

BodyDim: Body dimension pictograms for size designation of clothes generated with MetaPost

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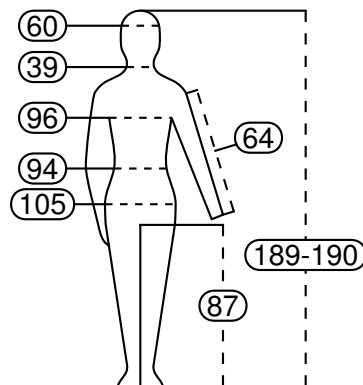
Starting from mid 2004, European clothes vendors will switch to a new standard system for designating the size of garments. This new system is defined in EN 13402 and based on body dimensions measured in centimeters.

EN 13402-1 defines a standard list of body dimensions, namely head girth, neck girth, chest girth, bust girth, underbust girth, waist girth, hip girth, height, inside leg length, arm length, hand girth, foot length, and body mass.

For each type of garment, the EN 13402-2 standard specifies a *primary dimension*, a body measurement in centimeters (or body mass in kilograms) that shall be used in designating its size. For some types of garment, where a single size is not adequate to select the right product, a *secondary dimension* is added.

For use on language-neutral clothes labels, EN 13402-1 specifies a pictogram for each body dimension. The BodyDim MetaPost package helps \TeX users in the simple generation of these pictograms as Embedded PostScript files.

An example pictogram generated by BodyDim is



which was produced by a file `test.mp` with content

```
prologues:=2;
input bodydim
beginfig(1)
head_girth := 60; neck_girth := 39; chest_girth := 96;
waist_girth := 94; hip_girth := 105; arm_length := 64;
```

```

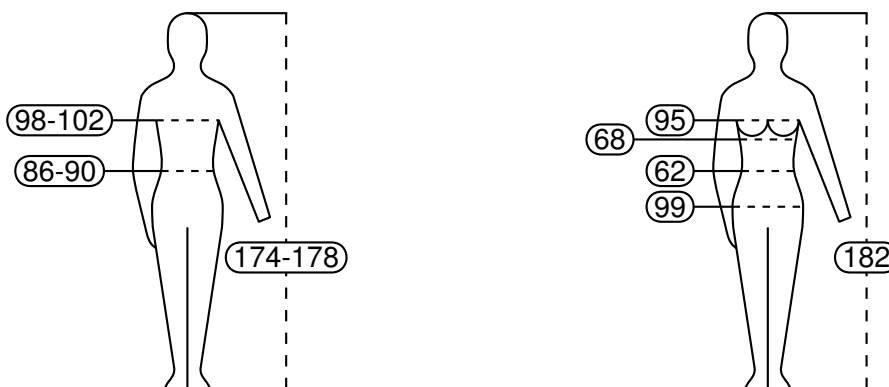
inside_leg_length := 87; string height; height := "189-190";
draw bodydim(false);
endfig;
end

```

Invoking the command line `mpost test.mp` leads to the generation of the above EPS diagram in the file `mpost test.1`.

Note that all girth measurements are on the left side, while all length measurements are on the right.

While in practice, clothes labels normally never show more than two body measures (primary and secondary), BodyDim provides for the simultaneous display of almost all dimensions in a single pictogram. This can be used to produce little cards where customers can record all their body measures for easy reference.



These diagrams were generated respectively by

```

beginfig(1)
string chest_girth, waist_girth, height;
chest_girth := "98-102";
waist_girth := "86-90";
height := "174-178";
draw bodydim(false);
endfig;

```

```

beginfig(1)
bust_girth := 95;
underbust_girth := 68;
waist_girth := 62;
hip_girth := 99;
height := 182;
draw bodydim(true);
endfig;

```

The `bodydim.mp` files provides users a single macro `bodydim` that draws the standard pictogram if its sole parameter is `false`. If the parameter is `true`, it draws instead the modified pictogram with breasts, which is used to indicate an underbust girth measure. The body dimension labels are added depending on which of the following global numeric or string variables are defined:

```

head_girth, neck_girth, chest_girth, underbust_girth, bust_girth,
waist_girth, hip_girth, height, inside_leg_length, arm_length

```

BodyDim has in the present version the following limitations:

- The pictograms for hand girth and foot girth are not yet implemented. (This can be fixed given time and user demand.)
- The pictograms for chest girth (for men and children) and bust girth (for women) are identical, just like in the standard. (Only their definition in the standard varies.)
- The standard does not provide a pictogram for body mass and neither does BodyDim at present.
- The standard specifies the font Univers 55, but BodyDim uses Helvetical by default for portability. (Owners of Univers 55 simply have to adjust `defaultfont`.)

BodyDim is available on:

<http://www.cl.cam.ac.uk/~mgk25/download/bodydim.tar.gz>

The author welcomes feedback and suggestions for improvement. Contact information: <http://www.cl.cam.ac.uk/~mgk25/>

References

- [1] Size designation of clothes — Part 1: Terms, definitions and body measurement procedure (ISO 3635:1981 modified), British and European Standard BS EN 13402-1, 2001.
- [2] Size designation of clothes — Primary and secondary dimensions, British and European Standard BS EN 13402-2, 2002.
- [3] Size designation of clothes — Measurements and intervals, British and European Standard BS EN 13402-3, 2004.
- [4] John D. Hobby: MetaPost. <http://www.tug.org/metapost.html>
- [5] All change for clothes sizes. BSI news release, 2002-05-11. <http://www.bsi-global.com/Corporate/News+Room/clothes-sizes.xalter>

A Definitions of body dimensions

EN 13402-1 defines a standard list of body dimensions together with a method for how to measure each on a person. These are:

- **head girth:** maximum horizontal girth of the head measured above the ears
- **neck girth:** girth of the neck measured with the tape-measure passed 2 cm below the Adam's apple and at the level of the 7th cervical vertebra
- **chest girth:** maximum horizontal girth measured during normal breathing with the subject standing erect and the tape-measure passed over the shoulder blades (scapulae), under the armpits (axillae), and across the chest

- **bust girth:** maximum horizontal girth measured during normal breathing with the subject standing erect and the tape-measure passed horizontally, under the armpits (axillae), and across the bust prominence
- **underbust girth:** horizontal girth of the body measured just below the breasts
- **waist girth:** girth of the natural waistline between the top of the hip bones (iliac crests) and the lower ribs, measured with the subject breathing normally and standing erect with the abdomen relaxed
- **hip girth:** horizontal girth measured round the buttocks at the level of maximum circumference
- **height:** vertical distance between the crown of the head and the soles of the feet, measured with the subject standing erect without shoes and with the feet together (for infants not yet able to stand upright: length of the body measured in a straight line from the crown of the head to the soles of the feet)
- **inside leg length:** distance between the crotch and the soles of the feet, measured in a straight vertical line with the subject erect, feet slightly apart, and the weight of the body equally distributed on both legs
- **arm length:** distance, measured using the tape-measure, from the armscye/ shoulder line intersection (acromion), over the elbow, to the far end of the prominent wrist bone (ulna), with the subject's right fist clenched and placed on the hip, and with the arm bent at 90°
- **hand girth:** maximum girth measured over the knuckles (metacarpals) of the open right hand, fingers together and thumb excluded
- **foot length:** horizontal distance between perpendiculars in contact with the end of the most prominent toe and the most prominent part of the heel, measured with the subject standing barefoot and the weight of the body equally distributed on both feet
- **body mass**

These are measured using

- a measuring stand (anthropometer, somatometer), consisting essentially of a rule, graduated in centimeters, vertically mounted and with a movable arm (cursor)
- a dimensionally stable tape-measure, of width approximately 15 mm and graduated in centimetres
- a balance suitable for measuring body mass in kilograms

The standard further provides diagrams that illustrate the measurements and says: “If practicable, measure the body in the unclothed state. If this is impracticable (for example, if measurements are made at the point of sale), ensure that the measurements are taken over as few clothes as possible and that these garments do not seriously affect the body shape or interfere with the taking of accurate measurements. When determining bust girth, measure over a brassiere that shall not deform the breast in an unnatural way and shall not displace its volume.” Moderate tension is to be applied to the tape measure while not constricting the body, and measurements are to be rounded up to the next centimeter.