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	410	450	490	375	415	450
Euro (n.a.)						
Italy	412	460	511	362	411	472
Japan	370	405	442	340	369	403
Korea	365	399	437	333	369	403
Thailand	380	413	450	355	389	423
USA (n.a.)						
China	383	413	448	342	382	405
Mexico	374	412	453	338	376	406
Malaysia (n.a.)						

Overview

1 Body Weight

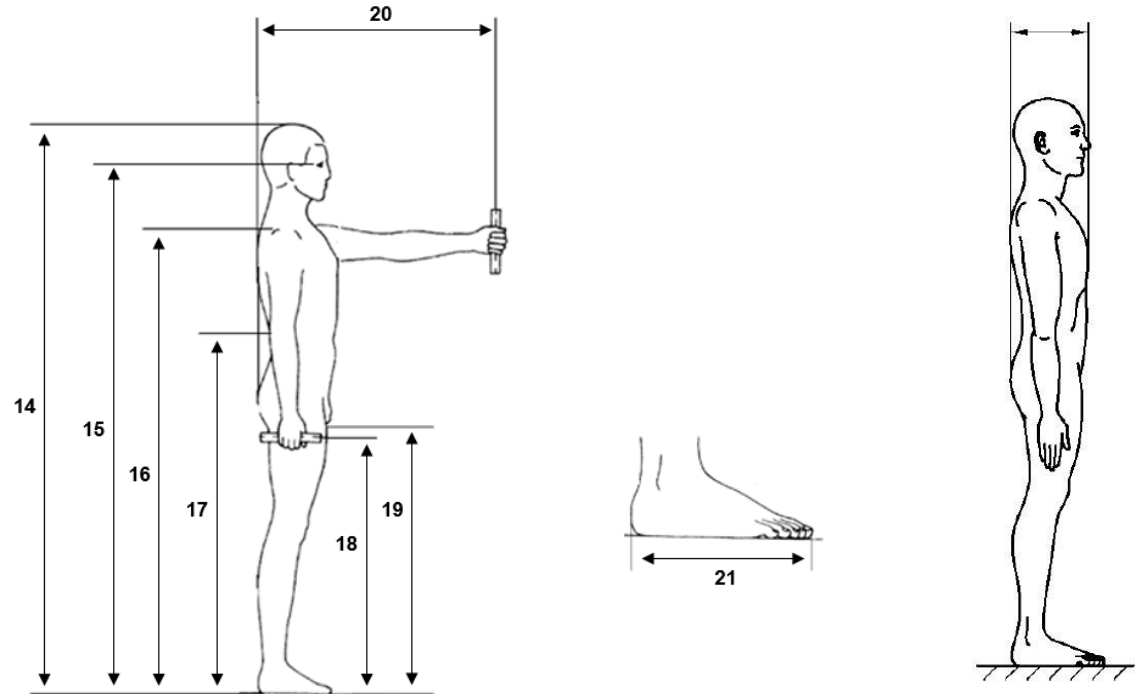
2 Seated

3 Standing

4 Sources and References

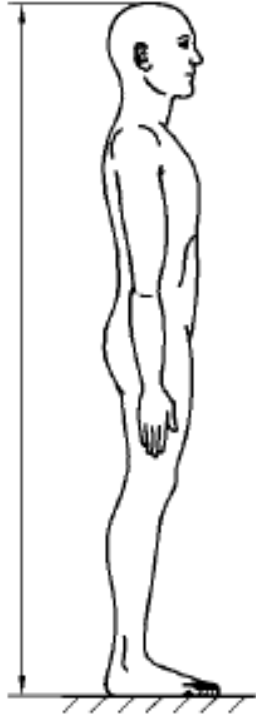
Measurements for Standing Operations

- 14 Height, standing
- 15 Eye Height, standing
- 16 Shoulder Height, standing
- 17 Elbow Height, standing
- 18 Fist Height (Grip Reach)
- 19 Crotch Height
- 20 Operating Reach Forward
- 21 Feet Length
- 22 Body Depth, standing



14. Height, standing [mm]

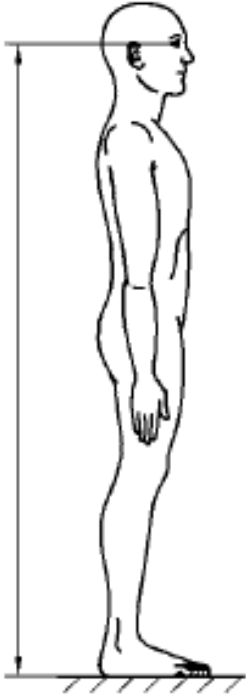
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	1650	1750	1855	1535	1625	1720
Euro	1530 (P5)		1719 (P50)		1880 (P95)	
Italy	1601	1714	1834	1490	1590	1695
Japan	1597	1696	1795	1481	1570	1664
Korea	1608	1708	1805	1491	1577	1670
Thailand	1576	1663	1770	1467	1546	1633
USA	1650	1759	1901	1526	1630	1767
China	1583	1678	1775	1484	1570	1659
Mexico	1576	1668	1780	1471	1570	1658
Malaysia	1590	1692	1805	1483	1562	1665

15. Eye Height, standing [mm]

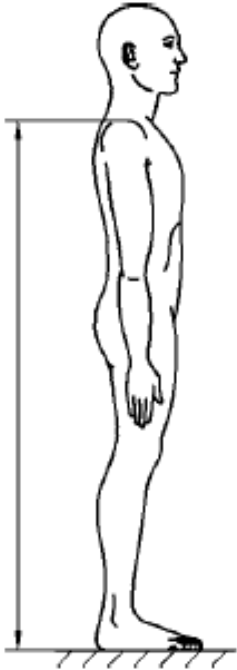
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	1530	1630	1735	1430	1515	1605
Euro	1420 (P5)		1603 (P50)		1750 (P95)	
Italy (n.a.)						
Japan	1484	1579	1675	1372	1459	1552
Korea	1493	1592	1687	1384	1470	1556
Thailand	1462	1549	1650	1353	1433	1515
USA (n.a.)						
China	1474	1568	1664	1371	1454	1541
Mexico	1447	1546	1651	1351	1450	1540
Malaysia	1457	1570	1685	1345	1443	1546

16. Shoulder Height, standing [mm]

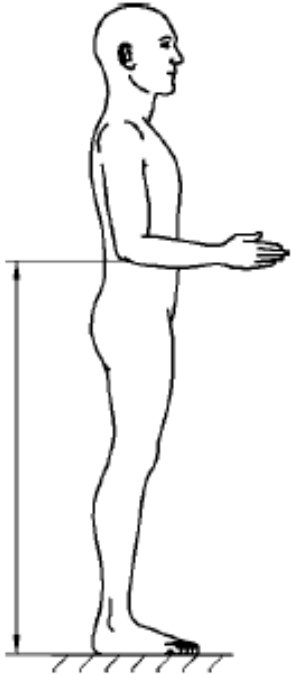
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	1345	1450	1550	1260	1345	1425
Euro	1260 (P5)		1424 (P50)		1570 (P95)	
Italy	1323	1405	1508	1210	1302	1394
Japan	1282	1369	1460	1182	1263	1350
Korea	1304	1392	1479	1209	1284	1366
Thailand	1282	1369	1467	1190	1265	1340
USA	1341	1442	1570	1243	1336	1456
China	1281	1367	1455	1195	1271	1350
Mexico	1281	1377	1477	1209	1290	1380
Malaysia	1314	1402	1506	1220	1296	1387

17. Elbow Height, standing [mm]

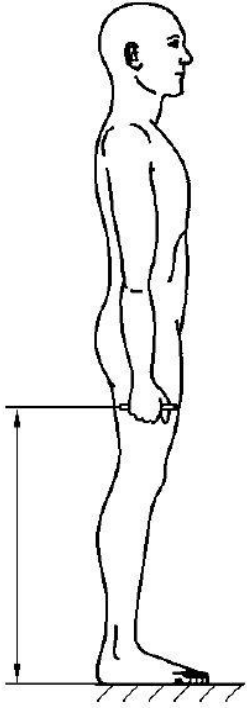
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	1025	1100	1175	960	1020	1080
Euro	960 (P5)		1078 (P50)		1190 (P95)	
Italy	1004	1082	1170	925	1000	1078
Japan	960	1031	1102	889	953	1020
Korea	974	1045	1115	907	967	1032
Thailand	953	1024	1100	895	952	1014
USA (n.a.)						
China	954	1024	1096	899	960	1023
Mexico	906	969	1046	906	969	1044
Malaysia	964	1042	1130	902	965	1048

18. Fist Height (Grip Reach) [mm]

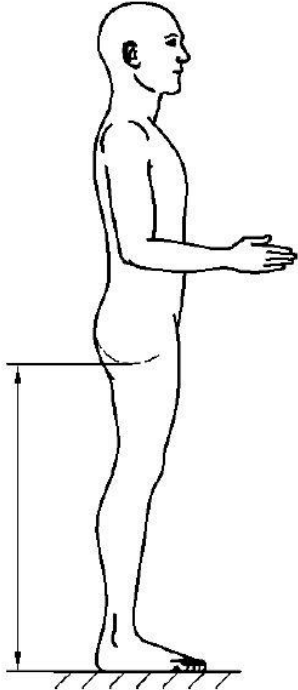
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	730	765	825	670	715	760
Euro	660 (P5)		764 (P50)		845 (P95)	
Italy (n.a.)						
Japan	697	753	812	642	699	752
Korea	699	758	815	655	708	764
Thailand	683	740	800	647	696	746
USA (n.a.)						
China	680	741	801	650	704	757
Mexico (n.a.)						
Malaysia (n.a.)						

19. Crotch Height [mm]

The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.

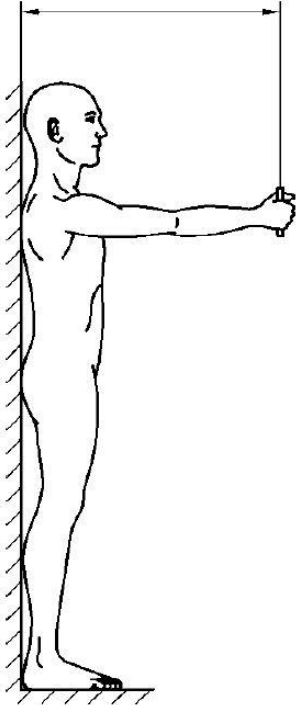


Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	760	830	905	710	775	830
Euro	709 (P5)		816 (P50)		890 (P95)	
Italy	760	834	914	689	756	827
Japan	707	771	837	645	705	768
Korea	707	778	843	649	707	768
Thailand (n.a.)						
USA	719	796	880	672	744	831
China	728	790	856	673	732	792
Mexico (n.a.)						
Malaysia						

Italy: Data distinguishes from ISO 7250-2 or has been replaced
 USA: Data distinguishes from ISO 7250-1 or has been replaced

20. Operating Reach Forward [mm]

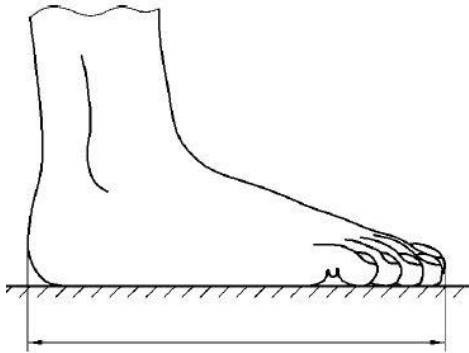
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	685	740	815	625	690	750
Euro	640 (P5)		728 (P50)		820 (P95)	
Italy (n.a.)						
Japan	635	693	750	588	635	690
Korea	621	700	766	612	658	709
Thailand	665	720	780	627	677	730
USA (n.a.)						
China (n.a.)						
Mexico (n.a.)						
Malaysia (n.a.)						

21. Feet Length [mm]

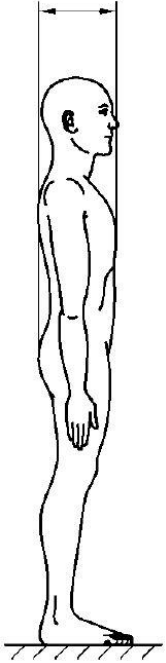
The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	245	265	285	225	245	260
Euro	232 (P5)		255 (P50)		280 (P95)	
Italy (n.a.)						
Japan	234	251	270	215	230	246
Korea	232	250	270	214	230	246
Thailand	229	246	267	210	227	243
USA (n.a.)						
China (n.a.)						
Mexico (n.a.)						
Malaysia (n.a.)						

22. Body Depth, standing [mm]

The distribution of the body measurements shows a Gaussian distribution. For ergonomic design, the 5th, 50th and 95th percentiles are commonly used.



Country	Male			Female		
	P5	P50	P95	P5	P50	P95
Germany	260	285	380	245	290	345
Euro (n.a.)						
Italy (n.a.)						
Japan	205	245	296	185	217	268
Korea	186	225	275	193	231	285
Thailand (n.a.)						
USA (n.a.)						
China (n.a.)						
Mexico	219	272	323	233	269	344
Malaysia (n.a.)						

Overview

1 Body Weight

2 Seated

3 Standing

4 Sources and References

Sources and References

- Body Measurements taken from:
R. Chaurand, L. León, E. Munoz (2007): Anthropometric Data of the Latin-American population, 2. Run, University Guadalajara (Size of sample about 600 persons)
- Measurements for Euro: AWE Nr. 108
- Other Measurements taken from: DIN CEN ISO/TR 7250-2
- Images taken from: DIN 33402-2:2005-12
- “n.a.” stands for “not available”
- Measurements for European population (listed as “Euro”) are gender neutral