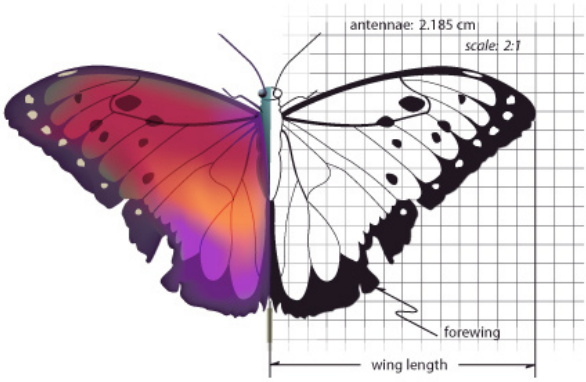
hot door

CADtools 4

for Adobe® Illustrator® 10, CS and CS2



Precision drawing, labeling and dimensioning for professional design within Adobe Illustrator

USER GUIDE

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This user guide is designed for use as a product tutorial or reference guide, with topics organized to follow the process of a typical project.

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About CADtools 4

Welcome to Hot Door CADtools, a full-featured CAD plug-in for **Adobe Illustrator 10, CS or CS2**. CADtools offers aneasy and elegant solution for designers who need the precision of CAD within the flexible, creative environment of Adobe Illustrator.

Core features of CADtools 4

- Precision drawing tools for 2D and isometric or axonometric objects
- Standard or custom scale defined per document or per Illustrator layer
- Scaled snapping CADgrids and CADrulers
- On-screen info while dragging objects in scale
- Live dimensions link to objects and respond to artwork changes
- Dimensions show measurement or custom text
- Instant dimensioning of document or objects
- International number format support
- Dual dimensioning and tolerancing
- Chain and datum dimension tools
- Auto-labeling with increments or custom text
- Wall creation tool with sliding editability
- Custom dimension and label styles
- Path division for cutting or marking any path
- Palette controls allow live editing of objects, dimension styles, scale, etc.
- Scaled move, transform and repeat
- Instant calculation of area, perimeter, length of any path or set of paths
- Measure Scale tool - similar to a map's scale
- Smart Trim and Extend tools

What's new in CADtools 4

- Instant dimensioning of document or objects
- New wall tool with sliding editability and live on-screen info while dragging
- Dimensions can be edited with values preserved
- Dimensions can show measurement or custom text
- Dimension line spacing can be adjusted
- Path divide marks or cuts paths into equal parts
- Improved fillet and chamfer tools
- New Illustrator CS2 compatibility

Behind the concept

Hot Door, Inc. (metaphorical for 'exciting opportunity') was formed in 1996 around a product concept that bridged CAD and Adobe Illustrator. Our lead developer Brendon Cheves conceived the idea while teaching students how to use Adobe Illustrator to present their CAD files in a university classroom. After much research in the technical design field, CADtools 1 was developed and released in 1997. With the support of Adobe Solutions Network and thousands of happy customers, CADtools 2 was carefully crafted and released in 1999 with live drawing and dimensioning features and a palette-based interface. Hot Door subsequently released other Illustrator plugin products including the popular Transparency, MultiPage, and Perspective plugins for Illustrator. CADtools 3 shipped in 2003, marking a new phase of product evolution with innovative isometric drawing and dimensioning features and refined dimension control. Since then, we have added other complementary products such as Code Zebra Symbols and the CADpatterns library to simplify projects within Illustrator.

CADtools 4 polishes the broad range of tools and functions that now rival major CAD programs. On a larger scale, dimensions can now be applied instantly to an entire document. On a smaller scale, any path can be marked and divided into equal parts. The new improved wall tool offers on-screen data during creation and elegant sliding control during editing. Customers will be pleased with the new editable dimensions that preserve their text or numeric values. Even dimensions and labels are more adjustable in appearance. CADtools continues to grow with Adobe Illustrator to make work easier and enjoyable for design professionals around the world.

Our customers determine the design and direction of our products, and we promise complete satisfaction with a 90-day money-back guarantee. Our customer service is unmatched, and we welcome your calls and emails every day. Please don't hesitate to ask questions or provide comments on our products - we look forward to hearing from you!

Shari Cheves, President

Brendon Cheves & Jeff Winters
Lead Software Engineers

Updating or installing CADtools

UPDATING from CADtools 3 on Macintosh or Windows

1. If you are currently running Adobe Illustrator, quit the application.

2. Double-click **Install Hot Door CADtools**. Follow the on-screen instructions to install the file named **CADtools.aip** into Adobe Illustrator > Plug-ins > Tools folder. Your old version will be replaced.

3. When you launch the Adobe Illustrator application again, a CADtools Personalization dialog will appear. Enter the new CADtools 4 upgrade serial number and then enter the CADtools 3 serial number when prompted.

4. If you plan to use Illustrator CS or CS2 with older CADtools files generated with Illustrator 10, please follow instructions in the next section **"Converting CADtools files with Legacy Text."**

FULL VERSION of CADtools 4 on Macintosh or Windows

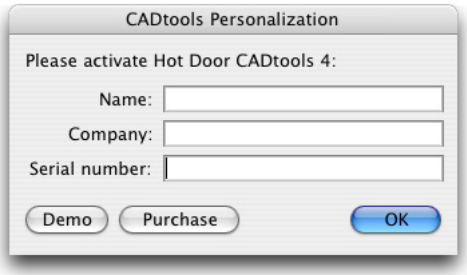
1. If you are currently running Adobe Illustrator, quit the application.

2. Double-click **Install Hot Door CADtools**. Follow the on-screen instructions to install the file named **CADtools** into Adobe Illustrator > Plug-ins > Tools folder.

3. When you launch the Adobe Illustrator application again, the CADtools Personalization dialog will request your name and serial number.

Hot Tip!
If you ever need to reinstall CADtools, just download the demo version from the CADtools > Demos section of the Hot Door Web site at www.hotdoor.com.

Personalizing, registration and support



Personalization:
If you have purchased a full version of CADtools 4, enter your CADtools serial number (with a format XXXX-X-X-XXX-XXX-XXXXX) and click OK. Illustrator will open and you will see some of the tools belonging to CADtools in the toolbox. *The CADtools icons have red point markings.*

If you wish to use the demo version of CADtools, click the Demo button. CADtools will function for an unlimited time period but limits your drawing and dimensioning to 1:3 scale with access to only the top tool in each of the six tool groups.

If you wish to purchase the full version of CADtools, click the Purchase button to automatically launch the Hot Door Web site and online store.

Registration:
To be eligible for free technical support, information on upgrades, and other special offers, please register your copy of CADtools online at:
http://www.hotdoor.com
(if you purchased CADtools directly from Hot Door, you are already registered)

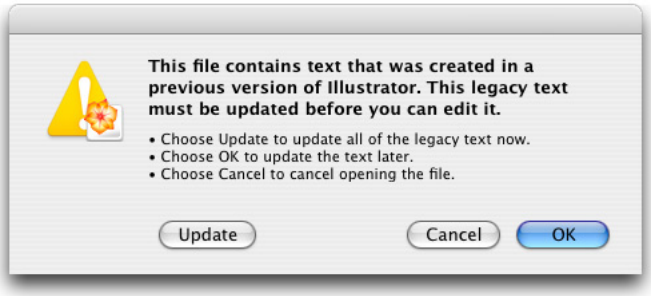
Technical support online:
As a registered user, you are entitled to free email or phone technical support.

Online detailed FAQ, technical support, and tutorial:
Visit **http://www.hotdoor.com** to access the CADtools page.

Technical support by phone: 949-464-0300
Phone inquiries are always welcome and service is prompt and professional.

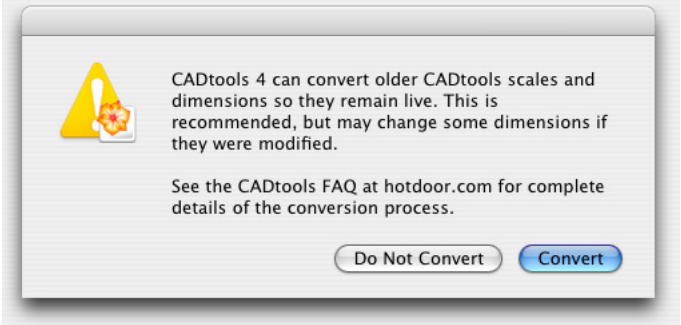
Converting older CADtools files

Converting CADtools files created with Legacy Text (Illustrator 10 or earlier)
To properly convert an Illustrator 10 file containing CADtools dimensions to Illustrator CS or Illustrator CS2, first open the file in CS2. **Do NOT click Update when prompted. Click OK.**



Once the file is opened, click Update links in the CADstyle palette. Then save the file in CS or CS2 format. Close the file. **Open the file again and click Update** when prompted. This process converts Legacy dimension text separately from Legacy Illustrator text for best results.

Converting CADtools files to preserve scales and live dimensions (CADtools 2 or 3)
Files created with older versions of CADtools can be opened with live dimensions and scale data. Click **Convert** when opening to retain the information. However, some dimensions may change if they were modified without the CADtools palettes or tools. If this is a problem, reopen the files without scale data or live dimensions by clicking **Do Not Convert**.



Overview of the CADtools interface

Finding the tools

After you have properly installed CADtools and launched Adobe Illustrator, you will notice new CADtools drawing and dimensioning tools in the toolbox of Adobe Illustrator. In addition to the six new tools you see in the toolbox, there are many popout tools. Select the small arrows on the right of the tool icons and drag to highlight other tools. The six different tool groups can be separated by dragging the tearoff icon at the end of each set of hidden tools.

Color icons and tool behavior

CADtools icons are distinguished by their red point markings. The red points indicate the position of mouse-click(s) in relationship to the artwork created. Tool icons which have only one red point require only one mouse-click-and-drag – except for the object center tool, which requires only one mouse-click on an object. Tool icons which have two red points require two mouse-clicks positioned on artwork as shown in the icon. For most of these tools, you must drag the mouse after the second click. The fillet, chamfer, trim, and extend tools do not require dragging after the second click.

CADtools automatic dimensioning features

CADtools features automatic dimensioning of selected objects or all objects on the document. After setting the desired scale with the CADdocument palette, Choose **Window > CADtools > Auto Dimension Selection** or **Auto Dimension Document.**

Hot Tip!

The CADtools icons all contain red points which indicate the number and placement of mouse-clicks required to properly use the tool.

Overview of the CADtools interface (cont.)

Finding the palettes

The eight palettes in CADtools are essential for controlling the appearance and creation of CAD artwork. To view and select one of these palettes, choose **Window > CADtools**. Refer to the list below for the names of the palettes and their functions.

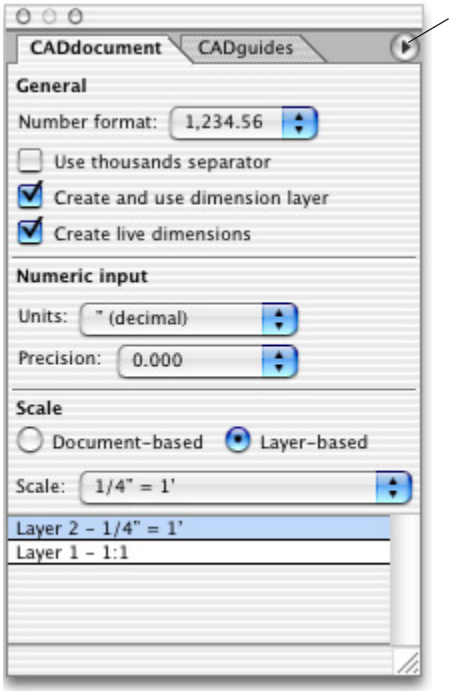
CADdocument	Defines document-wide settings such as numeric input and scale
CADguides	Allows CADgrid and CADruler control in scale
CADisometric	Controls isometric/axonometric angles and allows one-click projection and flattening of artwork between 2D and isometric views
CADlabels	Sets the appearance of labels and increments for automatic labeling
CADstyles	Sets the appearance of dimensions, including size of arrowheads and witness lines
CADtext	Controls the text options for all CADtools dimensions and labels
CADtracker	Displays geometric data for CADtools artwork (including location, length, perimeter, and area), transforms objects in scale, moves objects in scale, and repeats objects in scale
CADwalls	Sets the thickness of walls and how they are measured (from inside, center or outside)

Hot Tip!

To dock a palette, drag the palette tab of one palette to the bottom of another palette.

Setting up the document: CADdocument

Before working with CADtools, it's important to use the **CADdocument** palette to define specific settings which affect the entire document – including scale by document or layer. The CADdocument palette also controls the units and precision for numeric input default values.



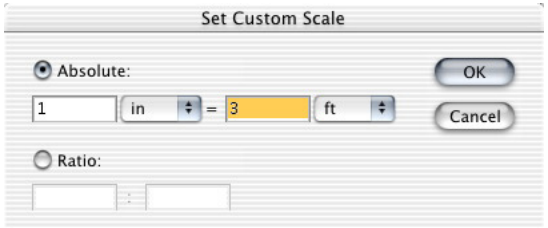
- Set custom scales with this popup menu (see info on scale)
- Comma or decimal number format applies to all dimension text
- The thousands separator shows the comma in dimension numbers
- A dimension layer keeps your dimensions separate from other artwork
- Live dimensions will auto-update with changes in scale or appearance
- Set ***default*** units and precision for numeric input when using tools in CAD-tools. (You can always input your own units and override the default settings.)
- Set level of precision for numeric input.
- Choose Document-based scale for one scale on the entire document. Choose Layer-based scale to set unique scales per layer. When using scale, you can draw objects larger or smaller than actual size using a ratio of measurement. For example, if your scale is set to 1" = 1', then an object 1" in length would dimension as 12" or 1' in length using CADtools.

Note about live dimensions: Dimensions that have been created with 'Create live dimensions' checked will automatically update with changes in scale and appearance. Dimensions that have been created with this option unchecked cannot ever be live. To automatically unlink the dimensions from their objects, ungroup the dimensions. ***Always ungroup dimensions prior to copying them into new documents.*** If you need to duplicate an object with live dimensions, copy and paste the object with its dimensions rather than option-dragging them.

Setting up the document: Scale

Using CADdocument and scale
To change a layer or document scale, use the Scale popup menu in the CADdocument palette. Choose a scale from the three sections of presets: custom, engineering, and architectural scales.

To set a custom scale, choose Add Custom Scale... from the popout menu in the CADdocument palette. Enter values on each side of the "scale equation" in Absolute or Ratio format. Architectural scales are typically expressed in Absolute format and engineering scales are typically expressed in Ratio format. Choose independent CADtools units from the popup menus for each side of the Absolute equation. Use any number of digits in the fields. Add a space between digits representing feet and inches (ex: 1' 2 1/2") You can add up to 5 custom scales to the custom scale menu.

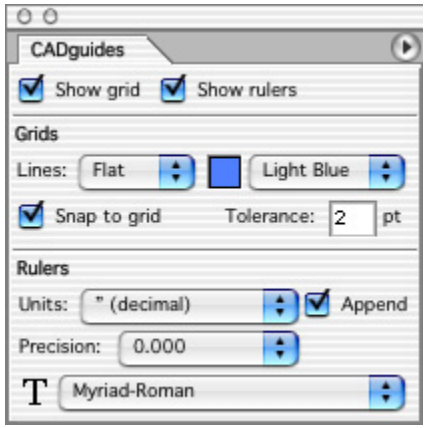


To delete a custom scale, first select the scale and then choose Remove Custom Scale from the popup menu in the CADdocument palette.

Note about drawing with scale: *Since scale affects only CADtools drawing, editing, labeling and dimensioning tools, remember to use the CADrulers, CADgrids, and CADtracker to monitor your values in scale. Object artwork is not affected by changes in scale - only dimensions and measurements are affected by scale.* ***Changing scale does not resize artwork.***

Setting up the document: CADguides

CADguides establishes special grid and ruler settings for use with CADtools. The origin for CADrulers is defined by the Illustrator's ruler origin. If you plan to use isometric drawing and dimensioning tools, choose Isometric grid lines to preview the grid according to the settings in the CADisometric palette.



- Show grid and Show rulers display special scaled grids and rulers for use with CADtools
- Choose flat or isometric grid lines
- Change the grid color with the pop-up menu, and choose Other... to open the system level color picker for additional choices
- Snap to grid to snap the cursor to grid lines and intersections while using CADtools drawing tools; enter a value for snapping tolerance
- Units and precision settings are unique for CADrulers; append will add the unit label in the CADrulers
- Change the CADrulers font with the popup menu

Hot Tip! *Adobe Illustrator includes Smart Guides that help you create, align, edit, and transform objects. Choose Illustrator > View > Smart Guides. The Illustrator Smart Guides work with CADtracker, CADgrids and CADrulers for optimal precision and control when manipulating artwork.*

2D CAD drawing tools

Once you've set up your document settings, you can use Use CAD 2D drawing tools to create flat objects in scale by drawing or clicking for numeric input with these units:

Points: *pt*
Picas: *p*
Millimeters: *mm*
Centimeters: *cm*
Meters: *m*
Kilometers: *km*
Decimal inches with symbol: X.X"
Fractional inches with symbol: X X/X"
Decimal inches with units: X.X *in*
Fractional inches with units: X X/X *in*
Decimal feet and inches with symbol: X' X.X"
Fractional feet and inches with symbol: X' X/X"
Decimal feet and inches with units: X *ft* X.X *in*
Fractional feet and inches with units: X *ft* X/X *in*
Miles: *mi*

Orthographic drawing tool group:

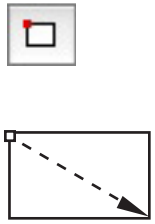
Click once on the document to input values numerically

CAD Rectangle - Click and drag to create the shape.
CAD Centered Rectangle - Click and drag.
CAD Ellipse - Click and drag to create the shape.
CAD Centered Ellipse - Click and drag.
CAD Arc by Radius - Click origin point, then click and drag another point to define the endpoint and radius of the arc. Click the second point without dragging to input values numerically.
CAD Arc by Points - Click origin point, then click and drag another point to define the endpoints and curvature of the arc. Click the second point without dragging to input values numerically.
CAD Line - Click and drag to create the line. Click and drag from the endpoint of a line path to continue the line. ***Shift-alt/option drag to create isometric lines.*** Shift-drag to constrain to 45° angles.
Add Wall - Click and drag on the side or end of a wall to create a new wall.
Remove Wall - Click a wall that is free of dependent walls to remove it.
Move Wall - Click and drag a wall to adjust its location. View all relative wall sizes in the red change boxes.

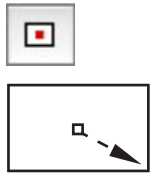
2D CAD drawing tools (cont.)

CAD Rectangle
Select the CAD Rectangle tool and position the cursor where you want a corner of the rectangle to appear. Click and drag from one edge of the rectangle to the opposite edge. Hold down the shift key while dragging to create a square.

Note: To quickly toggle between the Rectangle and Centered Rectangle, use the alt/option key. To numerically create a rectangle in scale, click once with the CAD Rectangle or Centered Rectangle tool.

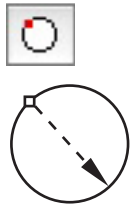


CAD Centered rectangle
Select the CAD Centered Rectangle tool and position the cursor where you want a corner of the rectangle to appear. Click and drag from the center of the rectangle to the edge. Hold down the shift key while dragging to create a square.

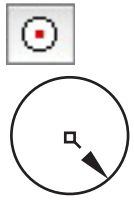


CAD Ellipse
Select the CAD Ellipse tool and position the cursor where you want a corner of the ellipse to appear. Click and drag from one edge of the ellipse to the opposite edge. Hold down the shift key while dragging to create a circle.

Note: To quickly toggle between Ellipse and Centered ellipse, use the alt/option key. To numerically create an ellipse in scale, click once with the CAD Ellipse or Centered Ellipse tool.

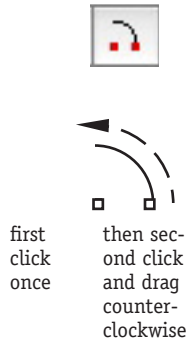


CAD Centered Ellipse
Select the CAD Centered Ellipse tool and position the cursor where you want a center of the ellipse to appear. Click and drag from the center of the ellipse to the edge. Hold down the shift key while dragging to create a circle.



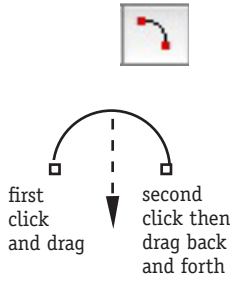
2D CAD drawing tools (cont.)

CAD Arc (by Radius)
Select the CAD Arc (by Radius) tool and position the cursor where you want the center of the arc. Click the mouse button once and release the mouse button. Then position the cursor where you want the arc to begin, which will be the length of the arc radius. Click and drag *counterclockwise* to create the arc. Hold down the control key while you are dragging to create the opposite angle.



Note: To quickly toggle between Arc (by Radius) and Arc (by Points), use the alt/option key. To numerically create an arc (by radius) to scale:
1) Click once where you want the arc to begin
2) Click once anywhere on the document
3) Enter the values and units for the arc

CAD Arc (by Points)
Select the CAD Arc (by Points) tool and position the cursor where you want the arc to begin. If this is an anchor point, the cursor will change to ( ). Click the mouse button once and release the mouse button. Position the cursor where you want the arc to end. Click and drag back and forth to create the arc. Hold down the control key while you are dragging to create the opposite arc.

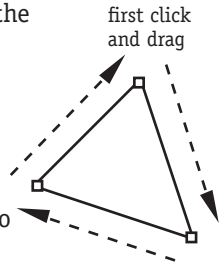


To numerically create an arc (by points) to scale:
1) Click once where you want the arc to begin
2) Click once where you want the arc to end
3) Enter the values and units for the arc radius

2D CAD drawing tools (cont.)

CAD Line

The CAD Line tool allows you to see the line while you are dragging to create it and join it to other lines. Using the CADgrids, CADrulers, and CADtracker palette, you can precisely control the line size and placement.



Select the line tool and position the cursor where you want the beginning of the line to appear. Click and drag to position the line, then release the mouse button to create the line. Hold down the shift key while dragging to constrain the tool to multiples of 45°.

For isometric lines, hold down the shift+alt/option keys while dragging to constrain the tool to the current isometric angle. Isometric lines will not automatically update with changes to the isometric view. Be sure to set up your isometric view angles with the CADisometric palette before creating isometric artwork with the CAD Line tool.

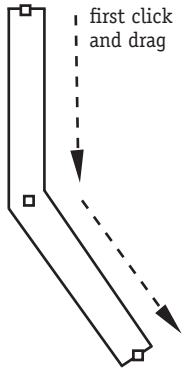
To create polygons with the line tool, create a line, then position your mouse over an endpoint of the line. When the ( ) cursor appears, begin dragging to create a new line joined at that endpoint. Release the mouse button when you have positioned the line and continue the process as needed. If you want to close the path, click and drag the final line until the cursor is over the first anchor point of the polygon. When the ( ) cursor appears, release the mouse button and the polygon will close itself.

Note about numeric input: *To numerically create a line in scale, click once on the document with the CAD Line tool.*

2D CAD drawing tools (cont.)

Add Wall

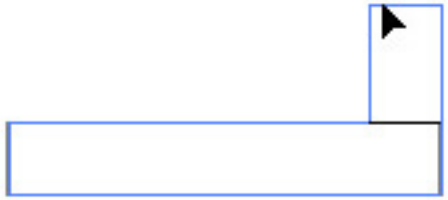
The Add Wall tool works like the CAD Line tool, creating rectangles (representing walls) with a thickness defined in the CADwalls palette numeric input dialog box. Before drawing walls, open the CADwalls palette and set the wall thickness and measurement reference.



If you have selected *measure to the inside,* additional wall segments will be joined like this:

If you have selected *measure to the middle,* additional wall segments will be joined like this:

If you have selected *measure to the outside,* additional wall segments will be joined like this:



Click and drag on the document or click once to access the numeric input dialog box to numerically create walls in scale.

2D CAD drawing tools (cont.)

Add Wall (cont.)

To draw a wall, select the Add Wall tool and position the cursor where you want the end of the wall to appear. Click and drag to position the wall. Release the mouse button to create it. Hold down the shift key while dragging to constrain the wall to 45° increments. **Hold down the alt/option key while dragging to snap the wall to the nearest unit increment.**

To view wall measurements while dragging, make sure you have checked *Show info while dragging* in the CADtracker palette.

To create an additional wall joined to the end or side of an existing wall, position the cursor over the wall path at the desired location until the ( ) cursor appears. Then click on the path of the wall and begin dragging. Release the mouse button to complete the new wall addition. *Walls can only be added when this cursor appears to show that you are over a wall line.*

The Add Wall tool does not create curved walls, but you can use the Illustrator Offset Path command to simulate curved walls. First draw a curved path and then select it. From the Illustrator menu, choose Effect > Path > Offset Path... to adjust the appearance of the offset.

Remove Wall

To remove a wall, select the Remove Wall tools and position the cursor over the path of the wall that you want to remove. When the ( ) cursor appears, click to remove the wall extension. *Note: Walls can only be removed if they are not joined to any dependent wall sections.*

Hot Tip!

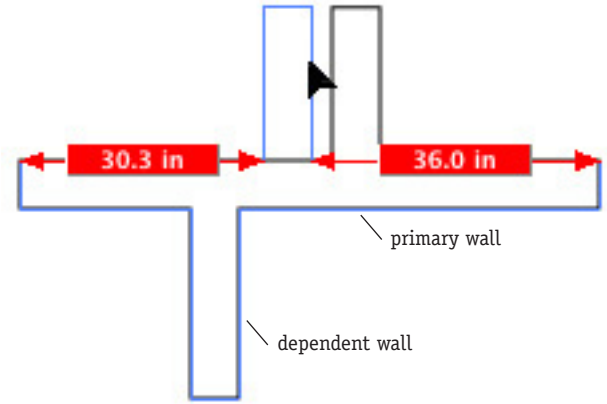
To obtain the area of a space inside walls, use the CAD Rectangle or Line tool to create a closed shape over the area. View the area in the CADtracker palette.

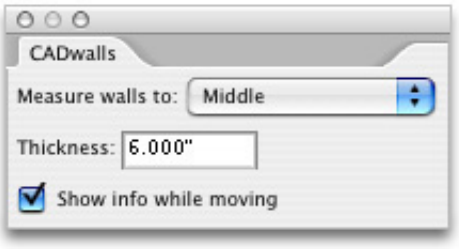
2D CAD drawing tools (cont.)

Move Wall

To move a dependent wall along a primary wall, select the Move Wall tool and position the cursor over the wall to adjust. Click and drag to slide the wall along the primary wall to the desired location.

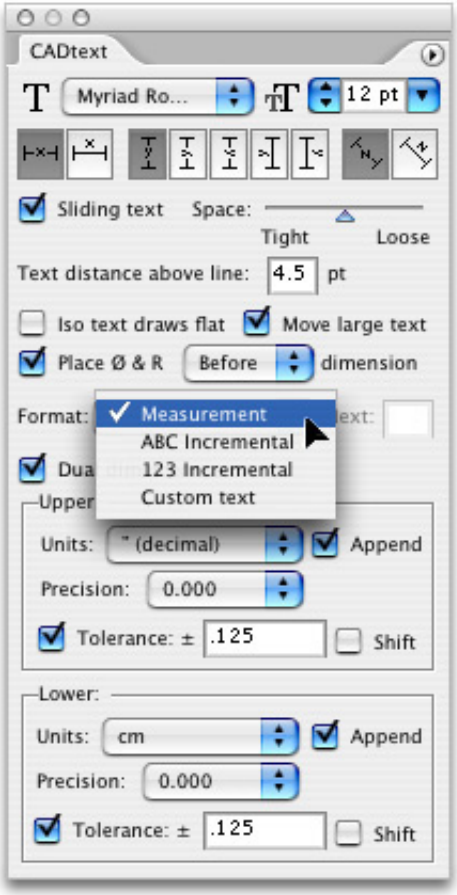
To view distances between walls while dragging, make sure you have checked *Show info while moving* in the CADwalls palette. Then, while moving the wall, dimensions will appear in red boxes that indicate measurements between the selected wall and other walls along the primary wall. The units for these measurements are defined in the last panel of the CADtracker palette.





Dimensioning control: CADtext

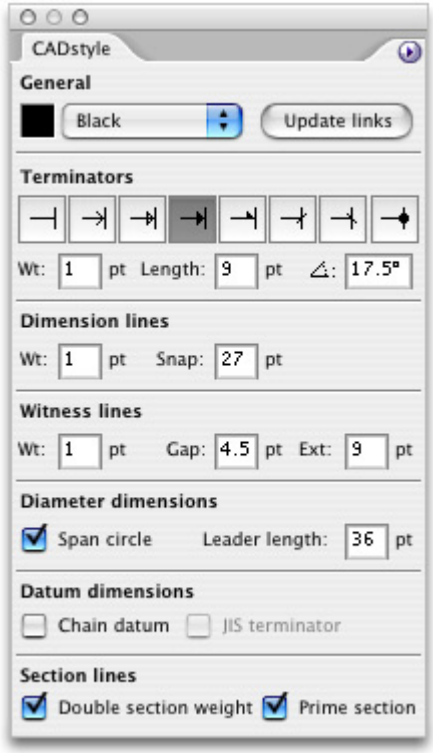
Before dimensioning your objects, open the CADtext palette to define text attributes for CADtools dimensions and labels. Use the icon buttons to set the placement of text within the dimensions. Set the format of dimensions to measurement, incremental, or custom text. Dual dimensions can also be set and adjusted separately. To change the text attributes of live dimensions after they are created, select them and make changes in the CADtext palette. **You can edit the value of any dimension with the Illustrator Type tool and it will retain the edited value as custom text.**



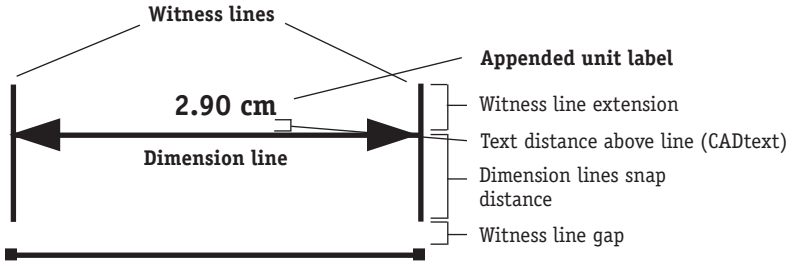
- Dimension font and size are set with the popup menu
- Use the icons to set the location of dimension text inline or above line for horizontal, vertical, and inclined dimensions; enter value for text distance above the dimension line (see sample on next page)
- Check Sliding text to adjust the placement of the dimension inside the dimension line while dragging
- Adjust the spacing between the dimension line and text with the Space slider
- Choose to show Isometric text as flat or projected with artwork
- Choose to move larger dimension text outside of crowded dimension line areas
- Diameter or radius symbols can appear before or after dimension text
- Use Measurement Format for standard numeric measurement of artwork, ABC or 123 Incremental for dimensioning with incremental text, or Custom text for dimensions displaying customizable text.
- Check dual dimensions as needed - **if this is unchecked, use 'Upper' menu choices to set single dimension units, precision and tolerance.**
- Units, precision and tolerance settings are unique for upper and lower dual dimensions

Dimensioning control: CADstyle

CADstyle helps you customize the appearance of dimensions. An Update links button adjusts your dimensions and reapplies these settings if artwork has been resized or moved. To change the style of live dimensions after they are created, select them and make changes in the CADstyle palette.



- Change the dimension color with the popup menu, selecting from presets, the current fill color, or other color using the system level picker - **for custom colors, use Fill color**
- Update links to apply changes to live dimensions
- Select from several terminator types and adjust weight, length, and angle with field values
- Dimension line weight and snap tolerance are set with field values
- Use field values to set witness line weight, extension beyond dimension line, and gap from object
- Choose to span diameter dimensions across the circle or from the circle center
- Select chain datum for dimensioning segments cumulatively from a reference point (datum)
- Choose to double the weight or add the prime symbol to Section lines (found in the Labeling tool group)



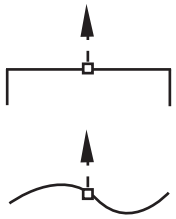
2D dimensioning tools

Orthographic dimensioning tool group:

Horizontal Dimension (by Line) - Click and drag out any horizontal segment to dimension the horizontal distance between two anchor points.
Horizontal Dimension (by Points) - Click multiple points anywhere on the document and drag to dimension their horizontal distances.
Horizontal Datum Dimension - Click a point of origin, then click multiple points and drag to dimension the horizontal distances from the origin.
Vertical Dimension (by Line) - Click and drag any vertical segment to dimension the vertical distance between two anchor points.
Vertical Dimension (by Points) - Click multiple points anywhere on the document and drag to dimension their vertical distances.
Vertical Datum Dimension - Click a point of origin, then click multiple points and drag to dimension their vertical distances from the origin.
Inclined Dimension (by Line) - Click and drag any inclined segment to dimension the inclined distance between two anchor points.
Inclined Dimension (by Points) - Click multiple points anywhere on the document and drag to dimension their inclined distances.
Inclined Datum Dimension - Click a point of origin, then click multiple points and drag to dimension their inclined distances from the origin.
Angle Dimension - Click a line of origin, then click and drag a nonparallel line to dimension the angle between the lines.
Arc Length Dimension - Click a point of origin on a circular arc, then click and drag another point on the same arc to dimension the length along the arc between the points.
Diameter Dimension - Click and drag a point on a circle to dimension its diameter.
Radius Dimension - Click and drag a point on a circle to dimension its radius.
Bézier Curvature Dimension - Click and drag *directly over* a curved line to display the radius of the curve at the cursor location.
Tangent Dimension - Click and drag *directly over* a curved line to display the tangent of the curve at the cursor location. Use alt/option key to display the tangent's normal line. Use shift to diplay the normal and tangent lines. Use control to toggle normal placement.
Center line - Click and drag to create the line.
Object center - Click on an object line to mark the center of its bounding box.

2D dimensioning tools (cont.)

click once
on a line segment
and drag



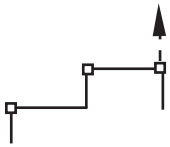
Horizontal Dimension (by Line)

The Horizontal Dimension (by Line) tool will dimension horizontal line segments. A line segment is a path between two anchor points in Illustrator.

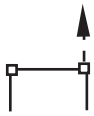
Select the Horizontal Dimension (by Line) tool and position the cursor over the line you want to dimension. When the (⊣↕) cursor appears, click the horizontal line and drag to position the dimension line. Hold down the shift key while dragging to offset the horizontal dimension line in increments. The offset increment value is set in the Snap field in the Dimension Lines panel of the CADstyle palette.

Note: To quickly toggle between Horizontal Dimension (by Line) and Vertical Dimension (by Line), use the alt/option key.

click on multiple
points and drag



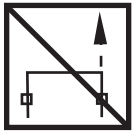
click on corner
points, not lines,
when dimension-
ing by points



Horizontal Dimension (by Points)

The Horizontal Dimension (by Points) tool will dimension the horizontal distance between multiple points. You can define the location of these points anywhere on your document.

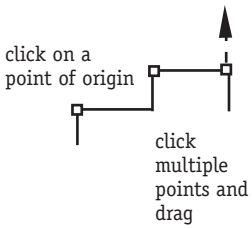
Select the Horizontal Dimension (by Points) tool and position the cursor at one end of the horizontal distance you want to dimension. If this is an anchor point, the cursor will change to (⊣↕) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the horizontal distance you want to dimension. Continue clicking on points along the horizontal distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.



Note about changing tools: *To quickly toggle between Horizontal Dimension (by Points) and Vertical Dimension (by Points), use the alt/option key.*

2D dimensioning tools (cont.)

Horizontal Datum Dimension



The Horizontal Datum Dimension tool will dimension the horizontal distances between a point of origin and other points. You can define the location of these points anywhere on your document.

Select the Horizontal Datum Dimension tool and position the cursor at the origin on one end of the horizontal distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the horizontal distance you want to dimension. Continue clicking on points along the horizontal distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

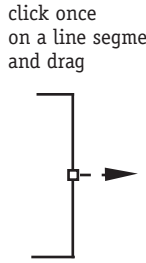
To make a datum dimension line appear as a linear chain of dimensions rather than stacked dimensions, check Chain datum in the CADstyle palette.

To change the datum dimension terminator to a JIS terminator, check Chain datum and JIS terminator in the CADstyle palette.

Note about changing tools: *To quickly toggle between Horizontal Datum Dimension and Vertical Datum Dimension tools, use the alt/option key.*

2D dimensioning tools (cont.)

Vertical Dimension (by Line)

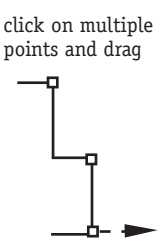


The Vertical Dimension (by Line) tool will dimension vertical line segments. A line segment is a straight path between two anchor points in Illustrator.

Select the Vertical Dimension (by Line) tool and position the cursor over the line you want to dimension. When the ( ) cursor appears, click the vertical line and drag to position the dimension line. Hold down the shift key while dragging to offset the vertical dimension line in increments. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

Note about changing tools: *To quickly toggle between Vertical Dimension (by Line) and Horizontal Dimension (by Line), use the alt/option key.*

Vertical Dimension (by Points)



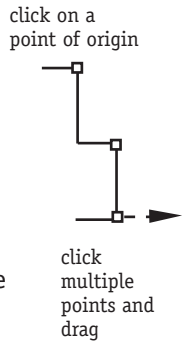
The Vertical Dimension (by Points) tool will dimension the vertical distance between multiple points. You can define the location of these points anywhere on your document.

Select the Vertical Dimension (by Points) tool and position the cursor at one end of the vertical distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the vertical distance you want to dimension. Continue clicking on points along the vertical distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

Note about changing tools: *To quickly toggle between Vertical Dimension (by Points) and Horizontal Dimension (by Points), use the alt/option key.*

2D dimensioning tools (cont.)

Vertical Datum Dimension



The Vertical Datum Dimension tool will dimension the vertical distances between a point of origin and other points. You can define the location of these points anywhere on your document.

Select the Vertical Datum Dimension tool and position the cursor at the origin on one end of the horizontal distance you want to dimension. If this is an anchor point, the cursor will change to ( ). Then click the mouse button once and release the mouse button. Position the cursor at the next point along the vertical distance you want to dimension. Continue clicking on points along the vertical distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

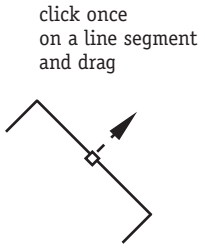
To make a datum dimension line appear as a linear chain of dimensions rather than stacked dimensions, check Chain datum in the CADstyle palette.

To change the datum dimension terminator to a JIS terminator, check Chain datum and JIS terminator in the CADstyle palette.

Note about changing tools: *To quickly toggle between Vertical Datum Dimension and Horizontal Datum Dimension tools, use the alt/option key.*

2D dimensioning tools (cont.)

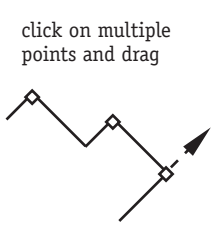
Inclined Dimension (by Line)



The Inclined Dimension (by Line) tool will dimension angled or “inclined” line segments. A line segment is a straight path between two anchor points in Illustrator.

Select the Inclined Dimension (by Line) tool and position the cursor over the inclined line you want to dimension. When the ( ) cursor appears, click the line and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

Inclined Dimension (by Points)



The Inclined Dimension (by Points) tool will dimension the inclined, absolute distance between multiple points along any axis. You can define the location of these points anywhere on your document.

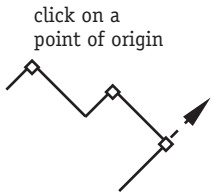
Select the Inclined Dimension (by Points) tool and position the cursor at one end of the inclined distance you want to dimension. If this is an anchor point, the cursor will change to ( ). Then click the mouse button once and release the mouse button. Position the cursor at the opposite end of the inclined distance you want to dimension. If this is an anchor point, the cursor will change to ( ). Then click and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

Note about dimensioning on inclines:
To prevent errors in measuring nonlinear inclined segments, the inclined chain dimension tool will only measure multiple segments contained within a reasonable angle.

2D dimensioning tools (cont.)

Inclined Datum Dimension

The Inclined Datum Dimension tool will dimension the inclined distances between a point of origin and other points. You can define the location of these points anywhere on your document.



Select the Inclined Datum Dimension tool and position the cursor at the origin on one end of the inclined distance you want to dimension. If this is an anchor point, the cursor will change to ( ). Then click the mouse button once and release the mouse button. Position the cursor at the next point along the inclined distance you want to dimension. Continue clicking on points along the inclined distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

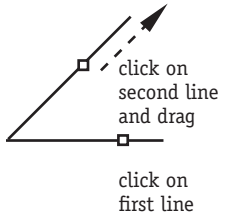
To make a datum dimension line appear as a linear chain of dimensions rather than stacked dimensions, check Chain datum in the CADstyle palette.

To change the datum dimension terminator to a JIS terminator, check Chain datum and JIS terminator in the CADstyle palette.

Note about dimensioning on inclines:
To prevent errors in measuring nonlinear inclined segments, the inclined chain dimension tool will only measure multiple segments contained within a reasonable angle.

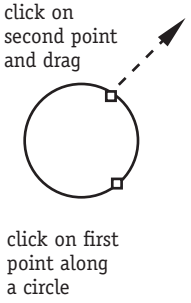
2D dimensioning tools (cont.)

Angle Dimension



The Angle Dimension tool will dimension the angle between any two nonparallel lines. Position the cursor over the first line. When the ( ) cursor appears, click anywhere on the line and release the mouse button. Then position the cursor over the second line. When the ( ) cursor appears, click anywhere on the line and drag to position the angle dimension line. Hold down the control key while dragging to dimension the opposite angle. Hold down the alt/option key while you are dragging to remove witness lines.

Arc Length Dimension



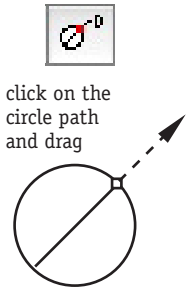
The Arc Length Dimension tool will dimension the length of a circular arc or circle defined by any two points on the circular arc or circle. Position the cursor over the arc or circle where the arc length dimension will begin. When the ( ) or ( ) cursor appears, click once on the arc or circle. Then position the cursor over the arc or circle where the arc length dimension will end. When the ( ) or ( ) cursor appears, click on the arc and drag to position the arc length dimension line. Hold down the control key while you are dragging to dimension the opposite arc length.

Note about dimensioning lengths along curves:
The Arc Length Dimension tool works only on circular arcs or circles. To retrieve the length between two points along a Bezier curve, copy the segment with the direct selection tool, paste, and use the CADtracker palette to view the length of the Bezier segment in scale. If necessary, use the Illustrator Add Anchor Point tool to add points along the Bezier curve for measuring.

2D dimensioning tools (cont.)

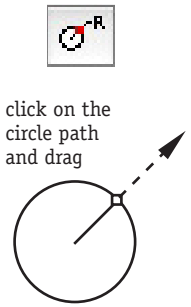
Diameter Dimension

Select the Diameter Dimension tool and position the cursor over the path of a circle. When the (⊹) cursor appears, click and drag to position the diameter dimension. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the diameter dimension text.



Radius Dimension

Select the Radius Dimension tool and position the cursor over the path of a circle. When the (⊹) cursor appears, click and drag to position the radius dimension. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the radius dimension text.

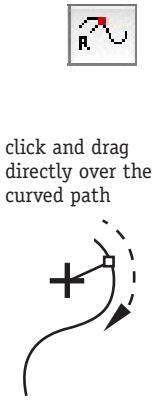


Note about changing tools: *To quickly toggle between radius dimension and diameter dimension, use the alt/option key.*

To dimension the radius of arcs, use the Bézier Curvature Dimension tool.

2D dimensioning tools (cont.)

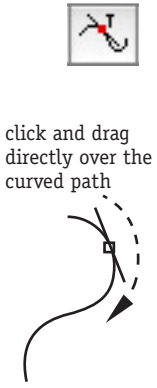
Bézier Curvature Dimension



The Bézier Curvature Dimension tool will automatically display the radius at any point on a Bézier curve. Select the Bézier Curvature Dimension tool and position the cursor *directly* over a Bézier curve. When the (⊹) cursor appears, click and drag along the Bézier curve. While you are dragging along the curved path, you will see a radius and its arc at every point. To create the Bézier curvature dimension at any point, release the mouse button at that point. To hide the arc, hold down the control key while dragging.

Note about the tool limitations: *Circles and arcs created within Illustrator are constructed with Bézier curves. The approximation of their radius may reveal up to 5% difference in value using the Bézier Curvature Dimension tool.*

Tangent Dimension



The Tangent Dimension tool will automatically display the tangent line at any point along on a Bézier curve. Select the Tangent Dimension tool and position the cursor directly over a Bézier curve. When the (⊹) cursor appears, click and drag along the Bézier curve. While you are dragging along the curved path, you will see a tangent line at every point. To create the tangent line, release the mouse button at that point. Use alt/option key to display the tangent's normal. Use shift to diplay the normal and tangent lines. Use control to toggle normal placement.

Hot Tip!

To dimension type, convert type to outlines with the Create Outlines command in Adobe Illustrator. Or use the dimension by points tools to measure between any points on the document.

2D dimensioning tools (cont.)

Center Line

The Center Line tool will allow you to create a center line on your document. Select the Center Line tool and position the cursor where you want the beginning of the line to appear. Click and drag to position the line, then release the mouse button to create the line. Hold down the shift key while dragging to constrain the tool to multiples of 45°.

click and drag

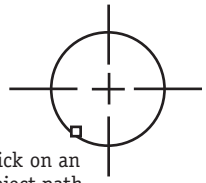
Hot Tip!

To place a center line over a shape, first click the object with the circle center tool. Then select the center line tool and drag over one of the circle center lines.

Object Center

Select the Object Center tool and position the cursor over the path of an object. When the ( ) cursor appears, click once and release the mouse button.

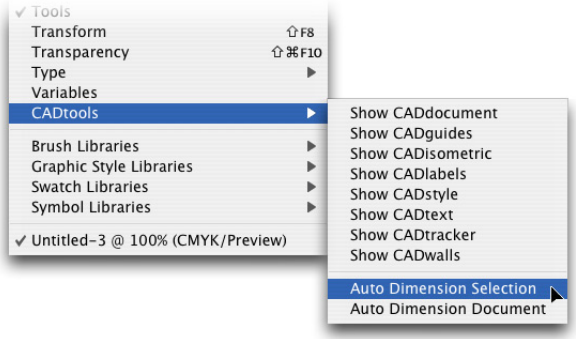
Use the object center tool to find the center of any shape or path. The center is determined by the invisible bounding box enclosing the artwork.



click on an object path

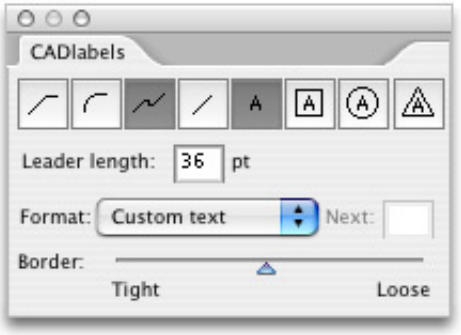
Automatic Dimensioning

Automatically dimension objects with horizontal, vertical, inclined, and diameter/radius dimensions by selecting the object(s) and choosing Window > CADtools > Auto Dimension Selection. Dimension all objects on the document by selecting Auto Dimension Document.



Labeling: CADlabels palette

CADlabels offers many options for adjusting the appearance of labels. For incremental labels, set the letter or number that the next label will display. Choose a tight or loose distance for label borders. Remember to check "Create live dimensions" in the CADdocument palette if you want to create CADtools artwork that can later be modified in appearance.

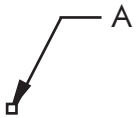


Labeling tool group:

Label tool - Click and drag to create a label using the format settings in the CADlabels palette - ABC incremental, 123 incremental, or Custom text. If Custom text is selected, labels will be created with default text "Custom" highlighted for easy editing.
Datum feature - Click and drag to create the label.
Datum target - Click and drag to create the label.
Datum flag - Click and drag to create the label.
Revision bubble - Click an object line, or click and drag to create the label.
Section line - Click and drag to create the line. Use the CADstyle palette to make the section line double weight and appear with the prime symbol.

Labeling: Tools

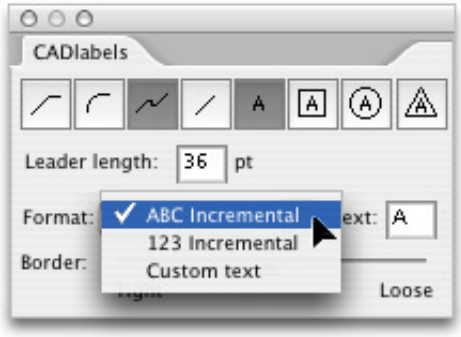
Each CADtools label is automatically linked to a point created at the base of each label. To adjust the angle or extension of each label while retaining the link to its location point, use the CADtools Dimension Resize tool. If you want to move the entire label, be sure to select the linked point at the tip of the arrowhead before moving. To prevent updating of the label, ungroup the label so that it will no longer be linked to its original location point.



invisible linking point at the base of each label determines its location when updated

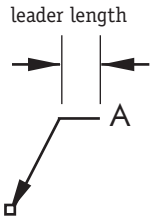
Label

The CADlabels palette controls the appearance of the Label tool with three different formats.



click and drag and the letter or number will increment according to the CADlabels palette

ABC Incremental - If ABC Incremental is selected as the CADlabel format, the Label tool will create character labels which automatically increment according to the text settings in the CADlabels palette. To create an incremental label, first use the CADlabels palette to set the appearance of the label extension, label shape, and the letter of the next incremental label you plan to draw. Then select the Label tool and position the cursor where you want the label terminator to end. Click and drag to position the incremental label. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the label text.



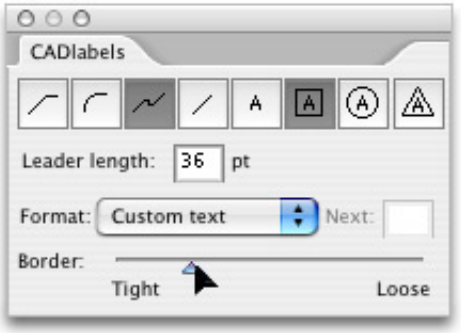
Labeling: Tools (cont.)

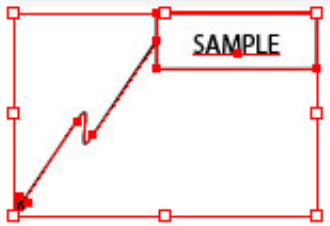
123 Incremental - If 123 Incremental is selected as the CADlabel format, the Label tool will create numeric labels which automatically increment according to the text settings in the CADlabels palette. Follow the ABC Incremental instructions for creating 123 Incremental labels. *To change the value of labels created with the Incremental label tool, change the format to Custom text or edit the label text with Illustrator's Type tool.*

Custom text - If Custom text is selected as the CADlabel format, the Label tool will create a text label with "Custom" highlighted as the default value. **Important: After editing custom dimension text, deselect the dimension to save the changes.**

If you have created 'live' labels (by checking Create live dimensions in the CADdocument palette), you can adjust the length and angle of the label while maintaining the link to its artwork. *Use the CADtools Dimension Resize tool to select and adjust live labels. If you want to edit the label with Illustrator tools, ungroup the label to unlink it and prevent updating.*

Once the label is created, use the Border slider in the CADlabels palette to adjust the shape surrounding the CADlabel value.



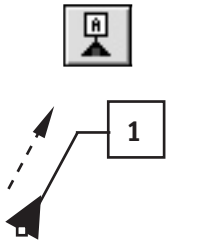


Labeling: Tools (cont.)

Datum Feature

To create a datum feature, first use the CADlabels palette to set the letter of the next datum feature you plan to draw. Then select the Datum Feature tool and position the cursor where you want the terminator to end. Click and drag to position the datum feature. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the label text.

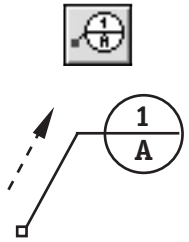
Use the CADtools Dimension Resize tool to select and adjust the label.



click and drag and the letter or number will increment according to the CADlabels palette

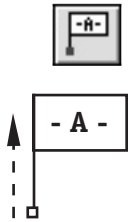
Datum Target

To create a datum target, select the Datum Target tool and position the cursor where you want the terminator to end. Click and drag to position the datum target. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the label text. The datum target will always be created with "1" and "A" text. To adjust the angle of the label while maintaining the link to its artwork, use the CADtools Dimension Resize tool to select and adjust the label. To change the text, use the Illustrator text tool to select and edit the type.



Datum Flag

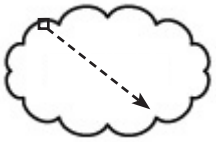
To create a datum flag, first use the CADlabels palette to set the letter or number of the next datum flag you plan to draw. Then select the Datum Flag tool and position the cursor where you want the terminator to end. Click and drag to position the datum feature. Hold down the shift key while dragging to constrain the tool to multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the label text.



click and drag and the letter or number will increment according to the CADlabels palette

Labeling: Tools (cont.)

click on an object to encircle it



click and drag

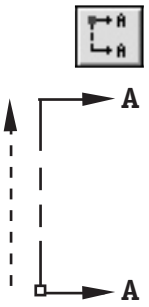
Revision Bubble

The Revision Bubble tool allows you to automatically encircle artwork or drag to make revision bubbles.

- To automatically encircle objects with a revision bubble, select the revision bubble tool and position the cursor over artwork or text path. Click once to create the bubble.

Note: Revision bubbles created in this manner will be linked to the encircled object. If the object is moved and Update Links is clicked, the bubble will redraw around the object in its new location.

- To create your own revision bubble, position the cursor where you want a corner of the bubble to appear. Click and drag from one edge of the bubble to the opposite edge. Hold down the shift key while dragging to create a circular revision bubble. Hold down the control or alt/option keys to adjust the bubble appearance.



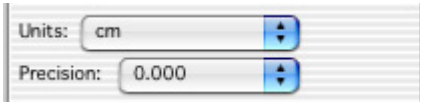
click and drag

Section Line

To create a section line, first use the CADlabels palette to set the letter or number of the next section line you plan to draw. To automatically double the stroke weight of the section line, check the Double section weight option in the CADstyle palette. To automatically add a prime symbol to the section line text, check the Prime section option in the CADstyle palette. Select the Section Line tool and position the cursor where you want the beginning of the line to appear. Click and drag to position the line, then release the mouse button to create the line. Hold down the shift key while dragging to constrain the tool to multiples of 45°. To toggle the direction of the section line label, hold down the control key while dragging.

Precision control with CADtracker

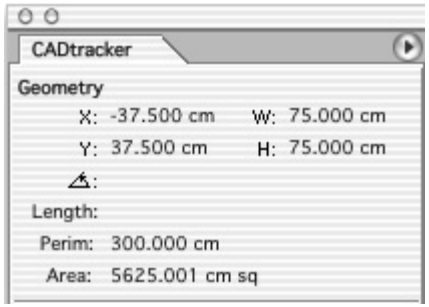
CADtracker helps you monitor and edit object information with four panels. The units and precision of the values displayed in the CADtracker palette can be changed with the Units and Precision fields at the bottom of the palette.



Units and Precision for CADtracker display are located at the bottom of the CADtracker palette

Geometry

The **Geometry** panel displays width, height, circumference, perimeter, area, angle, and line length of objects - including points and placed images.



Using CADtracker Geometry *while you are drawing...*

X: Horizontal distance of cursor from 0 pt on the ruler

Y: Vertical distance of cursor from 0 pt on the ruler

W: Horizontal width of the artwork

H: Vertical height of the artwork

: Angle between the first click point and the curent mouse location

Length: Distance between the first click point and current mouse location

Radius: Radius of circle or arc

Diameter: Diameter of circle

Perimeter: Distance around a path

Circumference: Distance around a circular path

Arc Length: Distance around the circular arc between two endpoints you have defined

Area: Area of rectangles, ellipses and arc (show area in acres using CADtracker popout menu)

Using CADtracker Geometry *with artwork selected...*

X: Horizontal distance of top left corner of object from 0 pt

Y: Vertical distance of top left corner of object from 0 pt

W: Horizontal width of artwork

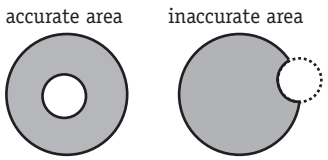
H: Vertical height of artwork

Length: Total distance along path(s)

Perimeter: Total distance around closed path(s)

Area: Total area inside closed path(s) or inside compound path(s).

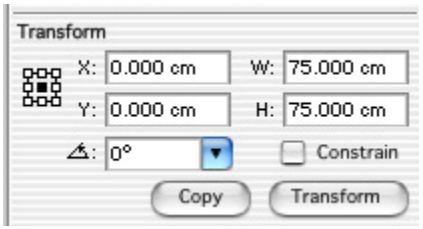
Area calculations will not be accurate for compound paths which overlap or compound paths which are projected in axonometric view:



Precision control with CADtracker (cont.)

Transform

CADtracker's **Transform** panel allows you to numerically resize a selected object in scale.



Select an object or set of objects and enter values in the Transform panel (you can enter digits with up to five decimal places in text boxes).

- To change an object's horizontal location, enter a value in the X text box.

- To change an object's vertical location, enter a value in the Y text box.

- To change the width of a selection's bounding box, enter a value in the W text box.

- To change the height of a selection's bounding box, enter a value in the H text box.

- To rotate a selection, enter a new angle between 0 and 360 degrees in the Angle text box, or choose a value from the popup menu.

- To Constrain proportions of the transformed object, check Constrain.

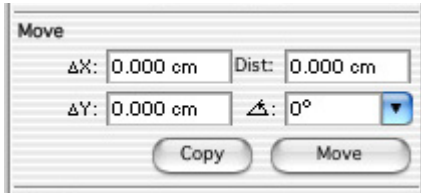
- To select the reference point from which you are modifying the selection, click a handle on the square representing the object's bounding box.

Click the Transform button to transform the selected objects. Click the Copy button to make a transformed copy of the artwork.

Precision control with CADtracker (cont.)

Move

CADtracker's **Move** panel allows you to numerically move a selected object in scale.



Select points or objects and enter options in the Move panel (you can enter digits with up to five decimal places in text boxes).

- To move an object along the horizontal axis, enter a value in the X text box.

- To move an object along the vertical axis, enter a value in the Y text box.

- To move an object a distance along a rotated axis, first enter a value in the Distance text box. Enter a value for the rotation of axis in the angle text box, or choose a value from the popup menu. Click the Move button to move the selected points or objects.

Click the Move button again to continue moving the objects as needed. Click the Copy button to make a copy of the artwork and move it.

Precision control with CADtracker (cont.)

Repeat

The **Repeat** panel allows you to numerically duplicate selected objects in rows and columns with scaled values.

Select an object and enter options in the Repeat panel.

- To duplicate objects on a horizontal path, enter the number of Rows in the Rows text box. Use the directional arrows to repeat up or down and left or right.

- To create space between the rows of duplicated objects, enter the actual value in the Space text box on the right of the Rows text box. The artwork will be created according to the scale set in your CADdocument palette.

- To duplicate objects on a vertical path, enter the number of Columns in the Cols text box.

- To create space between the columns of duplicated objects, enter the actual value in the Space text box on the right of the Columns text box. The artwork will be created according to the scale set in your CADdocument palette.

- Use the Between menu to set the spacing between edges or centers of the selected objects.

Click the Repeat button to repeat the selected objects.

2D CAD editing tools

CAD editing tools modify existing artwork with a high level of control and precision. Only the Dimension Resize tool is limited to CADtools artwork. And the Measure Scale tool is very useful for calculating a scale for imported artwork or objects that have a known actual size without scale.

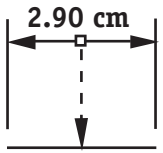
Editing tool group:

Dimension Resize - Click and drag a dimension to change the distance from the object it measures.
Fillet - Click on a line segment near a corner, then click anywhere on the adjacent segment and enter the fillet radius in the dialog box. Use the alt/option key while clicking to create additional fillets with the same radius.
Chamfer - Click on a line segment near a corner, then click anywhere on the adjacent segment and enter the chamfer offsets from the corner in the dialog box. Use the alt/option key while clicking to create additional chamfers with the same offsets.
Trim - Click the excess portion of one of two intersecting lines to remove it, or click on a line to remove the distance to its closest endpoint.
Extend - Click on a line, then click on any line or object which can be intersected by an extension of the line to extend it.
Path Divider - Click on a path, then choose from options in the Path Divider dialog box to divide and/or mark the path into measured segments with points or crosshairs.
Measure Scale - Click the first point from which to measure and drag to define the scaled distance. In the custom scale dialog box that appears, enter a scaled distance that represents the actual distance you dragged. The document scale will change based on this new equation, and the new scale will be added to the CADdocument popup menu.

2D CAD editing tools (cont.)

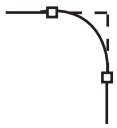
Dimension Resize

The Dimension Resize tool allows you to change the distance between a dimension and the object it measures while maintaining the link.



Note: Dimension changes made with any other tool will not be retained when dimensions are updated with the Update links button.

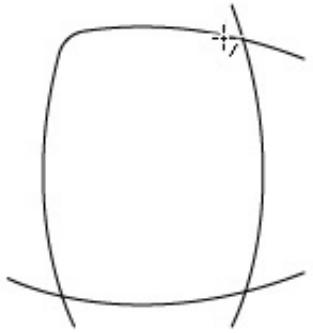
Select the Dimension Resize tool and position the cursor over the label or dimension line which you plan to resize. When the ( ) cursor appears, click and drag to adjust the dimension. Use the shift key while dragging to place dimension lines at a consistent distance from the object. This offset distance is defined in the Snap text box in the Dimension lines panel of the CADstyle palette. To unlink a dimension from the object it measures, select and ungroup the dimension.



Fillet

The Fillet tool allows you to create a fillet between two *intersecting lines or a corner*. The fillet radius is defined by the last value used in the numeric input dialog box.

Select the Fillet tool and position the cursor over one of two intersecting lines which you plan to fillet. When the ( ) cursor appears, click once on the line, then position the cursor over the second intersecting line. When the ( ) cursor appears, click once on the second line to open the numeric input dialog box. Enter the fillet radius value to create the radius.

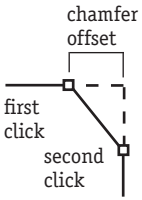


Note for creating multiple fillets: *To automatically create additional fillets with the same radii, use the alt/option key while clicking on the adjacent line.*

2D CAD editing tools (cont.)

Chamfer

The Chamfer tool allows you to create a chamfer between two *intersecting lines or a corner*. The chamfer length is determined by the distance between the chamfer endpoints and the corner or intersection.

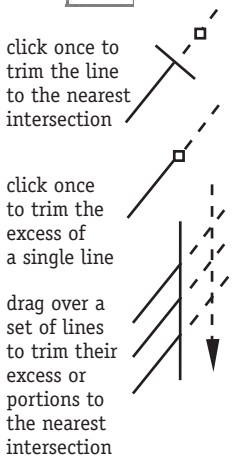


Select the Chamfer tool and position the cursor over one of two intersecting lines which you intend to chamfer. When the ( ) cursor appears, click once on the line, then position the cursor over the second intersecting line. When the ( ) cursor appears, click once on the second line to open the numeric input dialog box. Enter the chamfer offset values to create the chamfer.

Note for creating multiple chamfers: *To automatically create additional chamfers with the same offset values, use the alt/option key while clicking on the adjacent line.*

Trim

The Trim tool will automatically delete the excess portion of an intersecting path or the distance between the click point and the closest endpoint. For intersecting paths, select the Trim tool and position the cursor over the excess portion of the line. When the ( ) cursor appears, click once on the line to remove the distance to the intersection. For nonintersecting paths, select the Trim tool and click the path where you want to trim it.

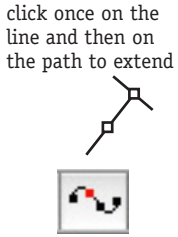


To trim multiple lines at once, select the Trim tool and click-drag over the excess portions of lines to trim. They will trim to the nearest intersecting line or at the click-drag point if there is no intersection.

Note about trimming: *To create trim points along the path without deleting the artwork, double-click the Trim tool and set the tool preferences.*

2D CAD editing tools (cont.)

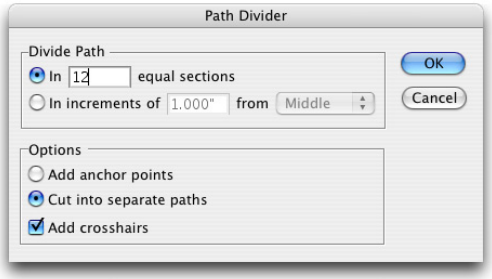
Extend

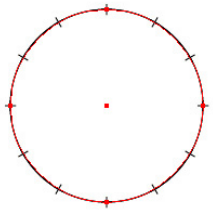


The Extend tool will automatically extend a path to meet another path. Select the Extend tool and position the cursor over the path you want to extend. When the ( ) cursor appears, click once on the path, then click the path to which you want to extend. *Note: The two paths must be able to intersect.*

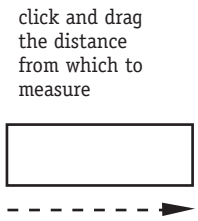
Path Divider

The Path Divider tool allows you to precisely divide a path in sections or in specified increments from beginning, middle or end. Divisions can be marked with anchor points and crosshairs and cut into paths. Select the Path Divider tool and click on the path you want to divide. Use the dialog box to set the options for division.





Measure Scale



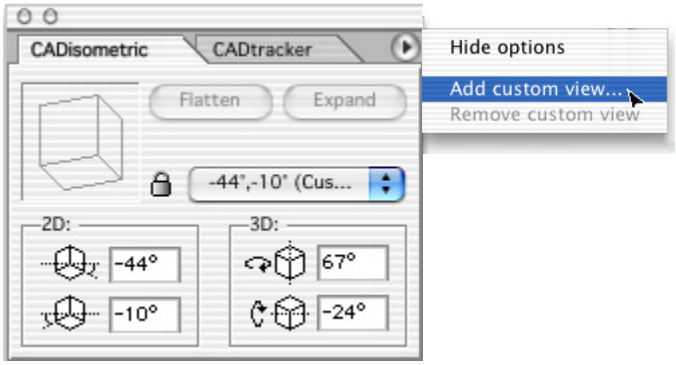
The Measure Scale tool allows you to set a custom scale based on a representative actual distance. Measure Scale works much like a legend on a map. Select the Measure Scale tool and click the first point from which to measure. Drag to define the scaled distance. In the custom scale dialog box that appears, enter a scaled distance that represents the actual distance you dragged. The current scale will change based on this new equation, and the new scale will be added to the CADdocument popup menu.

Isometric drawing: CADisometric palette

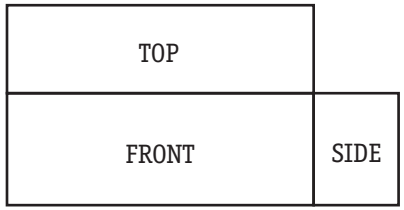
There are multiple ways to create and edit isometric artwork with CADtools. You can ***project*** flat artwork to top, front, or side planes, or you can ***draw*** isometric artwork with the CADisometric drawing tools. Both of these methods produce artwork that can be dimensioned with CADisometric dimensioning tools.

Note: You may want to copy your artwork or save a copy of your document before you start projecting artwork – especially if you need to preserve your 2D artwork.

The **CADisometric** palette helps you project flat artwork in isometric view and control the appearance of isometric artwork. Use the preset menu to choose from existing views, or create your own custom view by rotating the cube icon or using the 2D and 3D angle field values. Before rotating the cube icon, unlock it by clicking on the locked icon. Lock the view into place to prevent changes to the view.



Isometric projection - To project 2D artwork on to isometric planes, first draw artwork flat inside Adobe Illustrator. Use CADtools drawing tools if you need to create the artwork in scale. Dimensions can also be projected with the artwork. For creating 3-sided object views, draw top, front, and side in this arrangement.



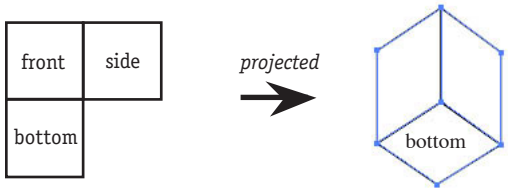
Isometric drawing: CADisometric palette

click the face on the cube icon in the CADisometric palette to project artwork on that plane

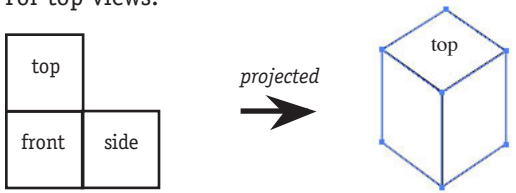
hold the alt/option key down when projecting artwork with the cube icon to automatically expand it

Select the pieces of artwork that comprise one plane - choose Object > Group. Select each set of grouped artwork and click the corresponding plane on the icon in the CADisometric palette. If you create 2 or 3 views to project, arrange the artwork prior to projection as shown below:

For bottom views:

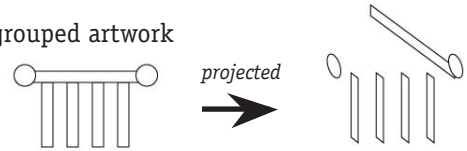


For top views:

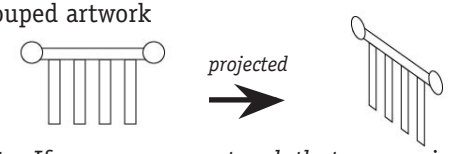


If you want the artwork to project on the same plane, remember to group the artwork before projecting.

Ungrouped artwork



Grouped artwork



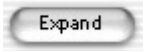
Note: If you ungroup artwork that was projected as a group, the artwork will not be live or able to flatten.

Once you've projected artwork with the CADisometric palette, you can adjust the view angles to change the artwork's appearance. First, unlock the cube icon by clicking on the lock icon. Then click and drag to rotate the cube icon to freely change the appearance of projected shapes on your document. Or you can numerically adjust the angles of projection with the 2D and 3D fields in the CADisometric palette.

Isometric drawing: CADisometric palette

Important to prevent exploded artwork: Do not rotate, shear, reflect, or modify projected isometric artwork unless it is first expanded.

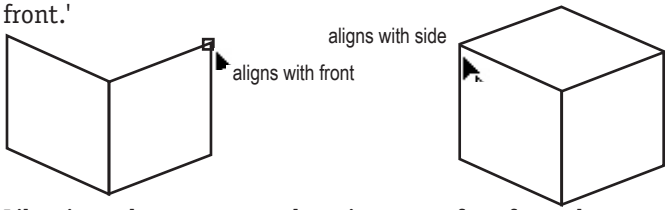
Flatten to edit projections in 2D - If you need to edit the projected isometric artwork, select the artwork and click the Flatten button in the CADisometric palette. After you have made changes, click on the faces of the cube icon to reproject the artwork as top, front, and side planes.



Expand to edit projections in 3D - If you want to edit the artwork *directly in isometric view*, you should select and Expand the artwork to avoid unexpected reshaping or 'exploding.' Use the Expand button located in the CADisometric palette to remove all internal links between the selected artwork and CADisometric settings. Some filters and tools such as Illustrator's gradient mesh will automatically expand the artwork and disable its 'live' attributes. Dimensions cannot be made on expanded artwork - be sure to finish all tasks related to measurement and adjustment before artwork is expanded.

Hot Tip!
To save time, start with a simple isometric cube and use it to set your desired view angles before creating isometric artwork. Then lock the view in the CADisometric palette to prevent changes.

Isometric drawing - You can easily create isometric vector artwork with CADtools isometric drawing tools. The cube icon in the CADisometric palette indicates the face you are drawing. The default face is the front/left side. Drag with cmd/cntrl to create side/right side. Drag with alt/option to create top/bottom sides. You will also see helpful cursor hints for snapping and alignment. For example, when the top corner of the side face aligns with the top of the front face, the cursor hint will appear - 'aligns with front.'



Likewise, when you start dragging a top face from the corner point of a front or side, you will be able to see helpful cursor hints for aligning the top. When the cursor changes to ( ), you are over a corner point. The tolerance for face snapping is the same as the snap to grid tolerance in the CADguides palette.

Isometric drawing: Tools

Isometric (axonometric) drawing tool group:
Use the following keys to create front, side or horizontal faces with the CADisometric drawing tools:

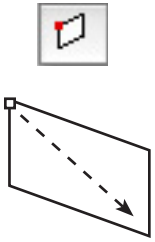
> **Front (or left side) vertical faces:** No modifier key
> **Side (right) vertical faces:** Hold down the command key (Mac) or control key (Windows) *after* you begin dragging
> **Top/bottom faces:** Hold down the alt/option key *after* you begin dragging with the tool.

Isometric Rectangle - Click and drag to create the shape according to settings in the CADisometric palette.
Isometric Centered Rectangle - Click and drag to create the shape from its center.
Isometric Ellipse - Click and drag to create the shape.
Isometric Centered Ellipse - Click and drag to create the shape from its center.
Isometric Grid - Click and drag to create a grid based on the settings in the CADguides palette.
Isometric Cube - Click and drag to create the front, side or top face (with control/command key for side or alt/option for top or bottom). After releasing the mouse, drag perpendicular to the side to create depth. (You do not need to hold down any modifier keys while dragging the depth of the cube.) When the desired depth is reached, click the mouse to finish creating the cube.
Isometric Cylinder - Click and drag to create the front, side or top face (with control/command key for side or alt/option for top or bottom). After releasing the mouse, drag perpendicular to the side to create depth. (You do not need to hold down any modifier keys while dragging the depth of the cylinder.) When the desired depth is reached, click the mouse to finish creating the cylinder.

Isometric drawing: Tools (cont.)

Isometric Rectangle

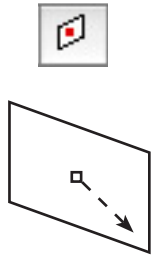
Select the Isometric Rectangle tool and position the cursor where you want a corner of the rectangle to appear. Click and drag from one edge of the rectangle to the opposite edge. To draw a front face rectangle, click and drag to the opposite edge. To create a side face, hold down the command/control key after you begin dragging. To create a top or bottom face, hold down the alt/option key after you begin dragging. (Bottom faces can only be created if your isometric view is rotated so that the bottom view is showing.) Hold down the shift key to create a square in isometric view. ***The cube icon in the CADisometric palette indicates which face you are drawing.***



To numerically create the rectangle, click once on the document. The click point will become the top right corner of a front face, the top left corner of a side face, and the bottom corner of a top face.

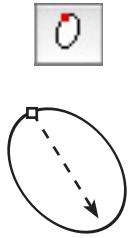
Isometric Centered Rectangle

This tool works just like the Isometric Rectangle tool, except that the initial click point becomes the center of the isometric rectangle.



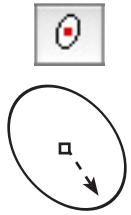
Isometric drawing: Tools (cont.)

Isometric Ellipse



Select the Isometric Ellipse tool and click and drag from one edge of the ellipse to the opposite edge. The cursor is located at the corner of the bounding box of the ellipse - not actually on the ellipse path. To draw a front face ellipse, click and drag to the opposite edge. To create a side face, hold down the command/control key after you begin dragging. To create a top or bottom face, hold down the alt/option key after you begin dragging. (Bottom faces can only be created if your isometric view is rotated so that the bottom view is showing.) Hold down the shift key to create a circle in isometric view. ***The cube icon in the CADisometric palette indicates which face you are drawing.***

Isometric Centered Ellipse

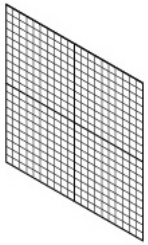


This tools works just like the Isometric Ellipse tool, except that the initial click point becomes the center of the isometric ellipse.

Isometric drawing: Tools (cont.)

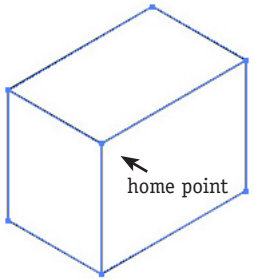
Isometric Grid

Select the Isometric Grid tool and position the cursor where you want a corner of the grid to appear. Click and drag from one edge of the grid to the opposite edge. Hold down the shift key while dragging to create a square grid.



Isometric Cube

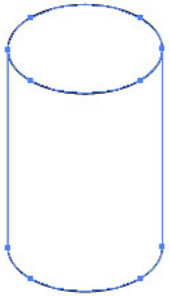
Select the Isometric Cube tool and click and drag a front, side, or top face just as you would draw an isometric rectangle. After releasing the mouse, immediately drag along the isometric angle *without clicking* to preview the cube depth. When the desired depth is reached, click the mouse to create the cube according to the current isometric view angle. Cubes are automatically grouped when created. ***Remember to finish creating the cube depth before deleting, undoing or choosing another tool.***



Single-click on the document to create a cube numerically. The cube's central 'home point' will be placed at your click point.

Isometric Cylinder

Select the Isometric Cylinder tool and click and drag a front, side, or top face just as you would draw an isometric circle. After releasing the mouse, immediately drag along the isometric angle *without clicking* to preview the cylinder's depth. When the desired depth is reached, click the mouse to create it. The exact drag point (top or bottom) differs based upon how the cylinder was created. Cylinders are automatically grouped when created. ***Remember to finish creating the cylinder depth before deleting, undoing or choosing another tool.***



Single-click on the document to create a cylinder numerically. The cylinder face's center point will be placed at your click point.

Isometric dimensioning: Tools

Isometric dimension tool group:

Horizontal Isometric Dimension (By Line) Click and drag out any horizontal segment projected in isometric view to dimension the distance between two anchor points.

Horizontal Isometric Dimension (By Points) Click multiple horizontal points in isometric view and drag to dimension the distance between two anchor points.

Horizontal Isometric Datum Dimension Click a point of origin, then click multiple horizontal points in isometric view and drag to dimension the distances from the origin.

Vertical Isometric Dimension (By Line) Click and drag out any vertical segment projected in isometric view to dimension the distance between two anchor points.

Vertical Isometric Dimension (By Points) Click multiple vertical points in isometric view and drag to dimension the distance between two anchor points.

Vertical Isometric Datum Dimension Click a point of origin, then click multiple vertical points in isometric view and drag to dimension the distances from the origin.

Isometric Diameter Dimension - Click and drag a point on an isometric circle to dimension its diameter.

Isometric Radius Dimension - Click and drag a point on an isometric circle to dimension its radius.

Isometric Center line - Shift-click and drag to create the line in isometric view.

Isometric Object center - Click on an object line to mark the center of its bounding box in isometric view.

Isometric dimensioning: Tools (cont.)

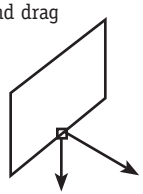
Horizontal Isometric Dimension (by Line)

The Horizontal Isometric Dimension (by Line) tool will dimension horizontal line segments in isometric view. A line segment is a straight path between two anchor points in Illustrator.

Select the Horizontal Isometric Dimension (by Line) tool and position the cursor over the line you want to dimension. When the ( ) cursor appears, click the horizontal line and drag to position the dimension line. Hold down the shift key while dragging to offset the dimension line in increments. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette.

Hot Tip! *Hold down the cmd/control key to create dimensions perpendicular to the isometric object.*

click once
on a line segment
and drag



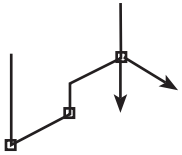
drag with the
control key to
create perpendicular
dimensions

Horizontal Isometric Dimension (by Points)

The Horizontal Isometric Dimension (by Points) tool will dimension the horizontal distance between multiple points in isometric view. You can define the location of these points anywhere on your document.

Select the Horizontal Isometric Dimension (by Points) tool and position the cursor at one end of the horizontal distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the horizontal distance you want to dimension. Continue clicking on points along the horizontal distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette. Hold down the control key to create dimensions perpendicular to the isometric object.

click on multiple
points and drag

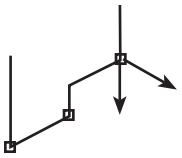


drag with the
control key to
create perpendicular
dimensions

Isometric dimensioning: Tools (cont.)

Horizontal Isometric Datum Dimension

click on multiple
points and drag



drag with the
control key to
create perpendicular
dimensions

The Horizontal Isometric Datum Dimension tool will dimension the horizontal distances between a point of origin and other points in isometric view.

Select the Horizontal Isometric Datum Dimension tool and position the cursor at the origin on one end of the horizontal distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the horizontal distance you want to dimension. Continue clicking on points along the horizontal distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette. Hold down the control key to create dimensions perpendicular to the isometric object.

To make a datum dimension line appear as a linear chain of dimensions rather than stacked dimensions, check Chain datum in the CADstyle palette.

To change the datum dimension terminator to a JIS terminator, check Chain datum and JIS terminator in the CADstyle palette.

Note: *For accurate measurements, make sure the artwork is arranged properly on one plane - to check this, flatten the artwork, adjust as needed, then group before reprojecting it. If the artwork is properly constructed, isometric dimension values should not change when the artwork and dimensions are flattened.*

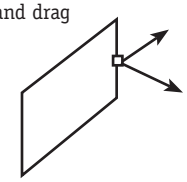
Isometric dimensioning: Tools (cont.)

Vertical Isometric Dimension (by Line)

The Vertical Isometric Dimension (by Line) tool will dimension vertical line segments in isometric view. A line segment is a straight path between two anchor points in Illustrator.

Select the Vertical Isometric Dimension (by Line) tool and position the cursor over the line you want to dimension. When the ( ) cursor appears, click the vertical line and drag to position the dimension line. Hold down the shift key while dragging to offset the dimension line in increments. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette. Hold down the control key to create dimensions perpendicular to the isometric object.

click once on a line segment and drag



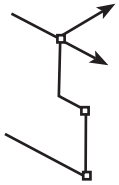
drag with the control key to create perpendicular dimensions

Vertical Isometric Dimension (by Points)

The Vertical Isometric Dimension (by Points) tool will dimension the vertical distance between multiple points in isometric view. You can define the location of these points anywhere on your document.

Select the Vertical Isometric Dimension (by Points) tool and position the cursor at one end of the vertical distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the vertical distance you want to dimension. Continue clicking on points along the vertical distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette. Hold down the control key to create dimensions perpendicular to the isometric object.

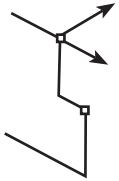
click on multiple points and drag



drag with the control key to create perpendicular dimensions

Isometric dimensioning: Tools (cont.)

click on multiple points and drag



drag with the control key to create perpendicular dimensions

Vertical Isometric Datum Dimension

The Vertical Isometric Datum Dimension tool will dimension the vertical distances between a point of origin and other points in isometric view.

Select the Vertical Isometric Datum Dimension tool and position the cursor at the origin on one end of the vertical distance you want to dimension. If this is an anchor point, the cursor will change to ( ) . Then click the mouse button once and release the mouse button. Position the cursor at the next point along the vertical distance you want to dimension. Continue clicking on points along the vertical distance until you have reached the last point to dimension. Then click the last point and drag to position the dimension line. Use the shift key while dragging to place the dimension line at a set distance from the object. The offset increment value is set in the Snap field in the Dimension lines panel of the CADstyle palette. Hold down the control key to create dimensions perpendicular to the isometric object.

To make a datum dimension line appear as a linear chain of dimensions rather than stacked dimensions, check Chain datum in the CADstyle palette.

To change the datum dimension terminator to a JIS terminator, check Chain datum and JIS terminator in the CADstyle palette.

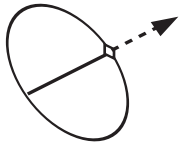
Note: For accurate measurements, make sure the artwork is arranged properly on one plane - to check this, flatten the artwork, adjust as needed, then group before reprojecting it. If the artwork is properly constructed, isometric dimension values should not change when the artwork and dimensions are flattened.

Isometric dimensioning: Tools (cont.)

Isometric Diameter Dimension

Select the Isometric Diameter Dimension tool and position the cursor over the path of an isometric circle. When the (⊹) cursor appears, click and drag to position the diameter dimension. Hold down the shift key while dragging to constrain the tool to isometric multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the diameter dimension text.

click on the circle path and drag

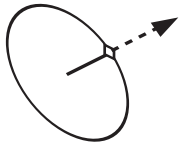


Isometric Radius Dimension

Select the Isometric Radius Dimension tool and position the cursor over the path of an isometric circle. When the (⊹) cursor appears, click and drag to position the radius dimension. Hold down the shift key while dragging to constrain the tool to isometric multiples of 45°. Hold down the control key while you are dragging to toggle the placement of the radius dimension text.

Note: To quickly toggle between radius dimension and diameter dimension, use the alt/option key.

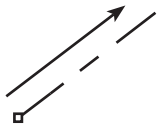
click on the circle path and drag



Isometric dimensioning: Tools (cont.)

Isometric Center Line

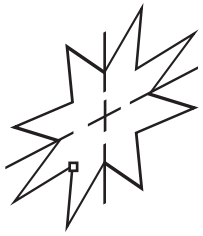
The Isometric Center Line tool will allow you to create a center line that constrains to the current isometric angles. Select the Isometric Center Line tool and position the cursor where you want the beginning of the line to appear. Click and drag to position the line, then release the mouse button to create the line. Hold down the shift key while dragging to constrain the tool to the current isometric view angles (set in the CADisometric palette).



click and drag

Isometric Object Center

Select the Isometric Object Center tool and position the cursor over the path of a circle or object. When the (⊹) cursor appears, click once and release the mouse button to create the object center in isometric view.



click on an object path

Quick Reference: Numeric input

Using numeric input

You can create artwork to scale by numerically specifying dimensions for CADtools drawing tools. Select the tool and click once where you want to begin creating the shape. If you are using a centered tool, your click location will define the center of the object; otherwise, the click location will define a corner of the object. A numeric input dialog box will appear, displaying the dimensions you last specified for that tool.

You can use the following unit abbreviations:

1) Points: *pt*
2) Picas: *p*
3) Millimeters: *mm*
4) Centimeters: *cm*
5) Meters: *m*
6) Kilometers: *km*
7) Decimal inches with symbol: X.X"
8) Fractional inches with symbol: X X/X"
9) Decimal inches with units: X.X *in*
10) Fractional inches with units: X X/X *in*
11) Decimal feet and inches with symbol: X' X.X"
12) Fractional feet and inches with symbol: X' X/X"
13) Decimal feet and inches with units: X *ft* X.X *in*
14) Fractional feet and inches with units: X *ft* X/X *in*
15) Miles: *mi*

Note: If you do not specify a unit, the artwork will be drawn in the units specified in the CADdocument palette.

Quick Reference: Keyboard shortcuts

Keyboarding for precision and shortcuts

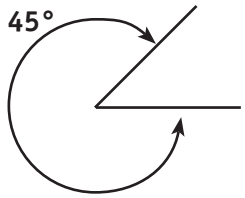
CADtools utilizes the shift, alt/option, and control keys to give you more control and flexibility while drawing and dimensioning. *Note: these keys only function if you hold them down **after** you select and begin drafting or dimensioning with one of the tools.*

Use the **shift** key to constrain most CADtools 2D drafting and dimensioning tools to multiples of 45°.

To quickly switch between certain tools in CADtools, use the **alt/option** key (alt for PC and option on Mac) while dragging to toggle between the following 2D and isometric tools:

1) Rectangle and Centered Rectangle
2) Ellipse and Centered Ellipse
3) Arc (by radius) and Arc (by endpoints)
4) Horizontal Dimension by Point and Vertical Dimension by Point
5) Horizontal Dimension by Line and Vertical Dimension by Line
6) Horizontal and Vertical Datum Dimension
7) Radius and Diameter Dimension
8) Tangent Dimension: Shows normal line

angle dimensioning without the control key



angle dimensioning with the control key

Use the **control** key for variations in dimensioning artwork. The control key provides the following tool variations:

1) Arc: complementary arc
2) Section Line: adjacent placement of label
3) Angle Dimension: complementary angle
4) Arc Length Dimension: complementary arc length
5) Diameter Dimension: adjacent placement of label
6) Radius Dimension: adjacent placement of label
7) Bézier Curvature Dimension: arc visibility
8) Tangent Dimension: placement of normal line
9) All label tools: adjacent placement of label

To remove witness lines while drawing angle dimensions, use the **alt/option** key while dragging with the angle dimension tool.

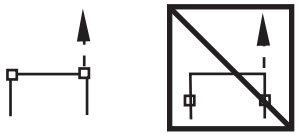
Hold the **alt/option** key down when projecting artwork with the cube icon to automatically expand it.

Quick Reference: Cursor feedback

Cursor feedback
While you are drawing and dimensioning with CADtools, you will receive additional precision cursor feedback to help you select lines and anchor points in the correct order.

Cursor description	Activity status
Precision cursor	CADtools drawing, editing, dimensioning or labeling tool is selected
Precision cursor over path	Tool is selected and cursor is directly over a path
Precision cursor over anchor point	Tool is selected and cursor is directly over an anchor point
Precision cursor waiting for second click	Tool is selected, you have already clicked once, and you need to click or click-drag to create artwork
Cursor dragging to create artwork	Tool is selected, you have clicked once or twice, and you are dragging
Cursor over dimension line	You are directly over a dimension line. You will not be able to create a dimension when this cursor appears.

Dimensioning objects
When dimensioning by points, be sure to use the precision cursor over the anchor points to properly dimension the object. Inaccurate measurements will result if the dimensions are pulled from the lines rather than the anchor points.



Advanced topics

Saving artwork
You must save artwork in Illustrator 10 or higher format or the dimension information will be lost.

Importing or exporting artwork
Adobe Illustrator 9 and above includes DXF and DWG import and export features. Once a file is imported as vector artwork inside Adobe Illustrator, CADtools can be used to dimension or edit the artwork. In some cases, an imported file may contain artwork comprised of small line segments. Dimensioning tools by line, as well as radius, diameter, arc length, and Bézier curvature dimensioning tools will not work for such segmented artwork. To connect these DXF line segments, use the Concatenate filter available at **(http://rj-graffix.com/)** For more information on opening or placing files within Illustrator, please refer to the Adobe Illustrator User Guide, technical notes, and Adobe web site at (**www.adobe.com)**.

Adobe Acrobat 7 now includes an AutoCAD plugin to write PDF files from AutoCAD 2002, 2004, and 2005. Please visit the Adobe Web site for more info.

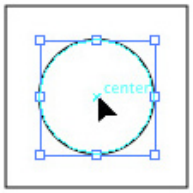
Other software programs offer some control of CAD file translation. Applicraft's CADgate is an Illustrator plug-in that supports the transfer of CADtools dimensions when importing and exporting (**www.hotdoor.com/CADgate/**). CADMover is a popular stand-alone translation product made by Kandu Software **(www.kandusoftware.com)**

Symbol and pattern libraries
Hot Door CADpatterns offers 134 patterns for technical drawing. Code Zebra makes a comprehensive set of symbols in seven categories: Architecture, Building Services, Landscaping, Electrical, Mechanical, Fasteners and General. Purchase the entire set or separate libraries at **(www.hotdoor.com)**. Check the Hot Door Web site for updates on new products as they become available.

Advanced topics (cont.)

Serial number saving problems
Your serial number may not save properly if your Illustrator Preferences file has been corrupted. To delete your Preferences with Illustrator CS/CS2, relaunch Illustrator and immediately press the following key combination: command + option + shift (Mac), or control + alt + shift (Windows). Then click Yes to delete your settings. With older Illustrator versions on Macintosh, throw away the Adobe Illustrator Preferences file found in the Preferences folder in the System folder. On Mac OS X platforms, the Preferences file is found in the Home > Library > Preferences folder. On Windows, perform a file search for the 'AI Prefs' file and delete it.

Using Illustrator's Smart Guides
Adobe Illustrator includes Smart Guides that help you create, align, edit, and transform objects. Smart Guides works with CADtracker, CADgrids and CADrulers for optimal precision and control when manipulating artwork.



Duplicating objects with dimensions
Any dimensions linked to objects which have been duplicated with the alt/option-drag keys may not update correctly. To duplicate objects with dimensions, copy and paste the objects *with their dimensions*. To avoid unpredictable results, ungroup dimensions prior to copying and pasting them into new documents.

Drawing in the dimension layer
Your dimensions will automatically draw into a separate layer named “Dimension Layer” if 'Create and use dimension layer' is checked in the CADdocument palette. This Dimension layer can be hidden, locked, displayed, and printed like other layers created within Illustrator. ***All objects drawn in the dimension layer will be 1:1 scale.*** *Avoid using the Dimension Layer for creating other artwork and make sure that you are working in the appropriate layer while you are drawing.*

Bézier curvature dimensioning for circles and arcs
Circles and circular arcs created within Illustrator are constructed with Bézier curves. Therefore, the radius at any point of a circle or circular arc may reveal a variance of up to 5% of the original specified radius.

Advanced topics (cont.)

Using CADgrids
CADgrids and CADrulers are created as artwork in separate locked layers. CADgrids increments are logical divisions of the units defined in the CADguides palette. Only CADtools drawing tools can snap to CADgrids if Snap to grid is checked in the CADguides palette. You cannot use CADtools to snap to Illustrator grids and guides, and you cannot use Illustrator tools to snap to CADgrids.

Drawing isometric objects
For best results, create a simple isometric cube before creating artwork and adjust the view angles. Then lock the cube icon in the CADisometric palette to prevent accidental view changes. For separate isometric shapes that share the same plane, first create them as flat artwork and group them. Then project them to the front, side, or top plane with the cube in the CADisometric palette.

Area values for intersecting paths
The area of a path that intersects itself cannot be calculated correctly by the CADtracker palette. Area can be calculated for single or multiple shapes as long as they are closed and do not include overlapping compound paths.

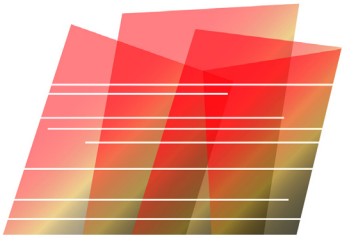
Using patterns in isometric view
Patterns are not automatically transformed with CADtools objects, but you can force a transformation of pattern artwork by expanding and projecting it with your flat artwork using the CADisometric palette.

Smoothing sharp isometric artwork
The geometry of isometric objects may naturally show many sharp angles in the artwork. If you plan to stroke the artwork, use Round Join for a cleaner appearance. You can choose Round Join in the Options panel of the Illustrator Stroke palette.

Illustrator CAD resources

Hot Door MultiPage 2

Publishing power with multiple pages inside Adobe Illustrator



- Create, export, and print multiple pages and multiple page pdf files
- Use page masters to share artwork throughout the document
- Create or delete one or more pages and easily set margins and page numbers
- Page navigation and thumbnails
- Turn it on or off as needed - easy!

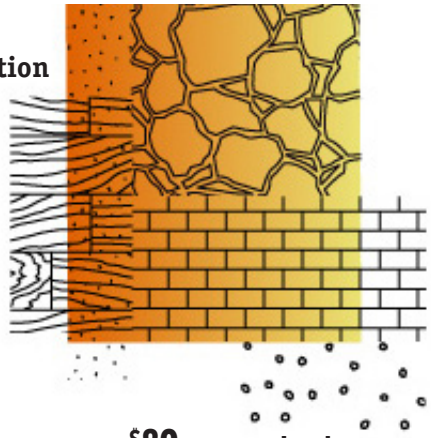
$79 at www.hotdoor.com

Hot Door CADpatterns

134 patterns for technical illustration

Hot Door CADpatterns add 134 vector-based swatch patterns for design documents. Swatch patterns tile seamlessly and include:

* Stipples
* Crosshatches
* Bricks
* Wood grains
* Stone
* Tile
* Building Materials
* And much more!



$89 at www.hotdoor.com

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CADMover software translates dozens of file formats

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