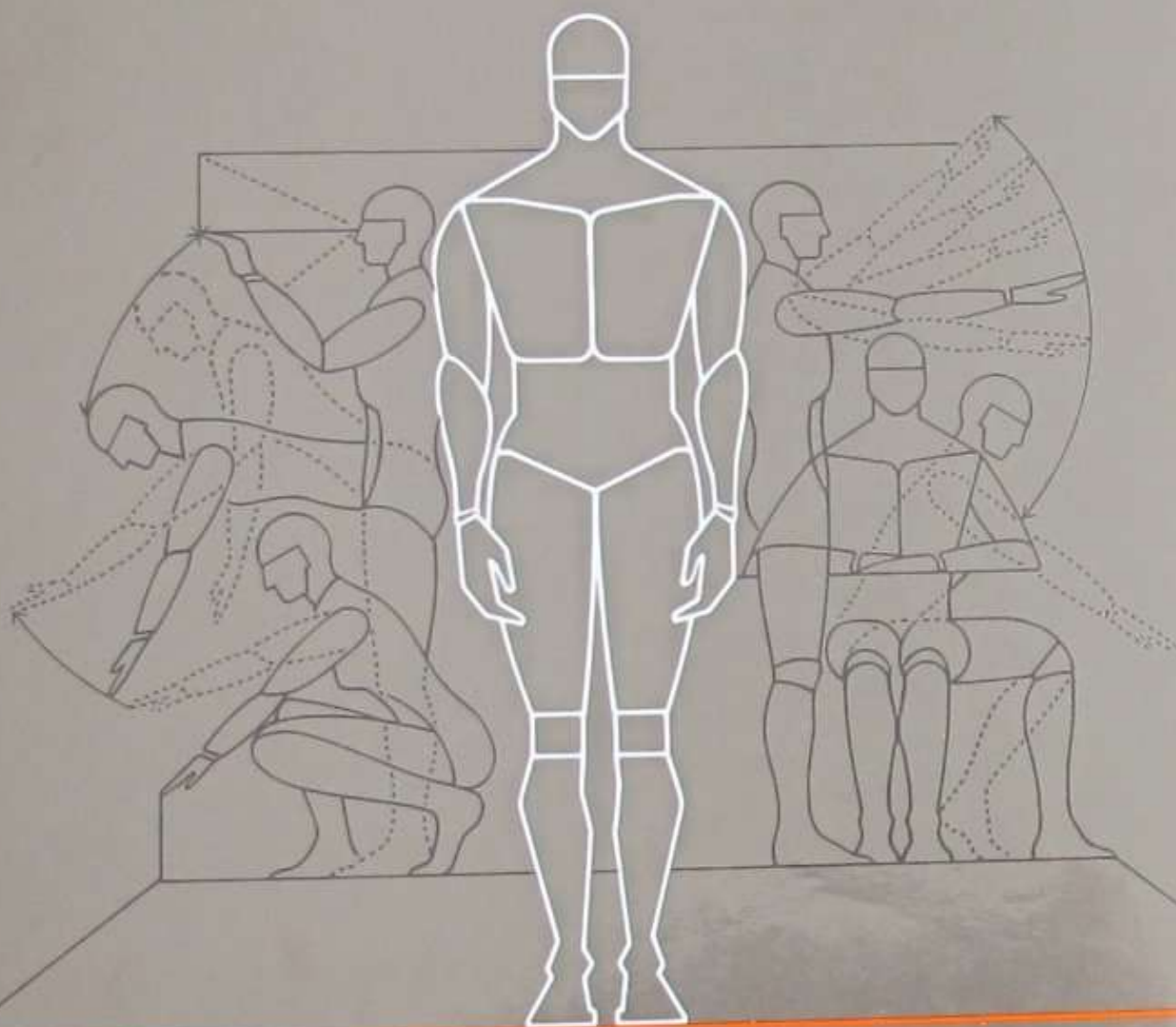

HUMAN DIMENSION & INTERIOR SPACE

A SOURCE BOOK OF
DESIGN REFERENCE STANDARDS



BY JULIUS PANERO, AIA, ASID
AND MARTIN ZELNIK, AIA, ASID

2.4 COOKING SPACES

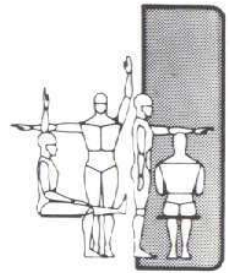


TABLE	ACTIVITIES					ANTHROPOMETRIC DATA
	STORAGE	PREPARATION	DINING	SINK	REFRIGERATOR RANGE/OVEN	
1A,2B	●			●		1 STATURE
1B,3C	○			●	●	2 EYE HEIGHT
1C,3B		●		●		3 ELBOW HEIGHT
1D,2C			●			4 SITTING HEIGHT ERECT
1F,3G			●			6 EYE HEIGHT SITTING
1L,2H		●	●			12 THIGH CLEARANCE
1P,2L		●	●			16 BUTTOCK-KNEE LENGTH
1T,4F	○					20 VERTICAL GRIP REACH
1V,4D				○		22 THUMB TIP REACH
1W,6B	●	●		●	●	23 MAXIMUM BODY DEPTH
1X,6A	●	●	●	●	●	24 MAXIMUM BODY BREADTH

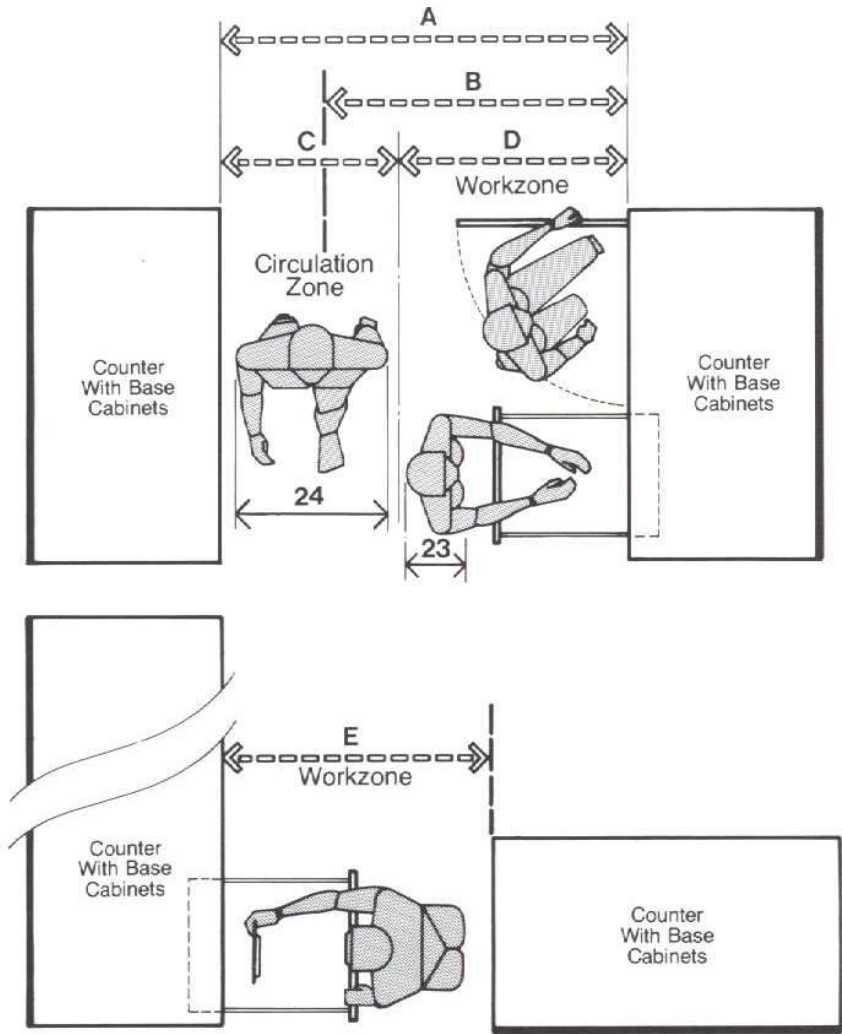
The height of a kitchen workcounter, the proper clearance between cabinets or appliances for circulation, the accessibility to overhead or undercounter storage, and proper visibility are among the primary considerations in the design of cooking spaces. All must be responsive to human dimension and body size if the quality of interface between the user and the components of the interior space are to be adequate. In establishing clearances between counters, the maximum body breadth and depth of the user of larger body size must be taken into account as well as the projections of the appliances. Refrigerator doors, cabinet drawers, dishwashing machine doors, and cabinet doors all project to some degree in their open position into the space within which the user must circulate and must be accommodated.

Standard kitchen counter heights manufactured are all about 36 in, or 91.4 cm. But such a height does not necessarily accommodate the body dimension of all users for all tasks. Certain cooking activities, for example, may be more efficiently performed from a standing position, but with a counter height less than 36 in. In overhead cabinets the upper shelves are usually inaccessible to the smaller person, while the lower shelves are usually inaccessible to most without bending or kneeling. The logical answer is the development of kitchen cabinet systems capable of total adjustability to accommodate the human dimension of the individual user. Such a system could accommodate not only those of smaller and larger body size, but also elderly and disabled people. The drawings on the following pages examine the question of human dimension in terms of the anthropometric measurements indicated in the above matrix. It should be noted, however, that the drawings are intended merely to illustrate the relationship of body size to clearances and reach situations and not to suggest an overall functional plan for the kitchen or the ergonomic relationship between workcenters.

2.4 COOKING SPACES

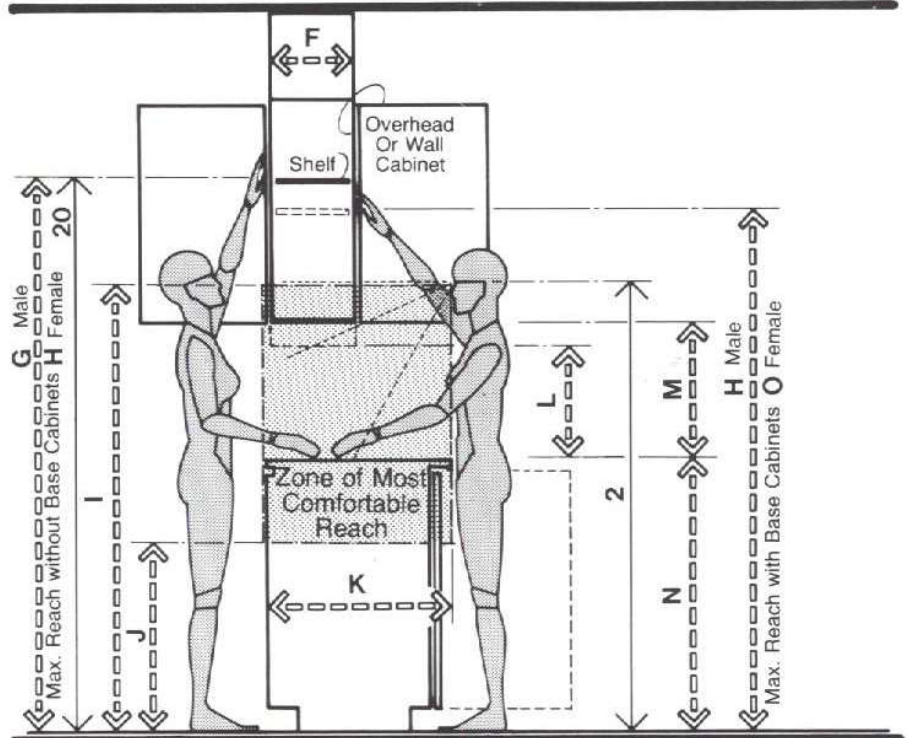
The drawings at the top and center of the page illustrate some of the basic horizontal clearances required in a kitchen. The drawing at the top shows clearances between two counters with base cabinets. A total clearance between cabinets of 60 to 66 in, or 152.4 to 167 cm, will accommodate the human body and an extended drawer or hinged cabinet door in the workzone and in the circulation zone the maximum body breadth of a person of larger body size. The B dimension of 48 in, or 121.9 cm, is a recommended minimum clearance between cabinets when the full circulation zone shown is not desired. The center drawing also shows a recommended clearance of 48 in between the face of a cabinet and the nearest physical obstruction.

The drawing at the bottom of the page deals with vertical clearances. The height of the shelf, shown in broken lines, within the overhead cabinets is within reach, allowing for the projection of the base cabinet. The height of the shelf, shown as a solid black line, is slightly greater, but also within reach, since the base cabinet does not interfere. The height of the shelves has been based on 5th percentile female vertical grip reach data to place them within reach of the user with the smaller body size.



**COUNTER AND BASE CABINETS/
GENERAL CLEARANCE**

	in	cm
A	60–66	152.4–167.6
B	48 min.	121.9 min.
C	24–30	61.0–76.2
D	36	91.4
E	48	121.9
F	12–13	30.5–33.0
G	76 max.	193.0 max.
H	72 max.	182.9 max.
I	59	149.9
J	25.5	64.8
K	24–26	61.0–66.0
L	15 min.	38.1 min.
M	18	45.7
N	35–36	88.9–91.4
O	69 max.	175.3 max.



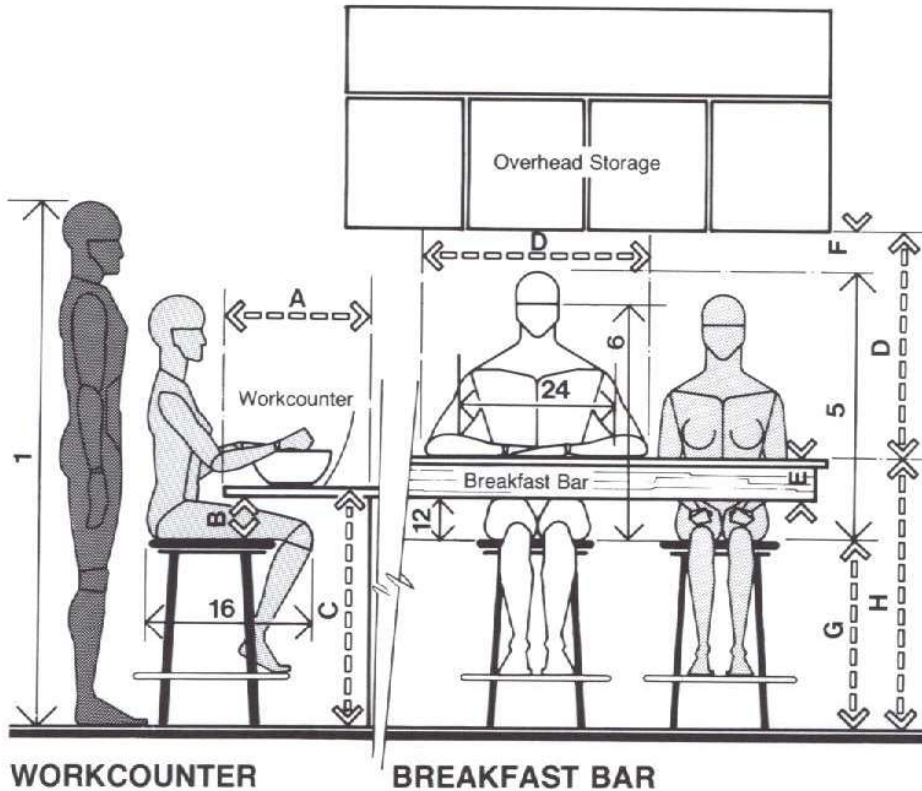
CABINET REACH COMPARISONS

2.4 COOKING SPACES

The drawing at the top of the page shows some of the more important horizontal and vertical clearances related to a typical breakfast bar. To ensure comfortable spacing between people, 30 in, or 76.2 cm, should be allocated for the horizontal space required for each person seated at the bar. It should be noted also that a bar height of 36 in, or 91.4 cm, requires that the stool be equipped with a footrest.

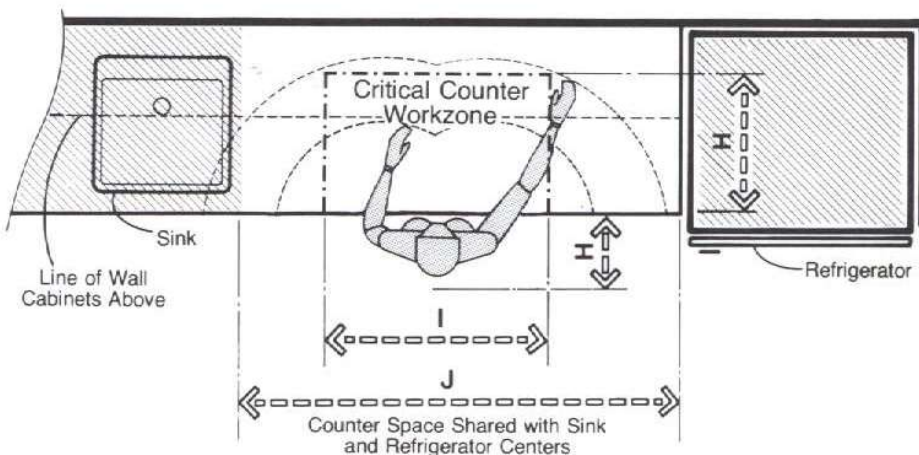
The center drawing shows a typical workcounter. Although most kitchen counters have a height of 35 to 36 in, or 88.9 to 91.4 cm, a 32-in, or 81.3-cm, height will accommodate a seated user. Moreover, certain food preparation activities, even if performed from a standing position, are more efficiently and comfortably executed with a lower counter height. This is particularly true for tasks involving some degree of force from the arms and upper back muscles; the rolling of dough would be a good example.

The drawing at the bottom of the page shows the critical counter workzone of a standing user. The outer perimeter is defined by the horizontal thumb tip reach of the user having the smaller body size. The 18-in, or 45.7-cm, dimension indicated was adapted from 5th percentile female data. The critical counter workzone of 18 by 30 in, or 45.7 by 76.2 cm, constitutes the immediate work area directly in front of the user, all of which is comfortably accessible, with little or no side arm reach required. The counter surface beyond this area, which is accessible with some effort, is limited only by the reach capability of the human body, which varies with the size of the individual.



WORKCOUNTER

BREAKFAST BAR



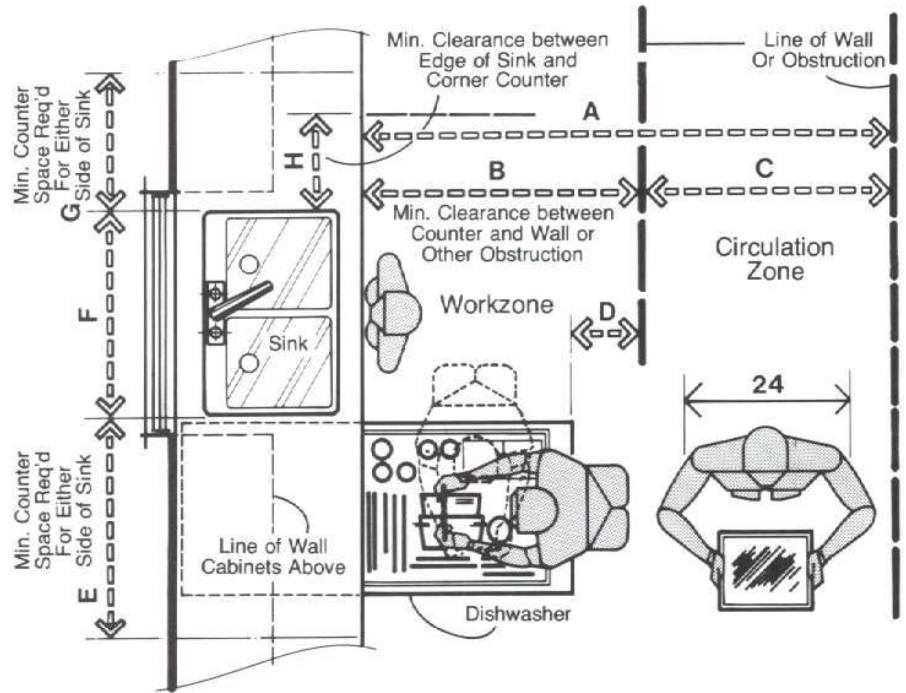
MIX AND PREPARATION CENTER

	in	cm
A	18 min.	45.7 min.
B	7.5 min.	19.1 min.
C	32	81.3
D	30	76.2
E	4 max.	10.2 max.
F	4	10.2
G	22-24.5	55.9-62.2
H	18	45.7
I	36	91.4
J	42	106.7

2.4 COOKING SPACES

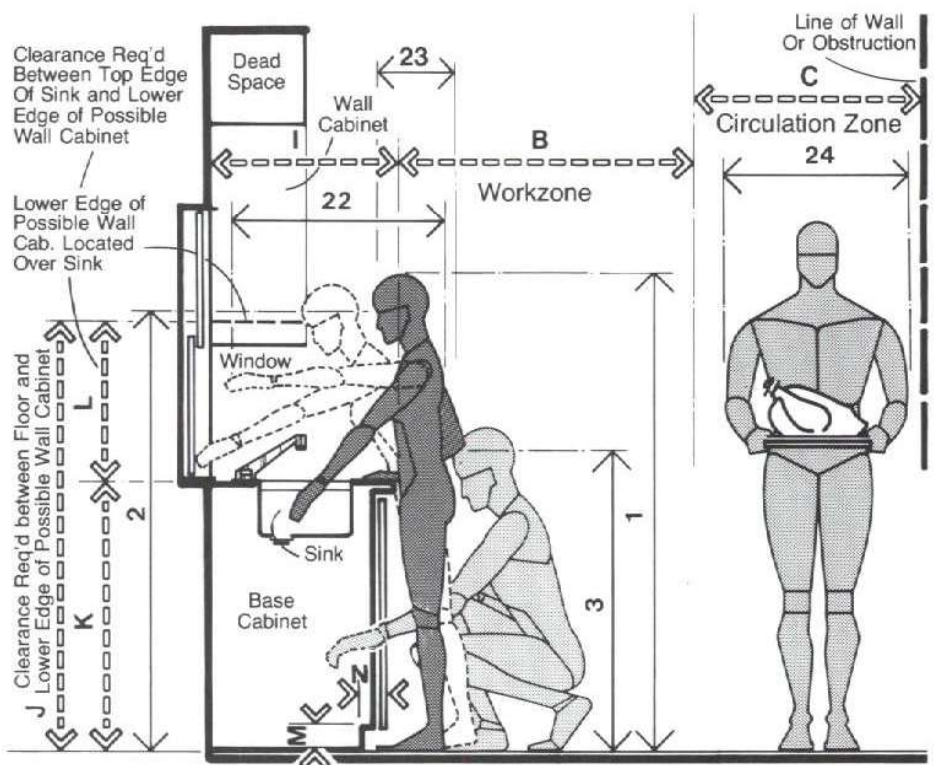
The drawing at the top of the page shows the horizontal clearances involved in the vicinity of the dish washing area. While loading or unloading the dishwasher, a clearance of at least 40 in, or 101.6 cm, is recommended to accommodate the human body and the extended dish rack and appliance door. To allow circulation as well, at least another 30 in, or 76.2 cm, should be added.

The drawing at the bottom of the page shows a sectional view through the same area. The recommended counter height is between 35 and 36 in, or 88.9 to 91.4 cm. If no window is provided over the kitchen sink and wall cabinets are to be provided instead, the height between the top of the counter and the bottom of those cabinets should not be less than 22 in, or 55.9 cm.



SINK CENTER

	in	cm
A	70–76	177.8–193.0
B	40 min.	101.6 min.
C	30–36	76.2–91.4
D	18	45.7
E	24 min.	61.0 min.
F	28–42	71.1–106.7
G	18 min.	45.7 min.
H	12 min.	30.5 min.
I	24–26	61.0–66.0
J	57 min.	144.8 min.
K	35–36	88.9–91.4
L	22 min.	55.9 min.
M	3	7.6
N	4	10.2



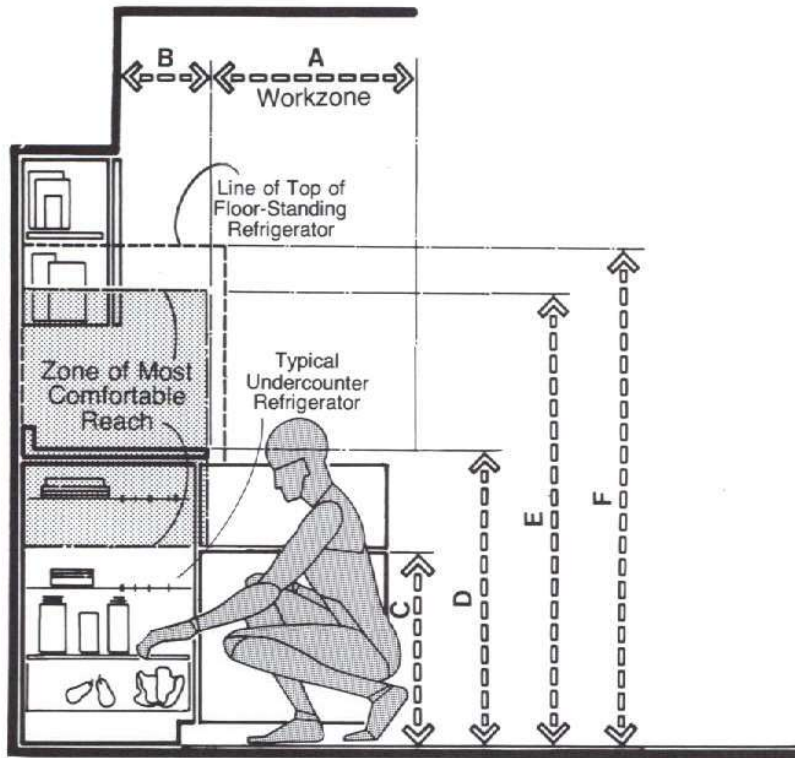
SINK CENTER

2.4 COOKING SPACES

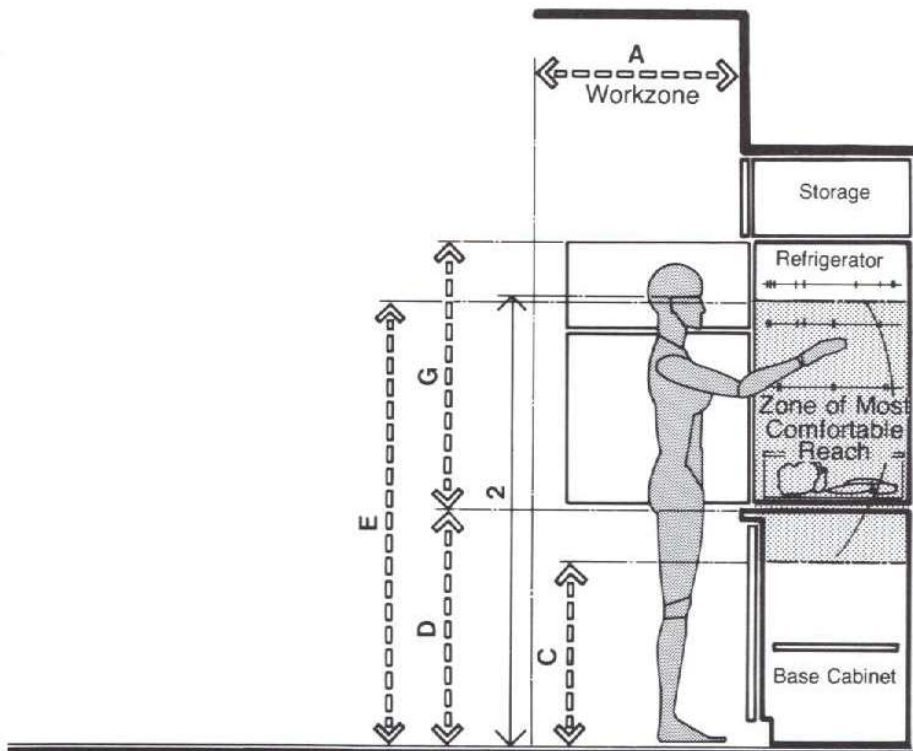
The two drawings on this page deal primarily with the vertical dimensions related to the refrigerator installation within the kitchen.

The top drawing illustrates a typical floor-standing refrigerator installation as well as a below-counter installation. Superimposed on the sectional view in shaded film is the zone of most comfortable reach. To reach elements located above or below this area requires some additional effort. Below the area, for example, it may be necessary to kneel or stoop. Although, in both the floor-standing and the under-counter situations everything is within physical reach, elements located within the shaded area can be reached almost effortlessly.

The bottom drawing suggests the possibility of a third type of refrigerator that might be wall mounted or located on the top of the counter, so that most of its surface would fall within this shaded area. To allow for proper viewing of the interior, the height of the proposed unit exceeds the upper limits of the shaded zone. Despite its slightly greater height, the unit is just about in line with the height above the floor of the larger-size conventional floor-standing model.



**REFRIGERATOR CENTER/
TYPICAL REFRIGERATOR LOCATIONS**



**REFRIGERATOR CENTER/
PROPOSED REFRIGERATOR LOCATION**

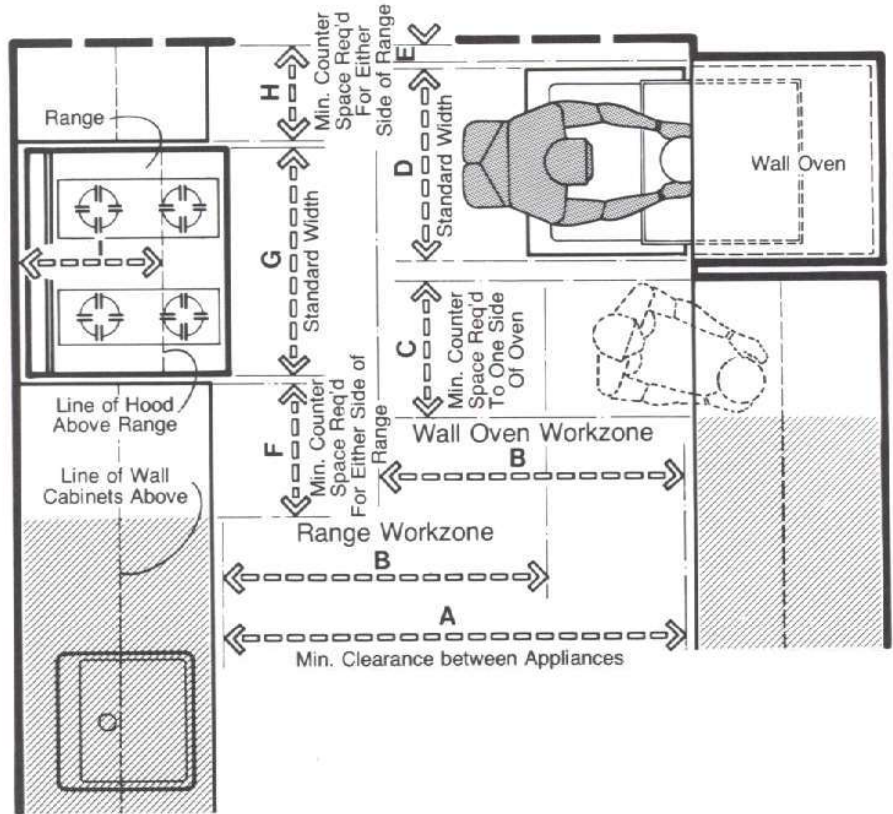
	in	cm
A	36	91.4
B	11-14	27.9-35.6
C	25.5	64.8
D	35-36	88.9-91.4
E	59	149.9
F	55-69.5	139.7-176.5
G	30-36	76.2-91.4

2.4 COOKING SPACES

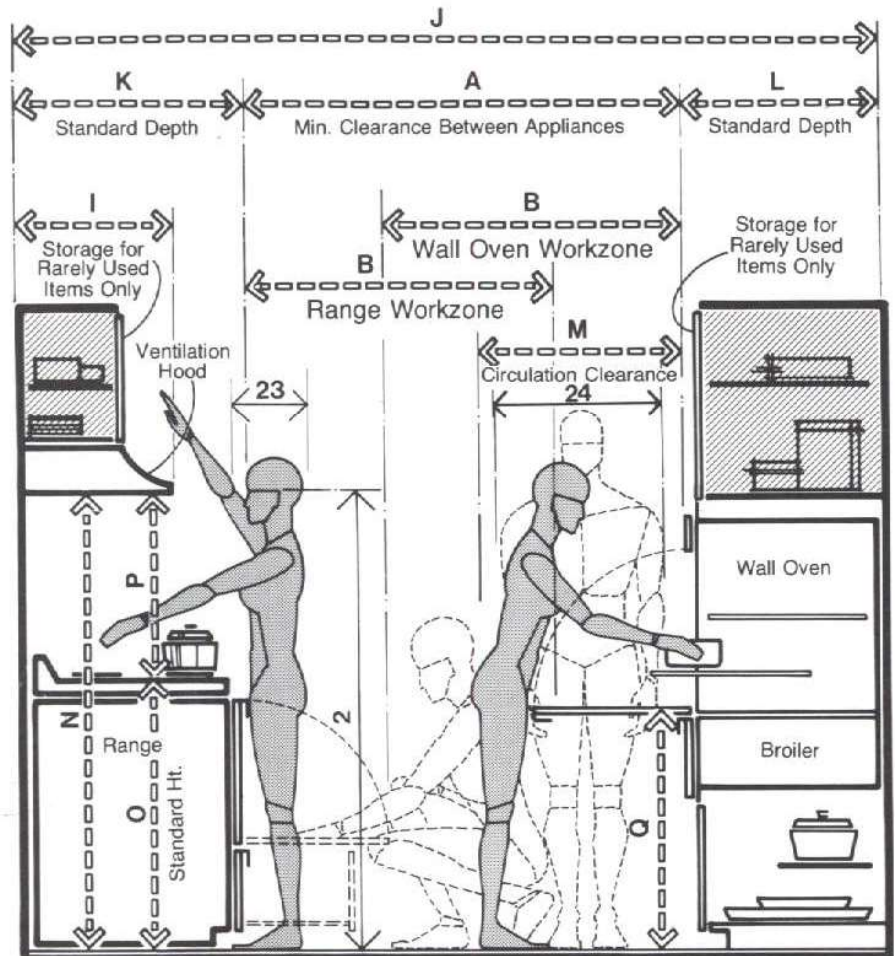
The drawings at the top and bottom of the page illustrate the clearances related to range centers. The top drawing indicates a minimum clearance between appliances of 48 in, 121.9 cm. The anthropometric basis for the clearances are amplified in the drawing below.

The 40-in, or 101.6 cm, wall oven workzone clearance is adequate to accommodate the projected wall oven door, in addition to the maximum body depth dimension of the user. The standing figure shown in broken line, however, indicates both dimensionally and graphically that the 40-in clearance will not permit comfortable circulation when appliances on both sides are in operation at the same time. The range workzone clearance, also 40-in, is adequate to accommodate the open range door and the body size of the kneeling user.

An extremely important, but frequently overlooked, anthropometric consideration in kitchen design is eye height. In this regard, the distance from the top of the range to the underside of the hood should allow the rear burners to be visible to the user.



RANGE CENTER



RANGE CENTER

	in	cm
A	48 min.	121.9 min.
B	40	101.6
C	15	38.1 min.
D	21-30	53.3-76.2
E	1-3	2.5-7.6
F	15 min.	38.1 min.
G	19.5-46	49.5-116.8
H	12 min.	30.5 min.
I	17.5 max.	44.5 max
J	96-101.5	243.8-257.8
K	24-27.5	61.0-69.9
L	24-26	61.0-66.0
M	30	76.2
N	60 min.	152.4 min.
O	35-36.25	88.9-92.1
P	24 min.	61.0 min.
Q	35 max.	88.9 max.