



# **ConstructDXF:** ***DXF Drawing Requirements***

**IES Virtual Environment**

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# 1 Introduction

## 1.1 Purpose of this Guide

The purpose of this guide is to assist CAD operators, engineers and architects in the preparation of DXF format CAD drawings for subsequent use by IES's ConstructDXF software. A small amount of time spent in preparation of the drawing will shorten the time spent using ConstructDXF.

## 1.2 What is ConstructDXF?

ConstructDXF is used to produce data for IES's thermal, shading analysis, lighting and building design appraisal software by scanning ordinary DXF drawings of building plan layouts, and generating a 3D building data model, within the ModelIT environment. ConstructDXF simplifies and accelerates the preparation of data for a wide range of building design studies including thermal design, shadow modelling, dynamic thermal simulation, multi-zone airflow analyses and electric lighting/daylighting studies.

The data model can be generated from DXF drawings containing any conventional drawing element (arcs, shapes, cells, B-splines, etc.). No special elements or attributes are required.

## 2 Preparation of the DXF drawing

### 2.1 *Drawing Elements Required by ConstructDXF*

The only items in a drawing which are essential for the use of ConstructDXF are external and internal walls and room name text.

Additionally, door and window symbols (if they exist in the drawing) can be used by ConstructDXF, if you require these items in the building model.

It may be appropriate to make a copy of the original drawing, and to prepare the copy for subsequent use by ConstructDXF.

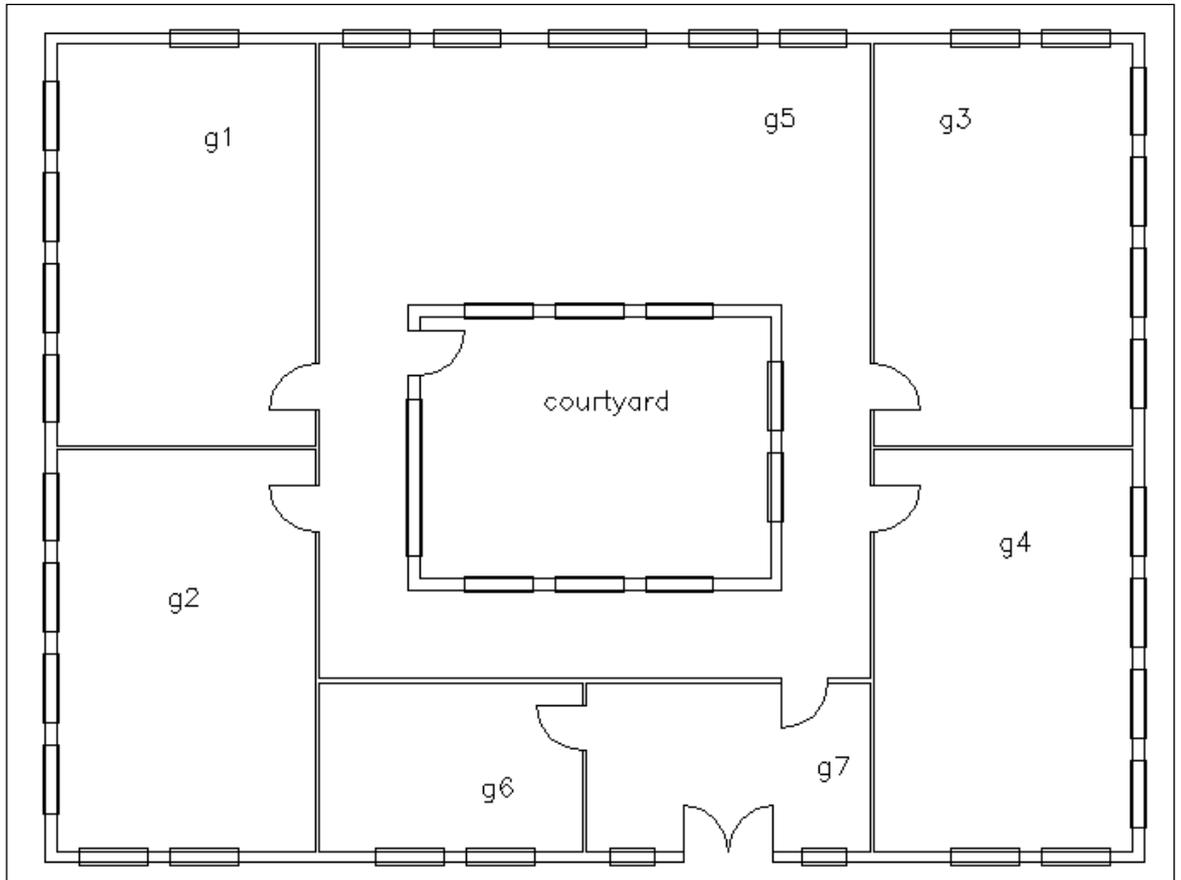
When the DXF drawing is being prepared, elements which are not to form part of the building model (such as grids, dimensions, furnishing and fitting symbols, services, drawing title blocks, etc.) should be deleted. When the drawing is initially being created, it may be easier for these items to be placed on separate layers (levels) from wall, window, door or room text elements, and then the appropriate layers can be deleted.

Stair symbols, riser symbols and hatching must be deleted. Desk partitions and partitions which do not divide a room into two separate rooms should also be deleted.

Any elements outside the building perimeter (including text) should be deleted. Alternatively, during preparation of the DXF drawing, the unwanted items can be placed on different layers (levels) from wall, window, door or room text elements. When the DXF drawing is subsequently attached in ModelIT prior to model generation using ConstructDXF, layers (levels) in the DXF file containing unrequired elements can be switched on or off using facilities within ModelIT.

It should be noted that the best method is to delete the unwanted items or the layers containing the unwanted items. This will shorten the time taken to attach and display the drawing in ModelIT, and will also shorten refresh times when views are changed within ModelIT. The simpler the drawing, the faster ConstructDXF will generate the building model.

An example of a drawing containing only the required items is shown below:



## 2.2 DXF Drawing Requirements

### 2.2.1 Basic Rules

ConstructDXF applies three basic rules to each DXF drawing file in order to identify building perimeters, room perimeters and bordering elements including roofs, ceilings, internal floors, ground floors, external walls and internal partitions:

- Rule 1 - each building on a drawing must have a closed external loop which may incorporate door symbols and window symbols (see Window Symbols and Door Symbols below).
- Rule 2 - all internal spaces or rooms in the drawing must have a closed internal loop which may include door and window symbols (see Window Symbols and Door Symbols below). The internal loop may include some of the elements of the external loop.
- Rule 3 - all rooms to be included in the generated model must have one text label located within the room perimeter.

### 2.2.2 Wall Elements

Wall element lines should meet or slightly overlap at their intersections at internal room corners so that rooms are closed spaces, i.e. there are no breaks in the room perimeters. Similarly, wall element lines should meet or slightly overlap at their intersections at external building corners, so that the building has a closed external loop.

Note there is a facility within ConstructDXF to account for lines which do not quite intersect, but an appropriately draughted drawing will shorten the time spent using ConstructDXF.

Ideally, wall thicknesses should be comprised of one or two lines. If more than two lines are used, this may interfere with the recognition of window symbols by ConstructDXF.

Internal or external sill lines should be deleted. Hatching lines must also be deleted.

### 2.2.3 Room names

All rooms/spaces in the drawing (including internal courtyards, stairs, lifts, atria, corridors etc) to be included in the generated model should have one text label located within the space. ConstructDXF will recognise the existence of multiple labels within one room but this will significantly increase the processing time and therefore any unnecessary text should be removed.

If any rooms/spaces in the drawing do not have any text labels, then these rooms will not be included when the model is generated using ConstructDXF.

The origins of text labels must not lie within the thickness of internal or external walls.

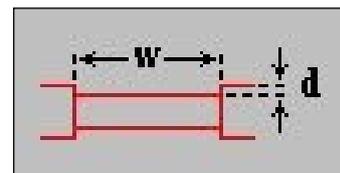
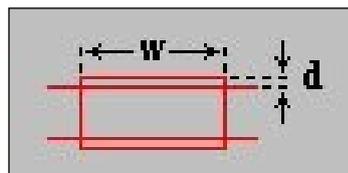
The room text must be single line text, not multi line text.

### 2.2.4 Window Symbols

Where possible, window symbols should be placed on a separate layer (level) from other elements. When ConstructDXF is being used, a particular layer can then be specified for the identification of window symbols. If possible, windows should not have any unnecessary detail lines.

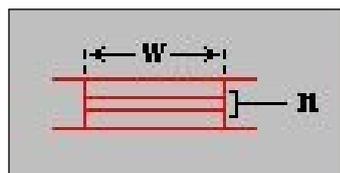
Windows should be drawn in one of two ways:

1. Elements forming an overlaid or indented rectangle within an external wall, as shown below:



w = window width  
d = window offset from wall plane

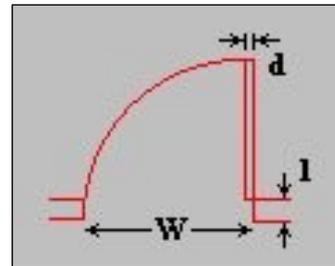
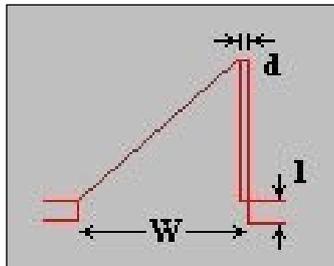
2. A number of parallel lines within an external wall element, as shown below:



w = window width  
n = no. of parallel lines

## 2.2.5 Door Symbols

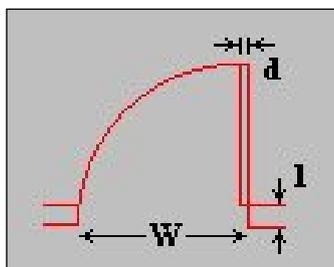
Doors may be represented using two lines at an angle of between 30 degrees and 60 degrees to each other or a 90-degree swept arc as shown below. Small line segments included within a door symbol will automatically be ignored.



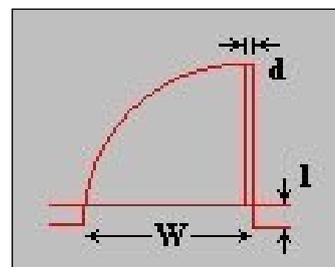
d = door thickness  
l = door recess depth  
w = door width

Door swings must be comprised of either an arc or a single straight line. If an arc is used, it must be an arc element (i.e. the arc must not be comprised of individual straight segments). If the door symbol is comprised of any other type of element, it will not be recognised by ConstructDXF.

The door opening in the wall must not be closed off with a line, see below:



Correct



Incorrect

If possible, where a 2-line wall element is being used, the door swing should connect with the inside corner of the wall element, rather than the outside corner.