GNU LibreDWG

for version 0.12.4, 30 December 2020

GNU LibreDWG Developers
and Thien-Thi Nguyen

This manual is for GNU LibreDWG (version 0.12.4, 30 December 2020).

Table of Contents

1 Overview

LibreDWG is a free C library to read and write *DWG files*. The DWG file format was created in the 1970s for the then-emerging CAD applications.

This library is part of the GNU project, released under the aegis of GNU. It is made available under GPLv3+, i.e., under the terms of the GNU General Public License version 3, or (at your option) any later version.

It came out of code from the QCad Community Edition product from Ribbonsoft.

1.1 API/ABI version

LibreDWG 0.12.4 provides the API/ABI version 1. We hope that this doesn't need to change much in the future.

See `include/dwg.h` for `LIBREDWG_VERSION_MAJOR`, `LIBREDWG_VERSION_MINOR` and `LIBREDWG_SO_VERSION`.

1.2 Coverage

Because the DWG file format is not open, its specification had to be reverse-engineered. The specification is almost complete. The LibreDWG implementation of the specification is an ongoing process; as of version 0.12.4, coverage is approximately 99%.

It can read the formats R13, R14, R2000, R2004, R2007, R2010, R2013 and R2018 for 99%. R11 and earlier cannot be read yet, only partially. Reading R11 and earlier is only enabled with the development git checkout, not the released tarball.

Here is a list of features that are still missing.

Reading pre-R13 DWG
: Reading DWG formats for pre-R13 and some R2010+ non-graphical objects is an ongoing effort, some minor parts are missing. Most DWG's can be read, some undocumented classes are skipped.

Writing pre-R13 and R2004+ DWG
: Writing DWG formats for R2004 and later: R2007, R2010, R2013, R2018 is an ongoing effort. You need to patch the code to enable writing to the R2004+ format. See the `work/2004` branch. Wriing to the specific R2007 format is not implemented. We write as default in the R2000 format only.

Reading binary DXF
: DXF support is now mostly implemented. ASCII DXF's are generated fully, with much more elements and fields and other free libraries, but AutoCAD fails to import some of them. See the `TODO` file for a detailed coverage report.

  Reading binary DXF is still under construction, done about 80%.

Enabled entities and objects, but unstable, undertested. Field names may change:
: For a detailed overview see the file `src/classes.inc` or `src/classes.c`.

  ACSH_BREP_CLASS ACSH_CHAMFER_CLASS ACSH_CONE_CLASS ACSH_PYRAMID_CLASS ARC_DIMENSION ASSOCACTION ASSOCBLENDSURFACEACTIONBODY ASSOCEXTENDSURFACEACTIONBODY ASSOCEXTRUDEDSURFACEACTIONBODY

ASSOCFILLETSURFACEACTIONBODY ASSOCGEOMDEPENDENCY ASSOCLOFTEDSURFACEACTIONBODY ASSOCNETWORK ASSOCDEPENDENCY ASSOCVALUEDEPENDENCY ASSOCNETWORKSURFACEACTIONBODY ASSOCOFFSETSURFACEACTIONBODY ASSOCPATCHSURFACEACTIONBODY ASSOCPLANESURFACEACTIONBODY ASSOCREVOLVEDSURFACEACTIONBODY ASSOCTRIMSURFACEACTIONBODY BACKGROUND BLOCKLINEARPARAMETER BLOCKROTATIONPARAMETER BLOCKXYPARAMETER BLOCKVISIBILITYGRIP BLOCKVISIBILITYPARAMETER EVALUATION_GRAPH HELIX LARGE_RADIAL_DIMENSION LIGHTLIST MATERIAL MENTALRAYRENDERSETTINGS OBJECT_PTR RAPIDRTRENDERSETTINGS RENDERSETTINGS SECTION_SETTINGS SPATIAL_INDEX SUN TABLESTYLE (works only pre-2010)

Unhandled (fields spec'ed, but broken/undertested):

ACMECOMMANDHISTORY ACMESCOPE ACMESTATEMGR ACSH_EXTRUSION_CLASS ACSH_LOFT_CLASS ACSH_REVOLVE_CLASS ACSH_SWEEP_CLASS ALDIMOBJECTCONTEXTDATA ANNOTSCALEOBJECTCONTEXTDATA ASSOC2DCONSTRAINTGROUP ASSOCACTION ASSOCALIGNEDDIMACTIONBODY ASSOCEXTRUDEDSURFACEACTIONBODY ASSOCGEOMDEPENDENCY ASSOCLOFTEDSURFACEACTIONBODY ASSOCNETWORK ASSOCOSNAPPOINTREFACTIONPARAM ASSOCOSNAPPOINTREFACTIONPARAM ASSOCPERSSUBENTMANAGER ASSOCREVOLVEDSURFACEACTIONBODY ASSOCVERTEXACTIONPARAM ATEXT BLKREFOBJECTCONTEXTDATA CONTEXTDATAMANAGER CSACDOCUMENTOPTIONS CURVEPATH DATALINK DATATABLE DIMASSOC DYNAMICBLOCKPROXYNODE EXTRUDEDSURFACE FCFOBJECTCONTEXTDATA GEOMAPIMAGE GEOPOSITIONMARKER LAYOUTPRINTCONFIG LEADEROBJECTCONTEXTDATA LOFTEDSURFACE MLEADEROBJECTCONTEXTDATA MOTIONPATH MTEXTATTRIBUTEOBJECTCONTEXTDATA MTEXTOBJECTCONTEXTDATA NAVISWORKSMODEL NAVISWORKSMODELDEF NURBSURFACE PERSUBENTMGR PLANESURFACE POINTPATH RENDERENVIRONMENT RENDERENTRY RENDERGLOBAL REVOLVEDSURFACE RTEXT SUNSTUDY SWEPTSURFACE TABLE (works only pre-2010) TABLECONTENT TEXTOBJECTCONTEXTDATA TVDEVICEPROPERTIES

ASSOCDIMDEPENDENCYBODY BLOCKPARAMDEPENDENCYBODY ALIGNMENTPARAMETERENTITY BASEPOINTPARAMETERENTITY FLIPPARAMETERENTITY LINEARPARAMETERENTITY POINTPARAMETERENTITY ROTATIONPARAMETERENTITY VISIBILITYPARAMETERENTITY VISIBILITYGRIPENTITY XYPARAMETERENTITY BLOCKALIGNEDCONSTRAINTPARAMETER BLOCKANGULARCONSTRAINTPARAMETER BLOCKARRAYACTION BLOCKDIAMETRICCONSTRAINTPARAMETER BLOCKHORIZONTALCONSTRAINTPARAMETER BLOCKLINEARCONSTRAINTPARAME-

TER BLOCKLOOKUPACTION BLOCKLOOKUPPARAMETER BLOCKPOINTPARAMETER BLOCKPOLARGRIP BLOCKPOLARPARAMETER BLOCKPOLARSTRETCHACTION BLOCKPROPERTIESTABLE BLOCKPROPERTIESTABLEGRIP BLOCKRADIALCONSTRAINTPARAMETER BLOCKREPRESENTATION BLOCKSTRETCHACTION BLOCKUSERPARAMETER BLOCKVERTICALCONSTRAINTPARAMETER BLOCKXYGRIP POINTCLOUD POINTCLOUDEX POINTCLOUDDEF POINTCLOUDDEFEX POINTCLOUDDEF_REACTOR POINTCLOUDDEF_REACTOR_EX POINTCLOUDCOLORMAP

See `src/classes.inc`.

Missing:

* PROXY subentities, PROXY_ENTITY

Halfway:

SUNSTUDY VBA_PROJECT ASSOCACTION ASSOCNETWORK ASSOCALIGNEDDIMACTIONBODY ASSOCOSNAPPOINTREFACTIONPARAM ASSOCPERSSUBENTMANAGER PERSUBENTMGR ASSOC2DCONSTRAINTGROUP EVALUATION_GRAPH ASSOCOSNAPPOINTREFACTIONPARAM ACSH_BOX_CLASS ACSH_EXTRUSION_CLASS ACSH_HISTORY_CLASS ACSH_SWEEP_CLASS NAVISWORKSMODEL (i.e. COORDINATION MODEL) NAVISWORKSMODELDEF DATATABLE TABLESTYLE ASSOCGEOMDEPENDENCY LAYOUTPRINTCONFIG RENDERENVIRONMENT RENDERGLOBAL LIGHTLIST SECTION_SETTINGS

Unhandled (i.e. passed through, no DXF and fields):

ACDSRECORD ACDSSCHEMA NPOCOLLECTION RAPIDRTRENDERENVIRONMENT XREFPANELOBJECT

no test coverage for entities:

I.e. we need an extended `example_2018.dwg` with all types, with the following missing entities:

ARCALIGNEDTEXT BODY CAMERA DIMENSION_ANG3PT DIMENSION_DIAMETER DIMENSION_RADIUS DGNUNDERLAY DWFUNDERLAY GEOPOSITIONMARKER IMAGE LEADER LONG_TRANSACTION MESH MINSERT OLE2FRAME OLEFRAME POLYLINE_2D POLYLINE_MESH PROXY_ENTITY PROXY_LWPOLYLINE SHAPE TOLERANCE VERTEX_2D VERTEX_MESH

and objects:

CSACDOCUMENTOPTIONS XREFPANELOBJECT IDBUFFER IMAGEDEF IMAGEDEF_REACTOR LAYER_INDEX LIGHTLIST NPOCOLLECTION OBJECT_PTR PLOTSETTINGS PROXY_OBJECT RASTERVARIABLES SPATIAL_INDEX UCS VBA_PROJECT

1.3 Related projects

Some projects that use DWG (and specifically LibreDWG) are:

FreeCAD `https://freecadweb.org/`

GRASS GIS
: http://grass.osgeo.org/

Plans are to add support for SolveSpace, OpenSCAD and PythonCAD.

Related libraries:

libdwg
: The old version (documented in Esperanto) which was forked to LibreDWG in 2009. But in the meantime it got a DXF reader.

libdxfrw
: Read the DWG format for all versions r13+ but with much less elements, only those needed for DXF. Written in C++, under the GPLv2 license.

libopencad
: Read the R2000 DWG format. Written in C++, under the GPLv2 license.

OpenDWG
: The OpenDWG's license does not allow the usage in free software projects.

Compared to libdwg, libdxfrw and libopencad, LibreDWG can read and write much more details. Which is especially important for attached links and data from third party applications: BIM, MAP, GIS, AEC, MECH, ... and for 3D solids and dynamic parametric constraints.

2 Usage

This chapter describes how to compile and link a program against LibreDWG. To access LibreDWG interface elements (see Chapter 3 [Types], page 6, see Chapter 7 [Functions], page 264), include its header file in the C code.

```
#include <dwg.h>
```

Optionally you can also use the

```
#include <dwg_api.h>
```

API.

Make sure you specify '`-lredwg`' when linking, such as in this `Makefile.am` fragment:

```
AM_LDFLAGS += -lredwg
```

Note that the shared object library is named `libredwg` (with some system-specific extension, e.g., `.so`), so you do **not** want to specify `-llibredwg`, as that would (try to) link against `liblibredwg` and fail.

3 Types

LibreDWG types map closely to the type system of the DWG file format. This chapter describes the enums and structs used to define the single DWG structure, which is passed around the functions (see Chapter 7 [Functions], page 264).

`BITCODE_RC char` [define]
1 raw unsigned char, uint8_t

`BITCODE_RS short` [define]
1 raw unsigned short int, uint16_t

`BITCODE_RL long` [define]
1 raw unsigned long int, uint32_t

`BITCODE_RD double` [define]
1 raw IEEE-754 double

`BITCODE_B byte` [define]
1 bit

`BITCODE_BB byte` [define]
2 bits

`BITCODE_3B byte` [define]
1-3 bits

`BITCODE_4BITS byte` [define]
4 bits (for VIEW view_mode)

`BITCODE_BS short` [define]
1 bit-encoded unsigned short

`BITCODE_BL long` [define]
1 bit-encoded unsigned long (max 32bit)

`BITCODE_BLL uint64_t` [define]
1 bit-encoded unsigned 64bit long

`BITCODE_BD double` [define]
1 bit-encoded double

`BITCODE_DD double` [define]
1 bit-encoded double with default

`BITCODE_MC long` *int* [define]
1-4 modular chars

`BITCODE_UMC long` *unsigned int* [define]
1-4 unsigned modular chars

`BITCODE_MS long` *unsigned int* [define]
1 modular short, max 2 words

`BITCODE_BE double[3]` [define]

1 bitencoded extrusion vector.

Note that this specifies an OCS (Object Coordinate System) for each entity, with the default (0, 0, 1). An extrusion of (0, 0, -1) is typically caused by exploding a block inserted with a negative x scale, i.e. the sign of each X point needs to be flipped. For more see the vendor DXF documentation on OCS and `programs/geom.c`.

`BITCODE_BT double` [define]

1 bitencoded thickness value

`BITCODE_TV char*` [define]

length + ASCIIZ string The default text type until r2004.

`BITCODE_TU wchar*` [define]

length + windows 2-byte wchar string (UCS-2). The default text type since r2007.

`BITCODE_TF char*` [define]

Fixed length buffer, which can include NUL characters.

`BITCODE_TFF char*` [define]

Embedded fixed length string, which can include NUL characters.

`BITCODE_H void*` [define]

handle-references

`BITCODE_CMC struct` *Dwg_Color* [define]

Dwg_Color struct with index or rgb, alpha and optional DBCOLOR handle, name, book_name.

[and some more]

Two types that do not derive from the type system of the DWG file format are the enums for return codes and error codes.

On non-C99 systems ensure that stdint.h and inttypes.h are available to use the proper C99 `int32_t`,... types, and not just the native fallback types int/long, which are different across platforms.

4 Objects

4.1 HEADER

All header variables.

`ACADMAINTVER`
: RC, DXF 90

`ANGBASE`
: BD, DXF 50

`ANGDIR`
: B, DXF 70

`APPID_CONTROL_OBJECT`
: H

`ATTDIA`
: B, DXF 70

`ATTMODE`
: BS, DXF 70

`ATTREQ`
: B, DXF 70

`AUNITS`
: BS, DXF 70

`AUPREC`
: BS, DXF 70

`BLIPMODE`
: B, DXF 70

`BLOCK_CONTROL_OBJECT`
: H

`BLOCK_RECORD_MSPACE`
: H

`BLOCK_RECORD_PSPACE`
: H

`CAMERADISPLAY`
: B, DXF 290

`CAMERAHEIGHT`
: BD, DXF 40

`CECOLOR`
: CMC, DXF 62

`CELTSCALE`
: BD, DXF 40

`CELTYPE`
: H, DXF 6

`CELWEIGHT`
: BSd, DXF 370

`CEPSNTYPE`
: BS, DXF 380

`CHAMFERA`
: BD, DXF 40

`CHAMFERB`
: BD, DXF 40

`CHAMFERC` BD, DXF 40

`CHAMFERD` BD, DXF 40

`CLAYER` H, DXF 8

`CMATERIAL`
H, DXF 347

`CMLJUST` BS, DXF 70

`CMLSCALE` BD, DXF 40

`CMLSTYLE` H, DXF 2

`COORDS` BS, DXF 70

`CPSNID` H, DXF 390

`CSHADOW` RC, DXF 280

`DELOBJ` B, DXF 70

`DGNFRAME` RC, DXF 280

`DICTIONARY_ACAD_GROUP`
H

`DICTIONARY_ACAD_MLINESTYLE`
H

`DICTIONARY_COLOR`
H

`DICTIONARY_LAYOUT`
H

`DICTIONARY_LIGHTLIST`
H

`DICTIONARY_MATERIAL`
H

`DICTIONARY_NAMED_OBJECT`
H

`DICTIONARY_PLOTSETTINGS`
H

`DICTIONARY_PLOTSTYLENAME`
H

`DICTIONARY_VISUALSTYLE`
H

`DIMADEC` BS, DXF 70

`DIMALT` B, DXF 70

`DIMALTD` BS, DXF 70

`DIMALTF` BD, DXF 40

`DIMALTMZF`
BD

`DIMALTMZS`
T, DXF 1

`DIMALTRND`
BD, DXF 40

`DIMALTTD` BS, DXF 70

`DIMALTTZ` BS, DXF 70

`DIMALTU` BS, DXF 70

`DIMALTZ` BS, DXF 70

`DIMAPOST` TV, DXF 1

`DIMAPOST_T`
T

`DIMARCSYM`
BS, DXF 70

`DIMASO` B, DXF 70

`DIMASSOC` RC, DXF 280

`DIMASZ` BD, DXF 40

`DIMATFIT` BS, DXF 70

`DIMAUNIT` BS, DXF 70

`DIMAZIN` BS, DXF 70

`DIMBLK` H, DXF 1

`DIMBLK1` H, DXF 1

`DIMBLK1_T`
T

`DIMBLK2` H, DXF 1

`DIMBLK2_T`
T

`DIMBLK_T` T

`DIMCEN` BD, DXF 40

`DIMCLRD` CMC, DXF 70

`DIMCLRD_C`
RS

`DIMCLRE` CMC, DXF 70

`DIMCLRE_C`
: RS

`DIMCLRT`
: CMC, DXF 70

`DIMCLRT_C`
: RS

`DIMDEC`
: BS, DXF 70

`DIMDLE`
: BD, DXF 40

`DIMDLI`
: BD, DXF 40

`DIMDSEP`
: BS, DXF 70

`DIMEXE`
: BD, DXF 40

`DIMEXO`
: BD, DXF 40

`DIMFIT`
: BS, DXF 70

`DIMFRAC`
: BS, DXF 70

`DIMFXL`
: BD, DXF 40

`DIMFXLON`
: B, DXF 70

`DIMGAP`
: BD, DXF 40

`DIMJOGANG`
: BD, DXF 40

`DIMJUST`
: BS, DXF 70

`DIMLDRBLK`
: H, DXF 1

`DIMLFAC`
: BD, DXF 40

`DIMLIM`
: B, DXF 70

`DIMLTEX1`
: H, DXF 6

`DIMLTEX2`
: H, DXF 6

`DIMLTYPE`
: H, DXF 6

`DIMLUNIT`
: BS, DXF 70

`DIMLWD`
: BSd, DXF 70

`DIMLWE`
: BSd, DXF 70

`DIMMALTTZ`
: BS

`DIMMALTZ`
: BS

`DIMMZF`
: BD

`DIMMZS`
: T, DXF 1

`DIMPOST` TV, DXF 1

`DIMPOST_T`
T

`DIMRND` BD, DXF 40

`DIMSAH` B, DXF 70

`DIMSAV` B

`DIMSCALE` BD, DXF 40

`DIMSD1` B, DXF 70

`DIMSD2` B, DXF 70

`DIMSE1` B, DXF 70

`DIMSE2` B, DXF 70

`DIMSHO` B, DXF 70

`DIMSOXD` B, DXF 70

`DIMSTYLE` H, DXF 2

`DIMSTYLE_CONTROL_OBJECT`
H

`DIMTAD` BS, DXF 70

`DIMTDEC` BS, DXF 70

`DIMTFAC` BD, DXF 40

`DIMTFILL` BS, DXF 70

`DIMTFILLCLR`
CMC, DXF 70

`DIMTIH` B, DXF 70

`DIMTIX` B, DXF 70

`DIMTM` BD, DXF 40

`DIMTMOVE` BS, DXF 70

`DIMTOFL` B, DXF 70

`DIMTOH` B, DXF 70

`DIMTOL` B, DXF 70

`DIMTOLJ` BS, DXF 70

`DIMTP` BD, DXF 40

`DIMTSZ` BD, DXF 40

`DIMTVP` BD, DXF 40

`DIMTXSTY` H, DXF 7

`DIMTXT` BD, DXF 40

`DIMTXTDIRECTION`
B, DXF 70

`DIMTZIN` BS, DXF 70

`DIMUNIT` BS, DXF 70

`DIMUPT` B, DXF 70

`DIMZIN` BS, DXF 70

`DISPSILH` B, DXF 70

`DRAGMODE` BS, DXF 70

`DRAGVS` H, DXF 349

`DWFFRAME` RC, DXF 280

`DWGCODEPAGE`
TV, DXF 3

`ELEVATION`
BD, DXF 40

`ENDCAPS` B, DXF 280

`EXTMAX` 3BD, DXF 30

`EXTMIN` 3BD, DXF 30

`EXTNAMES` B, DXF 290

`FACETRES` BD

`FILLETRAD`
BD, DXF 40

`FILLMODE` B, DXF 70

`FINGERPRINTGUID`
TV, DXF 2

`FLAGS` BL

`GRIDMODE` RS

`GRIDUNIT` 2RD

`HALOGAP` RC, DXF 280

`HANDLING` BS, DXF 70

`HANDSEED` H, DXF 5

`HIDETEXT` RC, DXF 280

`HYPERLINKBASE`
T, DXF 1

`INDEXCTL` RC, DXF 280

`INSBASE` 3BD, DXF 30

`INSUNITS` BS, DXF 70

`INTERFERECOLOR`
CMC, DXF 62

`INTERFEREOBJVS`
H, DXF 345

`INTERFEREVPVS`
H, DXF 346

`INTERSECTIONCOLOR`
BS, DXF 70

`INTERSECTIONDISPLAY`
RC, DXF 280

`ISOLINES` BS

`JOINSTYLE`
B, DXF 280

`LATITUDE` BD, DXF 40

`LAYER_CONTROL_OBJECT`
H

`LENSLENGTH`
BD, DXF 40

`LIGHTGLYPHDISPLAY`
RC, DXF 280

`LIMCHECK` B, DXF 70

`LIMMAX` 2DPOINT, DXF 20

`LIMMIN` 2DPOINT, DXF 20

`LOFTANG1` BD, DXF 40

`LOFTANG2` BD, DXF 40

`LOFTMAG1` BD, DXF 40

`LOFTMAG2` BD, DXF 40

`LOFTNORMALS`
RC, DXF 280

`LOFTPARAM`
BS, DXF 70

`LONGITUDE`
BD, DXF 40

`LTSCALE` BD, DXF 40

`LTYPE_BYBLOCK`
H

`LTYPE_BYLAYER`
H

`LTYPE_CONTINUOUS`
H

`LTYPE_CONTROL_OBJECT`
H

`LUNITS` BS, DXF 70

`LUPREC` BS, DXF 70

`LWDISPLAY`
B, DXF 290

`MAXACTVP` BS, DXF 70

`MEASUREMENT`
BS, DXF 70

`MENU` TV, DXF 1

`MIRRTEXT` B, DXF 70

`NORTHDIRECTION`
BD, DXF 40

`OBSCOLOR` BS, DXF 70

`OBSLTYPE` RC, DXF 280

`OLESTARTUP`
B, DXF 290

`ORTHOMODE`
B, DXF 70

`OSMODE` BS, DXF 70

`PDMODE` BS, DXF 70

`PDSIZE` BD, DXF 40

`PELEVATION`
BD, DXF 40

`PELLIPSE` B

`PEXTMAX` 3BD, DXF 30

`PEXTMIN` 3BD, DXF 30

`PICKSTYLE`
BS, DXF 70

`PINSBASE` 3BD, DXF 30

`PLIMCHECK`
B, DXF 70

`PLIMMAX` 2DPOINT, DXF 20

`PLIMMIN` 2DPOINT, DXF 20

`PLINEGEN` B, DXF 70

`PLINEWID` BD, DXF 40

`PROJECTNAME`
TV, DXF 1

`PROXYGRAPHICS`
BS, DXF 70

`PSLTSCALE`
B, DXF 70

`PSOLHEIGHT`
BD, DXF 40

`PSOLWIDTH`
BD, DXF 40

`PSTYLEMODE`
B, DXF 290

`PSVPSCALE`
BD, DXF 40

`PUCSBASE` H, DXF 2

`PUCSNAME` H, DXF 2

`PUCSORG` 3BD, DXF 30

`PUCSORGBACK`
3BD, DXF 30

`PUCSORGBOTTOM`
3BD, DXF 30

`PUCSORGFRONT`
3BD, DXF 30

`PUCSORGLEFT`
3BD, DXF 30

`PUCSORGRIGHT`
3BD, DXF 30

`PUCSORGTOP`
3BD, DXF 30

`PUCSORTHOREF`
H, DXF 2

`PUCSORTHOVIEW`
BS, DXF 70

`PUCSXDIR` 3BD, DXF 30

`PUCSYDIR` 3BD, DXF 30

`QTEXTMODE`
B, DXF 70

`REALWORLDSCALE`
B, DXF 290

`REGENMODE`
B, DXF 70

`REQUIREDVERSIONS`
BLL, DXF 160

`SAVEIMAGES`
BS

`SHADEDGE` BS, DXF 70

`SHADEDIF` BS, DXF 70

`SHADOWPLANELOCATION`
BD, DXF 40

`SHOWHIST` RC, DXF 280

`SKETCHINC`
BD, DXF 40

`SKPOLY` B, DXF 70

`SNAPANG` RD

`SNAPBASE` 2RD

`SNAPISOPAIR`
RS

`SNAPMODE` RS

`SNAPSTYL` RS

`SNAPUNIT` 2RD

`SOLIDHIST`
RC, DXF 280

`SORTENTS` RC, DXF 280

`SPLFRAME` B, DXF 70

`SPLINESEGS`
BS, DXF 70

`SPLINETYPE`
BS, DXF 70

`STEPSIZE` BD, DXF 40

`STEPSPERSEC`
BD, DXF 40

`STYLESHEET`
TV, DXF 1

`STYLE_CONTROL_OBJECT`
H

`SURFTAB1` BS, DXF 70

`SURFTAB2` BS, DXF 70

`SURFTYPE` BS, DXF 70

`SURFU` BS, DXF 70

`SURFV` BS, DXF 70

`TDCREATE` TIMEBLL, DXF 40

`TDINDWG` TIMEBLL, DXF 40

`TDUCREATE`
TIMEBLL, DXF 40

`TDUPDATE` TIMEBLL, DXF 40

`TDUSRTIMER`
TIMEBLL, DXF 40

`TDUUPDATE`
TIMEBLL, DXF 40

`TEXTQLTY` BS

`TEXTSIZE` BD, DXF 40

`TEXTSTYLE`
H, DXF 7

`THICKNESS`
BD, DXF 40

`TILEMODE` B, DXF 70

`TILEMODELIGHTSYNCH`
RC, DXF 280

`TIMEZONE` BL, DXF 70

`TRACEWID` BD, DXF 40

`TREEDEPTH`
BS, DXF 70

`TSTACKALIGN`
BS

`TSTACKSIZE`
: BS

`UCSBASE`
: H, DXF 2

`UCSNAME`
: H, DXF 2

`UCSORG`
: 3BD, DXF 30

`UCSORGBACK`
: 3BD, DXF 30

`UCSORGBOTTOM`
: 3BD, DXF 30

`UCSORGFRONT`
: 3BD, DXF 30

`UCSORGLEFT`
: 3BD, DXF 30

`UCSORGRIGHT`
: 3BD, DXF 30

`UCSORGTOP`
: 3BD, DXF 30

`UCSORTHOREF`
: H, DXF 2

`UCSORTHOVIEW`
: BS, DXF 70

`UCSXDIR`
: 3BD, DXF 30

`UCSYDIR`
: 3BD, DXF 30

`UCS_CONTROL_OBJECT`
: H

`UNITMODE`
: BS, DXF 70

`USERI1`
: BS, DXF 70

`USERI2`
: BS, DXF 70

`USERI3`
: BS, DXF 70

`USERI4`
: BS, DXF 70

`USERI5`
: BS, DXF 70

`USERR1`
: BD, DXF 40

`USERR2`
: BD, DXF 40

`USERR3`
: BD, DXF 40

`USERR4`
: BD, DXF 40

`USERR5`
: BD, DXF 40

`USRTIMER` B, DXF 70

`VERSIONGUID`
TV, DXF 2

`VIEWCTR` 2RD

`VIEWSIZE` RD

`VIEW_CONTROL_OBJECT`
H

`VISRETAIN`
B, DXF 70

`VPORT_CONTROL_OBJECT`
H

`VX_CONTROL_OBJECT`
H

`VX_TABLE_RECORD`
H

`WIREFRAME`
B

`WORLDVIEW`
B, DXF 70

`XCLIPFRAME`
RC, DXF 290

`XEDIT` B, DXF 290

`_3DDWFPREC`
BD, DXF 40

`bitsize` RL

`bitsize_hi`
RL

`size` RL

`unknown_0`
BD

`unknown_1`
BD

`unknown_10`
BS

`unknown_11`
B

`unknown_12`
BL

`unknown_13`
BL

`unknown_14`
BL

`unknown_14b`
BL

`unknown_15`
BL

`unknown_16`
BL

`unknown_17`
BL

`unknown_2`
BD

`unknown_20`
H

`unknown_21`
BL

`unknown_22`
BL

`unknown_23`
BD

`unknown_3`
BD

`unknown_54`
BS

`unknown_55`
BS

`unknown_56`
BS

`unknown_57`
BS

`unknown_8`
BL

`unknown_9`
BL

`unknown_text1`
TV

`unknown_text2`
: TV

`unknown_text3`
: TV

`unknown_text4`
: TV

4.2 ENTITIES

All graphical objects with its fields. See [Common Entity fields], page 255,

3DFACE

`parent` struct _dwg_object_entity*

`has_no_flags`
: B

`z_is_zero`
: B

`corner1` 3BD, DXF 10

`corner2` 3BD, DXF 11

`corner3` 3BD, DXF 12

`corner4` 3BD, DXF 13

`invis_flags`
: BS, DXF 70

3DSOLID

`parent` struct _dwg_object_entity*

`acis_empty`
: B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
: BL

`block_size`
: BL*

`encr_sat_data`
: char **, DXF 1

`sab_size` BL

`acis_data`
: RC*

`wireframe_data_present`
: B

`point_present`
: B

`point` 3BD

`isolines` BL

`isoline_present`
: B

`num_wires`
: BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
: BL

`silhouettes`
: Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
: B

`acis_empty2`
: B

`extra_acis_data`
: struct _dwg_entity_3DSOLID*

`num_materials`
: BL

`materials`
: Dwg_3DSOLID_material*

`revision_guid[39]`
: RC, DXF 2

`revision_major`
: BL

`revision_minor1`
: BS

`revision_minor2`
: BS

`revision_bytes[9]`
: RC

`end_marker`
: BL

`history_id`
: H, DXF 350

`has_revision_guid`
: B

`acis_empty_bit`
: B

ALIGNMENTPARAMETERENTITY

`parent` struct _dwg_object_entity*

ARC

`parent` struct _dwg_object_entity*

`center` 3BD, DXF 10

`radius` BD, DXF 40

`thickness`
: BT, DXF 39

`extrusion`
: BE, DXF 210

`start_angle`
: BD, DXF 50

`end_angle`
: BD, DXF 51

ARCALIGNEDTEXT

`parent` struct _dwg_object_entity*

`text_size`
: D2T, DXF 42

`xscale` D2T, DXF 41

`char_spacing`
: D2T, DXF 43

`style` T, DXF 7

`t2` T, DXF 2

`t3` T, DXF 3

`text_value`
: T, DXF 1

`offset_from_arc`
: D2T, DXF 44

`right_offset`
: D2T, DXF 45

`left_offset`
: D2T, DXF 46

`center` 3BD, DXF 10

`radius` BD, DXF 40

`start_angle`
BD, DXF 50

`end_angle`
BD, DXF 51

`extrusion`
3BD, DXF 210

`color` BL, DXF 90

`is_reverse`
BS, DXF 70

`text_direction`
BS, DXF 71

`alignment`
BS, DXF 72

`text_position`
BS, DXF 73

`font_19` BS, DXF 74

`bs2` BS, DXF 75

`is_underlined`
BS, DXF 76

`bs1` BS, DXF 77

`font` BS, DXF 78

`is_shx` BS, DXF 79

`wizard_flag`
BS, DXF 280

`arc_handle`
H, DXF 330

ARC_DIMENSION

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
: BD, DXF 31

`flag`
: RC, DXF 70

`flag1`
: RC

`user_text`
: T, DXF 1

`text_rotation`
: BD, DXF 53

`horiz_dir`
: BD, DXF 51

`ins_scale`
: 3BD_1

`ins_rotation`
: BD, DXF 54

`attachment`
: BS, DXF 71

`lspace_style`
: BS, DXF 72

`lspace_factor`
: BD, DXF 41

`act_measurement`
: BD, DXF 42

`unknown`
: B, DXF 73

`flip_arrow1`
: B, DXF 74

`flip_arrow2`
: B, DXF 75

`clone_ins_pt`
: 2RD, DXF 12

`dimstyle`
: H, DXF 3

`block`
: H

`xline1_pt`
: 3BD, DXF 13

`xline2_pt`
: 3BD, DXF 14

`center_pt`
: 3BD, DXF 15

`is_partial`
: B, DXF 70

`arc_start_param`
: BD, DXF 41

`arc_end_param`
: BD, DXF 42

`has_leader`
: B, DXF 71

`leader1_pt`
: 3BD, DXF 16

`leader2_pt`
: 3BD, DXF 17

ATTDEF

`parent` struct _dwg_object_entity*

`elevation`
: BD, DXF 30

`ins_pt` 2DPOINT, DXF 10

`alignment_pt`
: 2DPOINT, DXF 11

`extrusion`
: BE, DXF 210

`thickness`
: RD, DXF 39

`oblique_angle`
: RD, DXF 51

`rotation` RD, DXF 50

`height` RD, DXF 40

`width_factor`
: RD, DXF 41

`default_value`
: T, DXF 1

`generation`
: BS, DXF 71

`horiz_alignment`
: BS, DXF 72

`vert_alignment`
: BS, DXF 74

`dataflags`
: RC

`class_version`
: RC, DXF 280

`type`
: RC, DXF 70

`tag`
: T, DXF 2

`field_length`
: BS

`flags`
: RC

`lock_position_flag`
: B

`style`
: H, DXF 7

`mtext_handles`
: H, DXF 340

`annotative_data_size`
: BS, DXF 70

`annotative_data_bytes`
: RC

`annotative_app`
: H

`annotative_short`
: BS

`attdef_class_version`
: RC

`prompt`
: T, DXF 3

ATTRIB

`parent`
: struct _dwg_object_entity*

`elevation`
: BD, DXF 30

`ins_pt`
: 2DPOINT, DXF 10

`alignment_pt`
: 2DPOINT, DXF 11

`extrusion`
: BE, DXF 210

`thickness`
: RD, DXF 39

`oblique_angle`
: RD, DXF 51

`rotation` RD, DXF 50

`height` RD, DXF 40

`width_factor`
RD, DXF 41

`text_value`
T, DXF 1

`generation`
BS, DXF 71

`horiz_alignment`
BS, DXF 72

`vert_alignment`
BS, DXF 74

`dataflags`
RC

`class_version`
RC, DXF 280

`type` RC, DXF 70

`tag` T, DXF 2

`field_length`
BS

`flags` RC

`lock_position_flag`
B

`style` H, DXF 7

`mtext_handles`
H, DXF 340

`annotative_data_size`
BS, DXF 70

`annotative_data_bytes`
RC

`annotative_app`
H

`annotative_short`
BS

BASEPOINTPARAMETERENTITY

`parent` struct _dwg_object_entity*

BLOCK

`parent` struct _dwg_object_entity*

`name` T, DXF 2

`filename` T, DXF 4

BODY

See [3DSOLID], page 22,

CAMERA

`parent` struct _dwg_object_entity*

`view` H

CIRCLE

`parent` struct _dwg_object_entity*

`center` 3BD, DXF 10

`radius` BD, DXF 40

`thickness`
BT, DXF 39

`extrusion`
BE, DXF 210

DGNUNDERLAY

`parent` struct _dwg_object_entity*

`extrusion`
BE, DXF 210

`ins_pt` 3BD, DXF 10

`scale` 3BD_1, DXF 41

`angle` BD, DXF 50

`flag` RC, DXF 280

`contrast` RC, DXF 281

`fade` RC, DXF 282

`num_clip_verts`
BL

`clip_verts`
2RD*, DXF 11

`num_clip_inverts`
BS, DXF 170

`clip_inverts`
2RD*, DXF 12

`definition_id`
H, DXF 340

DIMENSION_ALIGNED

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
T, DXF 1

`text_rotation`
BD, DXF 53

`horiz_dir`
BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`xline1_pt`
3BD, DXF 13

`xline2_pt`
3BD, DXF 14

`oblique_angle`
BD

DIMENSION_ANG2LN

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
T, DXF 1

`text_rotation`
BD, DXF 53

`horiz_dir`
BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
: BD, DXF 42

`unknown`
: B, DXF 73

`flip_arrow1`
: B, DXF 74

`flip_arrow2`
: B, DXF 75

`clone_ins_pt`
: 2RD, DXF 12

`dimstyle`
: H, DXF 3

`block`
: H

`xline1start_pt`
: 3BD, DXF 13

`xline1end_pt`
: 3BD, DXF 14

`xline2start_pt`
: 3BD, DXF 15

`xline2end_pt`
: 3BD, DXF 16

DIMENSION_ANG3PT

`parent`
: struct _dwg_object_entity*

`class_version`
: RC, DXF 280

`extrusion`
: BE, DXF 210

`def_pt`
: 3BD, DXF 10

`text_midpt`
: 2RD, DXF 11

`elevation`
: BD, DXF 31

`flag`
: RC, DXF 70

`flag1`
: RC

`user_text`
: T, DXF 1

`text_rotation`
: BD, DXF 53

`horiz_dir`
: BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`xline1_pt`
3BD, DXF 13

`xline2_pt`
3BD, DXF 14

`center_pt`
3BD, DXF 15

DIMENSION_DIAMETER

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
T, DXF 1

`text_rotation`
BD, DXF 53

`horiz_dir`
BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`first_arc_pt`
3BD, DXF 15

`leader_len`
BD, DXF 40

DIMENSION_LINEAR

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
: BE, DXF 210

`def_pt`
: 3BD, DXF 10

`text_midpt`
: 2RD, DXF 11

`elevation`
: BD, DXF 31

`flag`
: RC, DXF 70

`flag1`
: RC

`user_text`
: T, DXF 1

`text_rotation`
: BD, DXF 53

`horiz_dir`
: BD, DXF 51

`ins_scale`
: 3BD_1

`ins_rotation`
: BD, DXF 54

`attachment`
: BS, DXF 71

`lspace_style`
: BS, DXF 72

`lspace_factor`
: BD, DXF 41

`act_measurement`
: BD, DXF 42

`unknown`
: B, DXF 73

`flip_arrow1`
: B, DXF 74

`flip_arrow2`
: B, DXF 75

`clone_ins_pt`
: 2RD, DXF 12

`dimstyle`
: H, DXF 3

`block`
: H

`xline1_pt`
: 3BD, DXF 13

`xline2_pt`
: 3BD, DXF 14

`oblique_angle`
: BD, DXF 52

`dim_rotation`
: BD, DXF 50

DIMENSION_ORDINATE

`parent` struct _dwg_object_entity*

`class_version`
: RC, DXF 280

`extrusion`
: BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
: 2RD, DXF 11

`elevation`
: BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
: T, DXF 1

`text_rotation`
: BD, DXF 53

`horiz_dir`
: BD, DXF 51

`ins_scale`
: 3BD_1

`ins_rotation`
: BD, DXF 54

`attachment`
: BS, DXF 71

`lspace_style`
: BS, DXF 72

`lspace_factor`
: BD, DXF 41

`act_measurement`
: BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`feature_location_pt`
3BD, DXF 13

`leader_endpt`
3BD, DXF 14

`flag2` RC

DIMENSION_RADIUS

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
T, DXF 1

`text_rotation`
BD, DXF 53

`horiz_dir`
BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`first_arc_pt`
3BD, DXF 15

`leader_len`
BD, DXF 40

DWFUNDERLAY

See [UNDERLAY], page 30,

ELLIPSE

`parent` struct _dwg_object_entity*

`center` 3BD, DXF 10

`sm_axis` 3BD, DXF 11

`extrusion`
BE, DXF 210

`axis_ratio`
BD, DXF 40

`start_angle`
BD, DXF 41

`end_angle`
BD, DXF 42

ENDBLK

`parent` struct _dwg_object_entity*

EXTRUDEDSURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
: B, DXF 290

`unknown`
: B

`version`
: BS, DXF 70

`num_blocks`
: BL

`block_size`
: BL*

`encr_sat_data`
: char **, DXF 1

`sab_size`
: BL

`acis_data`
: RC*

`wireframe_data_present`
: B

`point_present`
: B

`point`
: 3BD

`isolines`
: BL

`isoline_present`
: B

`num_wires`
: BL

`wires`
: Dwg_3DSOLID_wire*

`num_silhouettes`
: BL

`silhouettes`
: Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
: B

`acis_empty2`
: B

`extra_acis_data`
: struct _dwg_entity_3DSOLID*

`num_materials`
: BL

`materials`
: Dwg_3DSOLID_material*

`revision_guid[39]`
RC, DXF 2

`revision_major`
BL

`revision_minor1`
BS

`revision_minor2`
BS

`revision_bytes[9]`
RC

`end_marker`
BL

`history_id`
H, DXF 350

`has_revision_guid`
B

`acis_empty_bit`
B

`modeler_format_version`
BS

`bindata_size`
BL

`bindata` TF

`u_isolines`
BS, DXF 71

`v_isolines`
BS, DXF 72

`class_version`
BL

`draft_angle`
BD, DXF 42

`draft_start_distance`
BD, DXF 43

`draft_end_distance`
BD, DXF 44

`twist_angle`
BD, DXF 45

`scale_factor`
BD, DXF 48

`align_angle`
BD, DXF 49

`sweep_entity_transmatrix`
BD*, DXF 46

`path_entity_transmatrix`
BD*, DXF 47

`is_solid` B, DXF 290

`sweep_alignment_flags`
BS, DXF 70

`path_flags`
BS, DXF 71

`align_start`
B, DXF 292

`bank` B, DXF 293

`base_point_set`
B, DXF 294

`sweep_entity_transform_computed`
B, DXF 295

`path_entity_transform_computed`
B, DXF 296

`reference_vector_for_controlling_twist`
3BD, DXF 11

`sweep_entity`
H

`path_entity`
H

`sweep_vector`
3BD, DXF 10

`sweep_transmatrix`
BD*, DXF 40

FLIPPARAMETERENTITY

`parent` struct _dwg_object_entity*

GEOPOSITIONMARKER

`parent` struct _dwg_object_entity*

`class_version`
BS, DXF 90

`position` 3BD, DXF 10

`radius` BD, DXF 40

`landing_gap`
BD, DXF 40

`notes` T, DXF 1

`text_alignment`
RC, DXF 280

`mtext_visible`
B, DXF 290

`enable_frame_text`
B, DXF 290

`mtext` struct _dwg_object*

HATCH

`parent` struct _dwg_object_entity*

`is_gradient_fill`
BL, DXF 450

`reserved` BL, DXF 451

`gradient_angle`
BD, DXF 460

`gradient_shift`
BD, DXF 461

`single_color_gradient`
BL, DXF 452

`gradient_tint`
BD, DXF 462

`num_colors`
BL, DXF 453

`colors` Dwg_HATCH_Color*

`gradient_name`
T, DXF 470

`elevation`
BD, DXF 30

`extrusion`
BE, DXF 210

`name` T, DXF 2

`is_solid_fill`
B, DXF 70

`is_associative`
B, DXF 71

`num_paths`
BL, DXF 91

`paths` Dwg_HATCH_Path*

`style` BS, DXF 75

`pattern_type`
BS, DXF 76

`angle` BD, DXF 52

`scale_spacing`
BD, DXF 41

`double_flag`
B, DXF 77

`num_deflines`
BS, DXF 78

`deflines` Dwg_HATCH_DefLine*

`has_derived`
B

`pixel_size`
BD, DXF 47

`num_seeds`
BL, DXF 98

`seeds` 2RD*, DXF 10

HELIX

`parent` struct _dwg_object_entity*

`flag` BS, DXF 70

`scenario` BS

`degree` BS, DXF 71

`splineflags1`
BL

`knotparam`
BL

`fit_tol` BD, DXF 44

`beg_tan_vec`
3BD, DXF 12

`end_tan_vec`
3BD, DXF 13

`rational` B

`closed_b` B

`periodic` B

`weighted` B

`knot_tol` BD, DXF 42

`ctrl_tol` BD, DXF 43

`num_fit_pts`
BS, DXF 74

`fit_pts` 3DPOINT*, DXF 11

`num_knots`
BL, DXF 72

`knots` BD*, DXF 40

`num_ctrl_pts`
BL, DXF 73

`ctrl_pts` Dwg_SPLINE_control_point*

`major_version`
BL, DXF 90

`maint_version`
BL, DXF 91

`axis_base_pt`
3BD, DXF 10

`start_pt` 3BD, DXF 11

`axis_vector`
3BD, DXF 12

`radius` BD, DXF 40

`turns` BD, DXF 41

`turn_height`
BD, DXF 42

`handedness`
B, DXF 290

`constraint_type`
RC, DXF 280

IMAGE

`parent` struct _dwg_object_entity*

`class_version`
BL, DXF 90

`pt0` 3BD, DXF 10

`uvec` 3BD, DXF 11

`vvec` 3BD, DXF 12

`size` 2RD, DXF 13

`display_props`
BS, DXF 70

`clipping` B, DXF 280

`brightness`
RC, DXF 281

`contrast` RC, DXF 282

`fade` RC, DXF 283

`clip_mode`
B, DXF 290

`clip_boundary_type`
BS, DXF 71

`num_clip_verts`
BL, DXF 91

`clip_verts`
2RD*, DXF 14

`imagedef` H, DXF 340

`imagedefreactor`
H, DXF 360

INSERT

`parent` struct _dwg_object_entity*

`ins_pt` 3DPOINT, DXF 10

`scale_flag`
BB

`scale` 3BD_1, DXF 41

`rotation` BD, DXF 50

`extrusion`
BE, DXF 210

`has_attribs`
B, DXF 66

`num_owned`
BL

`block_header`
H, DXF 2

`first_attrib`
H

`last_attrib`
H

`attribs` H*

`seqend` H

LARGE_RADIAL_DIMENSION

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
T, DXF 1

`text_rotation`
BD, DXF 53

`horiz_dir`
BD, DXF 51

`ins_scale`
3BD_1

`ins_rotation`
BD, DXF 54

`attachment`
BS, DXF 71

`lspace_style`
BS, DXF 72

`lspace_factor`
BD, DXF 41

`act_measurement`
BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
B, DXF 74

`flip_arrow2`
B, DXF 75

`clone_ins_pt`
2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

`first_arc_pt`
3BD, DXF 15

`leader_len`
BD, DXF 40

`ovr_center`
3BD, DXF 12

`jog_point`
3BD, DXF 13

LEADER

`parent` struct _dwg_object_entity*

`unknown_bit_1`
B

`path_type`
BS, DXF 72

`annot_type`
BS, DXF 73

`num_points`
BL, DXF 76

`points` 3DPOINT*, DXF 10

`origin` 3DPOINT

`extrusion`
BE, DXF 210

`x_direction`
3DPOINT, DXF 211

`inspt_offset`
3DPOINT, DXF 212

`endptproj`
3DPOINT

`dimgap` BD

`box_height`
BD, DXF 40

`box_width`
BD

`hookline_dir`
B, DXF 74

`arrowhead_on`
B, DXF 71

`arrowhead_type`
BS

`dimasz` BD

`unknown_bit_2`
B

`unknown_bit_3`
B

`unknown_short_1`
BS

`byblock_color`
BS, DXF 77

`hookline_on`
B, DXF 75

`unknown_bit_5`
B

`associated_annotation`
H, DXF 340

`dimstyle` H, DXF 3

LIGHT

`parent` struct _dwg_object_entity*

`class_version`
BL, DXF 90

`name` T, DXF 1

`type` BL, DXF 70

`status` B, DXF 290

`color` CMC, DXF 63

`plot_glyph`
B, DXF 291

`intensity`
BD, DXF 40

`position` 3BD, DXF 10

`target` 3BD, DXF 11

`attenuation_type`
BL, DXF 72

`use_attenuation_limits`
B, DXF 292

`attenuation_start_limit`
BD, DXF 41

`attenuation_end_limit`
BD, DXF 42

`hotspot_angle`
BD, DXF 50

`falloff_angle`
BD, DXF 51

`cast_shadows`
B, DXF 293

`shadow_type`
BL, DXF 73

`shadow_map_size`
BS, DXF 91

`shadow_map_softness`
RC, DXF 280

`is_photometric`
B

`has_photometric_data`
B, DXF 1

`has_webfile`
B, DXF 290

`webfile` T, DXF 300

`physical_intensity_method`
BS, DXF 70

`physical_intensity`
BD, DXF 40

`illuminance_dist`
BD, DXF 41

`lamp_color_type`
BS, DXF 71

`lamp_color_temp`
BD, DXF 42

`lamp_color_preset`
BS, DXF 72

`lamp_color_rgb`
BL

`web_rotation`
3BD_1, DXF 43

`extlight_shape`
BS, DXF 73

`extlight_length`
BD, DXF 46

`extlight_width`
BD, DXF 47

`extlight_radius`
BD, DXF 48

`webfile_type`
BS, DXF 74

`web_symetry`
BS, DXF 75

`has_target_grip`
BS, DXF 76

`web_flux` BD, DXF 49

`web_angle1`
BD, DXF 50

`web_angle2`
BD, DXF 51

`web_angle3`
BD, DXF 52

`web_angle4`
BD, DXF 53

`web_angle5`
BD, DXF 54

`glyph_display_type`
BS, DXF 77

LINE

`parent` struct _dwg_object_entity*

`z_is_zero`
RC

`start` 3BD, DXF 10

`end` 3BD, DXF 11

`thickness`
BT, DXF 39

`extrusion`
BE, DXF 210

LINEARPARAMETERENTITY

`parent` struct _dwg_object_entity*

LOFTEDSURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **, DXF 1

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
BL

`silhouettes`
: Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
: B

`acis_empty2`
: B

`extra_acis_data`
: struct _dwg_entity_3DSOLID*

`num_materials`
: BL

`materials`
: Dwg_3DSOLID_material*

`revision_guid[39]`
: RC, DXF 2

`revision_major`
: BL

`revision_minor1`
: BS

`revision_minor2`
: BS

`revision_bytes[9]`
: RC

`end_marker`
: BL

`history_id`
: H, DXF 350

`has_revision_guid`
: B

`acis_empty_bit`
: B

`modeler_format_version`
: BS, DXF 70

`u_isolines`
: BS, DXF 71

`v_isolines`
: BS, DXF 72

`loft_entity_transmatrix`
: BD*, DXF 40

`plane_normal_lofting_type`
BL, DXF 70

`start_draft_angle`
BD, DXF 41

`end_draft_angle`
BD, DXF 42

`start_draft_magnitude`
BD, DXF 43

`end_draft_magnitude`
BD, DXF 44

`arc_length_parameterization`
B, DXF 290

`no_twist` B, DXF 291

`align_direction`
B, DXF 292

`simple_surfaces`
B, DXF 293

`closed_surfaces`
B, DXF 294

`solid` B, DXF 295

`ruled_surface`
B, DXF 296

`virtual_guide`
B, DXF 297

`num_cross_sections`
BS

`num_guide_curves`
BS

`cross_sections`
H*, DXF 310

`guide_curves`
H*, DXF 310

`path_curve`
H

LWPOLYLINE

`parent` struct _dwg_object_entity*

`flag` BS, DXF 70

`const_width`
BD, DXF 43

`elevation`
BD, DXF 38

`thickness`
BD, DXF 39

`extrusion`
BE, DXF 210

`num_points`
BL, DXF 90

`points` 2RD*, DXF 10

`num_bulges`
BL

`bulges` BD*, DXF 42

`num_vertexids`
BL

`vertexids`
BL*, DXF 91

`num_widths`
BL

`widths` Dwg_LWPOLYLINE_width*

MESH

`parent` struct _dwg_object_entity*

`dlevel` BS, DXF 71

`is_watertight`
B, DXF 72

`num_subdiv_vertex`
BL, DXF 91

`subdiv_vertex`
3DPOINT*, DXF 10

`num_vertex`
BL, DXF 92

`vertex` 3DPOINT*, DXF 10

`num_faces`
BL, DXF 93

`faces` BL*, DXF 90

`num_edges`
BL, DXF 94

`edges` Dwg_MESH_edge*

`num_crease`
BL, DXF 95

`crease` BD*, DXF 140

MINSERT

`parent` struct _dwg_object_entity*

`ins_pt` 3DPOINT, DXF 10

`scale_flag`
BB

`scale` 3BD_1, DXF 41

`rotation` BD, DXF 50

`extrusion`
BE, DXF 210

`has_attribs`
B, DXF 66

`num_owned`
BL

`num_cols` BS, DXF 70

`num_rows` BS, DXF 71

`col_spacing`
BD, DXF 44

`row_spacing`
BD, DXF 45

`block_header`
H, DXF 2

`first_attrib`
H

`last_attrib`
H

`attribs` H*

`seqend` H

MLINE

`parent` struct _dwg_object_entity*

`scale` BD, DXF 40

`justification`
RC, DXF 70

`base_point`
3BD, DXF 10

`extrusion`
BE, DXF 210

`flags` BS, DXF 71

`num_lines`
RC, DXF 73

`num_verts`
BS, DXF 72

`verts` Dwg_MLINE_vertex*

`mlinestyle`
H, DXF 340

MPOLYGON

`parent` struct _dwg_object_entity*

`is_gradient_fill`
BL

`reserved` BL

`gradient_angle`
BD

`gradient_shift`
BD

`single_color_gradient`
BL

`gradient_tint`
BD

`num_colors`
BL

`colors` Dwg_HATCH_Color*

`gradient_name`
T

`elevation`
BD, DXF 30

`extrusion`
BE, DXF 210

`name` T, DXF 2

`is_solid_fill`
B, DXF 70

`is_associative`
B, DXF 71

`num_paths`
BL, DXF 91

`paths` Dwg_HATCH_Path*

`style` BS, DXF 75

`pattern_type`
BS, DXF 76

`angle` BD, DXF 52

`scale_spacing`
BD, DXF 41

`double_flag`
B, DXF 77

`num_deflines`
BS, DXF 78

`deflines` Dwg_HATCH_DefLine*

`color` CMC, DXF 62

`x_dir` 2RD, DXF 11

`num_boundary_handles`
BL, DXF 99

MTEXT

`parent` struct _dwg_object_entity*

`ins_pt` 3BD, DXF 10

`extrusion`
BE, DXF 210

`x_axis_dir`
3BD, DXF 11

`rect_height`
BD, DXF 41

`rect_width`
BD, DXF 40

`text_height`
BD, DXF 40

`attachment`
BS, DXF 71

`flow_dir` BS, DXF 72

`extents_width`
BD, DXF 42

`extents_height`
BD, DXF 43

`text` T, DXF 1

`style` H, DXF 7

`linespace_style`
BS, DXF 73

`linespace_factor`
BD, DXF 44

`unknown_b0`
B

`bg_fill_flag`
BL, DXF 90

`bg_fill_scale`
BL, DXF 45

`bg_fill_color`
CMC, DXF 63

`bg_fill_trans`
BL, DXF 441

`is_not_annotative`
B

`class_version`
BS

`default_flag`
B, DXF 70

`appid` H

`ignore_attachment`
BL

`column_type`
BS, DXF 71

`numfragments`
BL, DXF 72

`column_width`
BD, DXF 44

`gutter` BD, DXF 45

`auto_height`
B, DXF 73

`flow_reversed`
B, DXF 74

`num_column_heights`
BL, DXF 72

`column_heights`
BD*, DXF 46

MULTILEADER

`parent` struct _dwg_object_entity*

`class_version`
BS, DXF 270

`ctx` Dwg_MLEADER_AnnotContext

`mleaderstyle`
H, DXF 340

`flags` BL, DXF 90

`type` BS, DXF 170

`color` CMC, DXF 91

`ltype` H, DXF 341

`linewt` BLd, DXF 171

`has_landing`
B, DXF 290

`has_dogleg`
B, DXF 291

`landing_dist`
BD, DXF 41

`arrow_handle`
H, DXF 342

`arrow_size`
BD, DXF 42

`style_content`
BS, DXF 172

`text_style`
H, DXF 343

`text_left`
BS, DXF 173

`text_right`
BS, DXF 95

`text_angletype`
BS, DXF 174

`text_alignment`
: BS, DXF 175

`text_color`
: CMC, DXF 92

`has_text_frame`
: B, DXF 292

`block_style`
: H, DXF 344

`block_color`
: CMC, DXF 93

`block_scale`
: 3BD, DXF 10

`block_rotation`
: BD, DXF 43

`style_attachment`
: BS, DXF 176

`is_annotative`
: B, DXF 293

`num_arrowheads`
: BL

`arrowheads`
: Dwg_LEADER_ArrowHead*

`num_blocklabels`
: BL

`blocklabels`
: Dwg_LEADER_BlockLabel*

`is_neg_textdir`
: B, DXF 294

`ipe_alignment`
: BS, DXF 178

`justification`
: BS, DXF 179

`scale_factor`
: BD, DXF 45

`attach_dir`
: BS, DXF 271

`attach_top`
: BS, DXF 273

`attach_bottom`
: BS, DXF 272

`is_text_extended`
: B, DXF 295

NAVISWORKSMODEL

`parent` struct _dwg_object_entity*

`flags` BS, DXF 70

`definition`
: H, DXF 340

`transmatrix`
: BD*, DXF 40

`unitfactor`
: BD, DXF 40

NURBSURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
: B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
: BL

`block_size`
: BL*

`encr_sat_data`
: char **, DXF 1

`sab_size` BL

`acis_data`
: RC*

`wireframe_data_present`
: B

`point_present`
: B

`point` 3BD

`isolines` BL

`isoline_present`
: B

`num_wires`
: BL

`wires`
: Dwg_3DSOLID_wire*

`num_silhouettes`
: BL

`silhouettes`
: Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
: B

`acis_empty2`
: B

`extra_acis_data`
: struct _dwg_entity_3DSOLID*

`num_materials`
: BL

`materials`
: Dwg_3DSOLID_material*

`revision_guid[39]`
: RC, DXF 2

`revision_major`
: BL

`revision_minor1`
: BS

`revision_minor2`
: BS

`revision_bytes[9]`
: RC

`end_marker`
: BL

`history_id`
: H, DXF 350

`has_revision_guid`
: B

`acis_empty_bit`
: B

`u_isolines`
: BS, DXF 71

`v_isolines`
: BS, DXF 72

`short170` BS, DXF 170

`cv_hull_display`
B, DXF 290

`uvec1` 3BD, DXF 10

`vvec1` 3BD, DXF 11

`uvec2` 3BD, DXF 12

`vvec2` 3BD, DXF 13

OLE2FRAME

`parent` struct _dwg_object_entity*

`type` BS, DXF 71

`mode` BS, DXF 72

`lock_aspect`
RC, DXF 73

`data_size`
BL, DXF 90

`data` TF, DXF 310

`oleversion`
BS, DXF 70

`oleclient`
TF, DXF 3

`pt1` 3BD, DXF 10

`pt2` 3BD, DXF 11

OLEFRAME

`parent` struct _dwg_object_entity*

`flag` BS, DXF 70

`mode` BS

`data_size`
BL, DXF 90

`data` TF, DXF 310

PDFUNDERLAY

See [UNDERLAY], page 30,

PLANESURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **, DXF 1

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
BL

`silhouettes`
Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
B

`acis_empty2`
B

`extra_acis_data`
struct _dwg_entity_3DSOLID*

`num_materials`
BL

`materials`
Dwg_3DSOLID_material*

`revision_guid[39]`
RC, DXF 2

`revision_major`
: BL

`revision_minor1`
: BS

`revision_minor2`
: BS

`revision_bytes[9]`
: RC

`end_marker`
: BL

`history_id`
: H, DXF 350

`has_revision_guid`
: B

`acis_empty_bit`
: B

`modeler_format_version`
: BS, DXF 70

`u_isolines`
: BS, DXF 71

`v_isolines`
: BS, DXF 72

`class_version`
: BL

POINT

`parent` struct _dwg_object_entity*

`x` BD, DXF 10

`y` BD, DXF 20

`z` BD, DXF 30

`thickness`
: BT, DXF 39

`extrusion`
: BE, DXF 210

`x_ang` BD, DXF 50

POINTCLOUD

`parent` struct _dwg_object_entity*

`class_version`
: BS, DXF 70

`origin` 3BD, DXF 10

`saved_filename`
T, DXF 1

`num_source_files`
BL, DXF 90

`source_files`
TV*, DXF 2

`extents_min`
3BD, DXF 11

`extents_max`
3BD, DXF 12

`numpoints`
RLL, DXF 92

`ucs_name` T, DXF 3

`ucs_origin`
3BD, DXF 13

`ucs_x_dir`
3BD, DXF 210

`ucs_y_dir`
3BD, DXF 211

`ucs_z_dir`
3BD, DXF 212

`pointclouddef`
H, DXF 330

`reactor` H, DXF 360

`show_intensity`
B

`intensity_scheme`
BS, DXF 71

`intensity_style`
Dwg_POINTCLOUD_IntensityStyle

`show_clipping`
B

`num_clippings`
BL

`clippings`
Dwg_POINTCLOUD_Clippings*

POINTCLOUDEX

`parent` struct _dwg_object_entity*

`class_version`
BS, DXF 70

`extents_min`
3BD, DXF 10

`extents_max`
3BD, DXF 11

`ucs_origin`
3BD, DXF 12

`ucs_x_dir`
3BD, DXF 210

`ucs_y_dir`
3BD, DXF 211

`ucs_z_dir`
3BD, DXF 212

`is_locked`
B, DXF 290

`pointclouddefex`
H, DXF 330

`reactor` H, DXF 360

`name` T, DXF 1

`show_intensity`
B, DXF 291

`stylization_type`
BS, DXF 71

`intensity_colorscheme`
T, DXF 1

`cur_colorscheme`
T, DXF 1

`classification_colorscheme`
T, DXF 1

`elevation_min`
BD, DXF 40

`elevation_max`
BD, DXF 41

`intensity_min`
BL, DXF 90

`intensity_max`
BL, DXF 91

`intensity_out_of_range_behavior`
BS, DXF 71

`elevation_out_of_range_behavior`
BS, DXF 72

`elevation_apply_to_fixed_range`
B, DXF 292

`intensity_as_gradient`
B, DXF 293

`elevation_as_gradient`
B, DXF 294

`show_cropping`
B, DXF 295

`unknown_bl0`
BL, DXF 93

`unknown_bl1`
BL, DXF 93

`num_croppings`
BL, DXF 92

`croppings`
Dwg_POINTCLOUDEX_Croppings*

POINTPARAMETERENTITY

`parent` struct _dwg_object_entity*

POLARGRIPENTITY

`parent` struct _dwg_object_entity*

POLYLINE_2D

`parent` struct _dwg_object_entity*

`has_vertex`
B, DXF 66

`num_owned`
BL

`first_vertex`
H

`last_vertex`
H

`vertex` H*

`seqend` H

`flag` BS, DXF 70

`curve_type`
BS, DXF 75

`start_width`
BD, DXF 40

`end_width`
BD, DXF 41

`thickness`
BT, DXF 39

`elevation`
BD

`extrusion`
BE, DXF 210

POLYLINE_3D

`parent` struct _dwg_object_entity*

`has_vertex`
B, DXF 66

`num_owned`
BL

`first_vertex`
H

`last_vertex`
H

`vertex` H*

`seqend` H

`curve_type`
RC, DXF 75

`flag` RC, DXF 70

POLYLINE_MESH

`parent` struct _dwg_object_entity*

`has_vertex`
B, DXF 66

`num_owned`
BL

`first_vertex`
H

`last_vertex`
H

`vertex` H*

`seqend` H

`flag` BS, DXF 70

`curve_type`
BS, DXF 75

`num_m_verts`
BS, DXF 71

`num_n_verts`
BS, DXF 72

`m_density`
BS, DXF 73

`n_density`
BS, DXF 74

POLYLINE_PFACE

`parent` struct _dwg_object_entity*

`has_vertex`
B, DXF 66

`num_owned`
BL

`first_vertex`
H

`last_vertex`
H

`vertex` H*

`seqend` H

`numverts` BS, DXF 71

`numfaces` BS, DXF 72

PROXY_ENTITY

`parent` struct _dwg_object_entity*

`class_id` BL, DXF 91

`version` BL, DXF 95

`maint_version`
BL, DXF 97

`from_dxf` B, DXF 70

`data_numbits`
BL

`data_size`
BL, DXF 93

`data` TF, DXF 310

`num_objids`
BL

`objids` H*, DXF 340

RAY

`parent` struct _dwg_object_entity*

`point` 3BD, DXF 10

`vector` 3BD, DXF 11

REGION

See [3DSOLID], page 22,

REVOLVEDSURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **, DXF 1

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
: BL

`wires`
: Dwg_3DSOLID_wire*

`num_silhouettes`
: BL

`silhouettes`
: Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
: B

`acis_empty2`
: B

`extra_acis_data`
: struct _dwg_entity_3DSOLID*

`num_materials`
: BL

`materials`
: Dwg_3DSOLID_material*

`revision_guid[39]`
: RC, DXF 2

`revision_major`
: BL

`revision_minor1`
: BS

`revision_minor2`
: BS

`revision_bytes[9]`
: RC

`end_marker`
: BL

`history_id`
: H, DXF 350

`has_revision_guid`
: B

`acis_empty_bit`
: B

`modeler_format_version`
: BS, DXF 70

`u_isolines`
: BS, DXF 71

`v_isolines`
BS, DXF 72

`class_version`
BL, DXF 90

`id` BL, DXF 90

`axis_point`
3BD, DXF 10

`axis_vector`
3BD, DXF 11

`revolve_angle`
BD, DXF 40

`start_angle`
BD, DXF 41

`revolved_entity_transmatrix`
BD*, DXF 42

`draft_angle`
BD, DXF 43

`draft_start_distance`
BD, DXF 44

`draft_end_distance`
BD, DXF 45

`twist_angle`
BD, DXF 46

`solid` B, DXF 290

`close_to_axis`
B, DXF 291

ROTATIONPARAMETERENTITY

`parent` struct _dwg_object_entity*

RTEXT

`parent` struct _dwg_object_entity*

`pt` 3BD, DXF 10

`extrusion`
BE, DXF 210

`rotation` BD, DXF 50

`height` BD, DXF 50

`flags` BS, DXF 70

`text_value`
T, DXF 1

`style` H, DXF 7

SECTIONOBJECT

`parent` struct _dwg_object_entity*

`state` BL, DXF 90

`flags` BL, DXF 91

`name` T, DXF 1

`vert_dir` 3BD, DXF 10

`top_height`
BD, DXF 40

`bottom_height`
BD, DXF 41

`indicator_alpha`
BS, DXF 70

`indicator_color`
CMC, DXF 62

`num_verts`
BL, DXF 92

`verts` 3BD*, DXF 11

`num_blverts`
BL, DXF 93

`blverts` 3BD*, DXF 12

`section_settings`
H, DXF 360

SEQEND

`parent` struct _dwg_object_entity*

SHAPE

`parent` struct _dwg_object_entity*

`ins_pt` 3BD, DXF 10

`scale` BD, DXF 40

`rotation` BD, DXF 50

`width_factor`
BD, DXF 41

`oblique_angle`
BD, DXF 51

`thickness`
BD, DXF 39

`style_id` BS

`extrusion`
BE, DXF 210

`style` H, DXF 7

SOLID

`parent` struct _dwg_object_entity*

`thickness`
BT, DXF 39

`elevation`
BD, DXF 38

`corner1` 2RD, DXF 10

`corner2` 2RD, DXF 11

`corner3` 2RD, DXF 12

`corner4` 2RD, DXF 13

`extrusion`
BE, DXF 210

SPLINE

`parent` struct _dwg_object_entity*

`flag` RS

`scenario` BS

`degree` BS, DXF 71

`splineflags1`
BL

`knotparam`
BL

`fit_tol` BD, DXF 44

`beg_tan_vec`
3BD, DXF 12

`end_tan_vec`
3BD, DXF 13

`closed_b` B

`periodic` B

`rational` B

`weighted` B

`knot_tol` BD, DXF 42

`ctrl_tol` BD, DXF 43

`num_fit_pts`
BS, DXF 74

`fit_pts` 3DPOINT*, DXF 11

`num_knots`
BL, DXF 72

`knots` BD*, DXF 40

`num_ctrl_pts`
BL, DXF 73

`ctrl_pts` Dwg_SPLINE_control_point*

SWEPTSURFACE

`parent` struct _dwg_object_entity*

`acis_empty`
B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **, DXF 1

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
BL

`silhouettes`
Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
B

`acis_empty2`
B

`extra_acis_data`
struct _dwg_entity_3DSOLID*

`num_materials`
BL

`materials`
Dwg_3DSOLID_material*

`revision_guid[39]`
RC, DXF 2

`revision_major`
BL

`revision_minor1`
BS

`revision_minor2`
BS

`revision_bytes[9]`
RC

`end_marker`
BL

`history_id`
H, DXF 350

`has_revision_guid`
B

`acis_empty_bit`
B

`modeler_format_version`
BS, DXF 70

`u_isolines`
BS, DXF 71

`v_isolines`
BS, DXF 72

`class_version`
BL, DXF 90

`sweep_entity_id`
BL, DXF 90

`sweepdata_size`
BL, DXF 90

`sweepdata`
TF, DXF 310

`path_entity_id`
BL, DXF 90

`pathdata_size`
BL, DXF 90

`pathdata` TF, DXF 310

`draft_angle`
BD, DXF 42

`draft_start_distance`
BD, DXF 43

`draft_end_distance`
BD, DXF 44

`twist_angle`
BD, DXF 45

`scale_factor`
BD, DXF 48

`align_angle`
BD, DXF 49

`sweep_entity_transmatrix`
BD*, DXF 46

`path_entity_transmatrix`
BD*, DXF 47

`is_solid` B, DXF 290

`sweep_alignment_flags`
BS, DXF 70

`path_flags`
BS, DXF 71

`align_start`
B, DXF 292

`bank` B, DXF 293

`base_point_set`
B, DXF 294

`sweep_entity_transform_computed`
B, DXF 295

`path_entity_transform_computed`
B, DXF 296

`reference_vector_for_controlling_twist`
3BD, DXF 11

`sweep_entity`
H

`path_entity`
H

TABLE

`parent` struct _dwg_object_entity*

`ldata` Dwg_LinkedData

`tdata` Dwg_LinkedTableData

`fdata` Dwg_FormattedTableData

`tablestyle`
H, DXF 342

`unknown_rc`
RC

`unknown_h`
H

`unknown_bl`
BL

`unknown_b`
B

`unknown_bl1`
BL

`ins_pt` 3BD, DXF 10

`scale` 3BD_1, DXF 41

`scale_flag`
BB

`rotation` BD, DXF 50

`extrusion`
BE, DXF 210

`has_attribs`
B, DXF 66

`num_owned`
BL

`flag_for_table_value`
BS, DXF 90

`horiz_direction`
3BD, DXF 11

`num_cols` BL, DXF 92

`num_rows` BL, DXF 91

`num_cells`
unsigned long

`col_widths`
BD*, DXF 142

`row_heights`
BD*, DXF 141

`cells` Dwg_TABLE_Cell*

`has_table_overrides`
B

`table_flag_override`
BL, DXF 93

`title_suppressed`
B, DXF 280

`header_suppressed`
B, DXF 281

`flow_direction`
BS, DXF 70

`horiz_cell_margin`
BD, DXF 40

`vert_cell_margin`
BD, DXF 41

`title_row_color`
CMC, DXF 64

`header_row_color`
CMC, DXF 64

`data_row_color`
CMC, DXF 64

`title_row_fill_none`
B, DXF 283

`header_row_fill_none`
B, DXF 283

`data_row_fill_none`
B, DXF 283

`title_row_fill_color`
: CMC, DXF 63

`header_row_fill_color`
: CMC, DXF 63

`data_row_fill_color`
: CMC, DXF 63

`title_row_alignment`
: BS, DXF 170

`header_row_alignment`
: BS, DXF 170

`data_row_alignment`
: BS, DXF 170

`title_text_style`
: H, DXF 7

`header_text_style`
: H, DXF 7

`data_text_style`
: H, DXF 7

`title_row_height`
: BD, DXF 140

`header_row_height`
: BD, DXF 140

`data_row_height`
: BD, DXF 140

`has_border_color_overrides`
: B

`border_color_overrides_flag`
: BL, DXF 94

`title_horiz_top_color`
: CMC, DXF 64

`title_horiz_ins_color`
: CMC, DXF 65

`title_horiz_bottom_color`
: CMC, DXF 66

`title_vert_left_color`
: CMC, DXF 63

`title_vert_ins_color`
: CMC, DXF 68

`title_vert_right_color`
: CMC, DXF 69

`header_horiz_top_color`
: CMC, DXF 64

`header_horiz_ins_color`
: CMC, DXF 65

`header_horiz_bottom_color`
: CMC, DXF 66

`header_vert_left_color`
: CMC, DXF 63

`header_vert_ins_color`
: CMC, DXF 68

`header_vert_right_color`
: CMC, DXF 69

`data_horiz_top_color`
: CMC, DXF 64

`data_horiz_ins_color`
: CMC, DXF 65

`data_horiz_bottom_color`
: CMC, DXF 66

`data_vert_left_color`
: CMC, DXF 63

`data_vert_ins_color`
: CMC, DXF 68

`data_vert_right_color`
: CMC, DXF 69

`has_border_lineweight_overrides`
: B

`border_lineweight_overrides_flag`
: BL, DXF 95

`title_horiz_top_linewt`
: BS

`title_horiz_ins_linewt`
: BS

`title_horiz_bottom_linewt`
: BS

`title_vert_left_linewt`
: BS

`title_vert_ins_linewt`
BS

`title_vert_right_linewt`
BS

`header_horiz_top_linewt`
BS

`header_horiz_ins_linewt`
BS

`header_horiz_bottom_linewt`
BS

`header_vert_left_linewt`
BS

`header_vert_ins_linewt`
BS

`header_vert_right_linewt`
BS

`data_horiz_top_linewt`
BS

`data_horiz_ins_linewt`
BS

`data_horiz_bottom_linewt`
BS

`data_vert_left_linewt`
BS

`data_vert_ins_linewt`
BS

`data_vert_right_linewt`
BS

`has_border_visibility_overrides`
B

`border_visibility_overrides_flag`
BL, DXF 96

`title_horiz_top_visibility`
BS

`title_horiz_ins_visibility`
BS

`title_horiz_bottom_visibility`
BS

`title_vert_left_visibility`
BS

`title_vert_ins_visibility`
BS

`title_vert_right_visibility`
BS

`header_horiz_top_visibility`
BS

`header_horiz_ins_visibility`
BS

`header_horiz_bottom_visibility`
BS

`header_vert_left_visibility`
BS

`header_vert_ins_visibility`
BS

`header_vert_right_visibility`
BS

`data_horiz_top_visibility`
BS

`data_horiz_ins_visibility`
BS

`data_horiz_bottom_visibility`
BS

`data_vert_left_visibility`
BS

`data_vert_ins_visibility`
BS

`data_vert_right_visibility`
BS

`block_header`
H, DXF 2

`first_attrib`
H

`last_attrib`
H

`attribs` H*

`seqend` H

`title_row_style_override`
H, DXF 7

`header_row_style_override`
H

`data_row_style_override`
H

`unknown_bs`
BS

`hor_dir` 3BD, DXF 11

`has_break_data`
BL

`break_flag`
BL

`break_flow_direction`
BL

`break_spacing`
BD

`break_unknown1`
BL

`break_unknown2`
BL

`num_break_heights`
BL

`break_heights`
Dwg_TABLE_BreakHeight*

`num_break_rows`
BL

`break_rows`
Dwg_TABLE_BreakRow*

TEXT

`parent` struct _dwg_object_entity*

`dataflags`
RC

`elevation`
RD, DXF 30

`ins_pt` 2DPOINT, DXF 10

`alignment_pt`
2DPOINT, DXF 11

`extrusion`
BE, DXF 210

`thickness`
RD, DXF 39

`oblique_angle`
RD, DXF 51

`rotation` RD, DXF 50

`height` RD, DXF 40

`width_factor`
RD, DXF 41

`text_value`
T, DXF 1

`generation`
BS, DXF 71

`horiz_alignment`
BS, DXF 72

`vert_alignment`
BS, DXF 73

`style` H, DXF 7

TOLERANCE

`parent` struct _dwg_object_entity*

`unknown_short`
BS

`height` BD

`dimgap` BD

`ins_pt` 3BD, DXF 10

`x_direction`
3BD, DXF 11

`extrusion`
BE

`text_value`
T, DXF 1

`dimstyle` H, DXF 3

TRACE

`parent` struct _dwg_object_entity*

`thickness`
BT, DXF 39

`elevation`
BD, DXF 38

`corner1` 2RD, DXF 10

`corner2` 2RD, DXF 11

`corner3` 2RD, DXF 12

`corner4` 2RD, DXF 13

`extrusion`
BE, DXF 210

UNKNOWN_ENT

`parent` struct _dwg_object_entity*

VERTEX_2D

`parent` struct _dwg_object_entity*

`flag` RC, DXF 70

`point` 3BD, DXF 10

`start_width`
BD, DXF 40

`end_width`
BD, DXF 41

`id` BL, DXF 91

`bulge` BD, DXF 42

`tangent_dir`
BD, DXF 50

VERTEX_3D

`parent` struct _dwg_object_entity*

`flag` RC, DXF 70

`point` 3BD, DXF 10

VERTEX_MESH

See [VERTEX_3D], page 88,

VERTEX_PFACE

See [VERTEX_3D], page 88,

VERTEX_PFACE_FACE

`parent` struct _dwg_object_entity*

`flag` RC, DXF 70

`vertind[4]`
BS

VIEWPORT

`parent` struct _dwg_object_entity*

`center` 3BD, DXF 10

`width` BD, DXF 40

`height` BD, DXF 41

`on_off` RS, DXF 68

`id` RS, DXF 69

`view_target`
3BD, DXF 17

`VIEWDIR` 3BD, DXF 16

`twist_angle`
BD, DXF 51

`VIEWSIZE` BD, DXF 45

`lens_length`
BD, DXF 42

`front_clip_z`
BD, DXF 43

`back_clip_z`
BD, DXF 44

`SNAPANG` BD, DXF 50

`VIEWCTR` 2RD, DXF 12

`SNAPBASE` 2RD, DXF 13

`SNAPUNIT` 2RD, DXF 14

`GRIDUNIT` 2RD, DXF 15

`circle_zoom`
BS, DXF 72

`grid_major`
BS, DXF 61

`num_frozen_layers`
BL

`status_flag`
BL, DXF 90

`style_sheet`
T, DXF 1

`render_mode`
RC, DXF 281

`ucs_at_origin`
B, DXF 74

`UCSVP` B, DXF 71

`ucsorg` 3BD, DXF 110

`ucsxdir` 3BD, DXF 111

`ucsydir` 3BD, DXF 112

`ucs_elevation`
BD, DXF 146

`UCSORTHOVIEW`
BS, DXF 79

`shadeplot_mode`
BS, DXF 170

`use_default_lights`
B, DXF 292

`default_lighting_type`
RC, DXF 282

`brightness`
BD, DXF 141

`contrast` BD, DXF 142

`ambient_color`
CMC, DXF 63

`vport_entity_header`
H

`frozen_layers`
H*, DXF 341

`clip_boundary`
H, DXF 340

`named_ucs`
H, DXF 345

`base_ucs` H, DXF 346

`background`
H, DXF 332

`visualstyle`
H, DXF 348

`shadeplot`
H, DXF 333

`sun` H, DXF 361

VISIBILITYGRIPENTITY

`parent` struct _dwg_object_entity*

VISIBILITYPARAMETERENTITY

`parent` struct _dwg_object_entity*

WIPEOUT

`parent` struct _dwg_object_entity*

`class_version`
BL, DXF 90

`pt0` 3BD, DXF 10

`uvec` 3BD, DXF 11

`vvec` 3BD, DXF 12

`size` 2RD, DXF 13

`display_props`
BS, DXF 70

`clipping` B, DXF 280

`brightness`
RC, DXF 281

`contrast` RC, DXF 282

`fade` RC, DXF 283

`clip_mode`
B, DXF 290

`clip_boundary_type`
BS, DXF 71

`num_clip_verts`
BL, DXF 91

`clip_verts`
2RD*, DXF 14

`imagedef` H, DXF 340

`imagedefreactor`
H, DXF 360

XLINE

See [RAY], page 72,

XYPARAMETERENTITY

`parent` struct _dwg_object_entity*

4.3 OBJECTS

All non-graphical objects with its fields. See [Common Object fields], page 257,

ACMECOMMANDHISTORY

`parent` struct _dwg_object_object*

`class_version`
BS

ACMESCOPE

`parent` struct _dwg_object_object*

`class_version`
BS

ACMESTATEMGR

`parent` struct _dwg_object_object*

`class_version`
BS

ACSH_BOOLEAN_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`operation`
RCd, DXF 280

`operand1` BL, DXF 92

`operand2` BL, DXF 93

ACSH_BOX_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`length` BD, DXF 40

`width` BD, DXF 41

`height` BD, DXF 42

ACSH_BREP_CLASS

`parent` struct _dwg_object_object*

`acis_empty`
B, DXF 290

`unknown` B

`version` BS, DXF 70

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **, DXF 1

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
BL

`silhouettes`
Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
B

`acis_empty2`
B

`extra_acis_data`
struct _dwg_entity_3DSOLID*

`num_materials`
BL

`materials`
Dwg_3DSOLID_material*

`revision_guid[39]`
RC, DXF 2

`revision_major`
BL

`revision_minor1`
BS

`revision_minor2`
BS

`revision_bytes[9]`
RC

`end_marker`
BL

`history_id`
H, DXF 350

`has_revision_guid`
B

`acis_empty_bit`
B

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

ACSH_CHAMFER_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`bl92` BL, DXF 92

`base_dist`
BD, DXF 41

`other_dist`
BD, DXF 42

`num_edges`
BL, DXF 93

`edges` BL*, DXF 94

`bl95` BL, DXF 95

ACSH_CONE_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`height` BD, DXF 40

`major_radius`
BD, DXF 41

`minor_radius`
BD, DXF 42

`x_radius` BD, DXF 43

ACSH_CYLINDER_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`height` BD, DXF 40

`major_radius`
BD, DXF 41

`minor_radius`
BD, DXF 42

`x_radius` BD, DXF 43

ACSH_EXTRUSION_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`direction`
3BD, DXF 10

`bl92` BL, DXF 92

`shsw_text_size`
BL, DXF 90

`shsw_text`
TF, DXF 310

`shsw_bl93`
BL, DXF 93

`shsw_text2_size`
BL, DXF 90

`shsw_text2`
TF, DXF 310

`draft_angle`
BD, DXF 42

`start_draft_dist`
BD, DXF 43

`end_draft_dist`
BD, DXF 44

`scale_factor`
BD, DXF 45

`twist_angle`
BD, DXF 48

`align_angle`
BD, DXF 49

`sweepentity_transform`
BD*, DXF 46

`pathentity_transform`
BD*, DXF 47

`align_option`
RC, DXF 70

`miter_option`
RC, DXF 71

`has_align_start`
B, DXF 290

`bank` B, DXF 292

`check_intersections`
B, DXF 293

`shsw_b294`
B, DXF 294

`shsw_b295`
B, DXF 295

`shsw_b296`
B, DXF 296

`pt2` 3BD, DXF 11

ACSH_FILLET_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`bl92` BL, DXF 92

`num_edges`
BL, DXF 93

`edges` BL*, DXF 94

`num_radiuses`
BL, DXF 95

`num_startsetbacks`
BL, DXF 96

`num_endsetbacks`
BL, DXF 97

`radiuses` BD*, DXF 41

`startsetbacks`
BD*, DXF 42

`endsetbacks`
BD*, DXF 43

ACSH_HISTORY_CLASS

`parent` struct _dwg_object_object*

`major` BL, DXF 90

`minor` BL, DXF 91

`owner` H, DXF 360

`h_nodeid` BL, DXF 92

`show_history`
B, DXF 280

`record_history`
B, DXF 281

ACSH_LOFT_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`num_crosssects`
BL, DXF 92

`crosssects`
H*

`num_guides`
BL, DXF 95

`guides` H*

ACSH_PYRAMID_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`height` BD, DXF 40

`sides` BL, DXF 92

`radius` BD, DXF 41

`topradius`
BD, DXF 42

ACSH_REVOLVE_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`axis_pt` 3BD, DXF 10

`direction`
2RD, DXF 11

`revolve_angle`
BD, DXF 40

`start_angle`
BD, DXF 41

`draft_angle`
BD, DXF 43

`bd44` BD, DXF 44

`bd45` BD, DXF 45

`twist_angle`
BD, DXF 46

`b290` B, DXF 290

`is_close_to_axis`
B, DXF 291

`sweep_entity`
H

ACSH_SPHERE_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`radius` BD, DXF 40

ACSH_SWEEP_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`direction`
3BD, DXF 10

`bl92` BL, DXF 92

`shsw_text_size`
BL, DXF 90

`shsw_text`
TF, DXF 310

`shsw_bl93`
BL, DXF 93

`shsw_text2_size`
BL, DXF 90

`shsw_text2`
TF, DXF 310

`draft_angle`
BD, DXF 42

`start_draft_dist`
BD, DXF 43

`end_draft_dist`
BD, DXF 44

`scale_factor`
BD, DXF 45

`twist_angle`
BD, DXF 48

`align_angle`
BD, DXF 49

`sweepentity_transform`
BD*, DXF 46

`pathentity_transform`
BD*, DXF 47

`align_option`
RC, DXF 70

`miter_option`
RC, DXF 71

`has_align_start`
B, DXF 290

`bank` B, DXF 292

`check_intersections`
B, DXF 293

`shsw_b294`
B, DXF 294

`shsw_b295`
B, DXF 295

`shsw_b296`
B, DXF 296

`pt2` 3BD, DXF 11

ACSH_TORUS_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`major_radius`
BD, DXF 40

`minor_radius`
BD, DXF 41

ACSH_WEDGE_CLASS

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`history_node`
Dwg_ACSH_HistoryNode

`major` BL, DXF 90

`minor` BL, DXF 91

`length` BD, DXF 40

`width` BD, DXF 41

`height` BD, DXF 42

ALDIMOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`dimension`
: Dwg_OCD_Dimension

`dimline_pt`
: 3BD, DXF 11

ANGDIMOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
: BS, DXF 70

`is_default`
: B, DXF 290

`scale` H, DXF 340

`dimension`
: Dwg_OCD_Dimension

`arc_pt` 3BD, DXF 11

ANNOTSCALEOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
: BS, DXF 70

`is_default`
: B, DXF 290

`scale` H, DXF 340

APPID

APPID is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
: B

`is_xref_resolved`
: BS

`is_xref_dep`
: B

`xref` H

`unknown` RC, DXF 71

APPID_CONTROL

APPID_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

ASSOC2DCONSTRAINTGROUP

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`geometry_status`
BL, DXF 90

`owningnetwork`
H, DXF 330

`actionbody`
H, DXF 360

`action_index`
BL, DXF 90

`max_assoc_dep_index`
BL, DXF 90

`num_deps` BL, DXF 90

`deps` Dwg_ASSOCACTION_Deps*

`num_owned_params`
BL

`owned_params`
H*

`num_values`
BL

`values` struct _dwg_VALUEPARAM*

`version` BL, DXF 90

`b1` B, DXF 70

`workplane[3]`
3BD

`h1` H, DXF 360

`num_actions`
BL, DXF 90

`actions` H*, DXF 360

`num_nodes`
BL, DXF 90

`nodes` Dwg_CONSTRAINTGROUPNODE*

ASSOC3POINTANGULARDIMACTIONBODY

`parent` struct _dwg_object_object*

`aaab_version`
BS, DXF 90

`assoc_dep`
H, DXF 330

`aab_version`
BS, DXF 90

`actionbody`
H, DXF 360

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`class_version`
BS, DXF 90

`r_node` H, DXF 330

`d_node` H, DXF 330

`assocdep` H, DXF 330

ASSOCACTION

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`geometry_status`
BL, DXF 90

`owningnetwork`
H, DXF 330

`actionbody`
H, DXF 360

`action_index`
BL, DXF 90

`max_assoc_dep_index`
BL, DXF 90

`num_deps` BL, DXF 90

`deps` Dwg_ASSOCACTION_Deps*

`num_owned_params`
BL

`owned_params`
H*

`num_values`
BL

`values` struct _dwg_VALUEPARAM*

ASSOCACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

ASSOCALIGNEDDIMACTIONBODY

`parent` struct _dwg_object_object*

`aaab_version`
BS, DXF 90

`assoc_dep`
H, DXF 330

`aab_version`
BS, DXF 90

`actionbody`
H, DXF 360

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`class_version`
BL, DXF 90

`r_node` H, DXF 330

`d_node` H, DXF 330

ASSOCARRAYACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`aaab_version`
BL, DXF 90

`paramblock`
T, DXF 1

`transmatrix`
BD*, DXF 40

ASSOCARRAYMODIFYACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`aaab_version`
BL, DXF 90

`paramblock`
T, DXF 1

`transmatrix`
BD*, DXF 40

`status` BS, DXF 70

`num_items`
BL, DXF 90

`items` Dwg_ARRAYITEMLOCATOR*

ASSOCASMBODYACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`asdap_class_version`
BL, DXF 90

`dep` H, DXF 330

`class_version`
BL, DXF 90

`acis_empty`
B

`unknown` B

`version` BS

`num_blocks`
BL

`block_size`
BL*

`encr_sat_data`
char **

`sab_size` BL

`acis_data`
RC*

`wireframe_data_present`
B

`point_present`
B

`point` 3BD

`isolines` BL

`isoline_present`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

`num_silhouettes`
BL

`silhouettes`
Dwg_3DSOLID_silhouette*

`_dxf_sab_converted`
B

`acis_empty2`
B

`extra_acis_data`
struct _dwg_entity_3DSOLID*

`num_materials`
BL

`materials`
Dwg_3DSOLID_material*

`revision_guid[39]`
RC

`revision_major`
BL

`revision_minor1`
BS

`revision_minor2`
BS

`revision_bytes[9]`
RC

`end_marker`
BL

`history_id`
H

`has_revision_guid`
B

`acis_empty_bit`
B

ASSOCBLENDSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

`b1` B, DXF 290

`b2` B, DXF 291

`b3` B, DXF 292

`b4` B, DXF 293

`b5` B, DXF 294

`blend_options`
BS, DXF 72

`bs2` BS, DXF 73

ASSOCCOMPOUNDACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`class_version`
BS, DXF 90

`bs1` BS, DXF 90

`num_params`
BL, DXF 90

`params` H*, DXF 360

`has_child_param`
B

`child_status`
BS, DXF 90

`child_id` BL, DXF 90

`child_param`
H, DXF 330

`h330_2` H, DXF 330

`bl2` BL, DXF 90

`h330_3` H, DXF 330

ASSOCDEPENDENCY

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`status` BL, DXF 90

`is_read_dep`
B, DXF 290

`is_write_dep`
B, DXF 290

`is_attached_to_object`
B, DXF 290

`is_delegating_to_owning_action`
B, DXF 290

`order` BLd, DXF 90

`dep_on` H, DXF 330

`has_name` B, DXF 290

`name` T, DXF 1

`depbodyid`
BLd, DXF 90

`readdep` H, DXF 330

`dep_body` H, DXF 360

`node` H, DXF 330

ASSOCDIMDEPENDENCYBODY

`parent` struct _dwg_object_object*

`adb_version`
BS, DXF 90

`dimbase_version`
BS, DXF 90

`name` T, DXF 1

`class_version`
BS, DXF 90

ASSOCEDGEACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`asdap_class_version`
BL, DXF 90

`dep` H, DXF 330

`class_version`
BL, DXF 90

`param` H, DXF 330

`has_action`
B, DXF 290

`action_type`
BL, DXF 90

`subent` H

ASSOCEDGECHAMFERACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

ASSOCEDGEFILLETACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

ASSOCEXTENDSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

`option` RC, DXF 280

ASSOCEXTRUDEDSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCFACEACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`asdap_class_version`
BL, DXF 90

`dep` H, DXF 330

`class_version`
BL, DXF 90

`index` BL, DXF 90

ASSOCFILLETSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

`status` BS, DXF 70

`pt1` 2RD, DXF 10

`pt2` 2RD, DXF 10

ASSOCGEOMDEPENDENCY

`parent` struct _dwg_object_object*

`assocdep` Dwg_Object_ASSOCDEPENDENCY

`class_version`
BS, DXF 90

`enabled` B, DXF 290

`classname`
T, DXF 1

`dependent_on_compound_object`
B, DXF 290

ASSOCLOFTEDSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCMLEADERACTIONBODY

`parent` struct _dwg_object_object*

`aaab_version`
BS, DXF 90

`assoc_dep`
H, DXF 330

`aab_version`
BS, DXF 90

`actionbody`
H, DXF 360

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`class_version`
BL, DXF 90

`num_actions`
BL, DXF 90

`actions` Dwg_ASSOCACTIONBODY_action*

ASSOCNETWORK

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`geometry_status`
BL, DXF 90

`owningnetwork`
H, DXF 330

`actionbody`
H, DXF 360

`action_index`
BL, DXF 90

`max_assoc_dep_index`
BL, DXF 90

`num_deps` BL, DXF 90

`deps` Dwg_ASSOCACTION_Deps*

`num_owned_params`
BL

`owned_params`
H*

`num_values`
BL

`values` struct _dwg_VALUEPARAM*

`network_version`
BS, DXF 90

`network_action_index`
BL, DXF 90

`num_actions`
BL, DXF 90

`actions` Dwg_ASSOCACTION_Deps*

`num_owned_actions`
BL, DXF 90

`owned_actions`
H*, DXF 330

ASSOCNETWORKSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCOBJECTACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`asdap_class_version`
BL, DXF 90

`dep` H, DXF 330

`class_version`
BS, DXF 90

ASSOCOFFSETSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

`b1` B, DXF 290

ASSOCORDINATEDIMACTIONBODY

`parent` struct _dwg_object_object*

`aaab_version`
BS, DXF 90

`assoc_dep`
H, DXF 330

`aab_version`
BS, DXF 90

`actionbody`
H, DXF 360

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`class_version`
BL, DXF 90

`r_node` H, DXF 330

`d_node` H, DXF 330

ASSOCOSNAPPOINTREFACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`class_version`
BS, DXF 90

`bs1` BS, DXF 90

`num_params`
BL, DXF 90

`params` H*, DXF 360

`has_child_param`
B

`child_status`
BS, DXF 90

`child_id` BL, DXF 90

`child_param`
H, DXF 330

`h330_2` H, DXF 330

`bl2` BL, DXF 90

`h330_3` H, DXF 330

`status` BS, DXF 90

`osnap_mode`
RC, DXF 90

`param` BD, DXF 40

ASSOCPATCHSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCPATHACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`class_version`
BS, DXF 90

`bs1` BS, DXF 90

`num_params`
BL, DXF 90

`params` H*, DXF 360

`has_child_param`
B

`child_status`
BS, DXF 90

`child_id` BL, DXF 90

`child_param`
H, DXF 330

`h330_2` H, DXF 330

`bl2` BL, DXF 90

`h330_3` H, DXF 330

`version` BL, DXF 90

ASSOCPERSSUBENTMANAGER

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`unknown_3`
BL, DXF 90

`unknown_0`
BL, DXF 90

`unknown_2`
BL, DXF 90

`num_steps`
BL, DXF 90

`num_subents`
BL, DXF 90

`steps` BL*, DXF 90

`subents` BL*

`unknown_bl6`
BL, DXF 90

`unknown_bl6a`
BL, DXF 90

`unknown_bl7a`
BL, DXF 90

`unknown_bl7`
BL, DXF 90

`unknown_bl8`
BL, DXF 90

`unknown_bl9`
BL, DXF 90

`unknown_bl10`
BL, DXF 90

`unknown_bl11`
BL, DXF 90

`unknown_bl12`
BL, DXF 90

`unknown_bl13`
BL, DXF 90

`unknown_bl14`
BL, DXF 90

`unknown_bl15`
BL, DXF 90

`unknown_bl16`
BL, DXF 90

`unknown_bl17`
BL, DXF 90

`unknown_bl18`
BL, DXF 90

`unknown_bl19`
BL, DXF 90

`unknown_bl20`
BL, DXF 90

`unknown_bl21`
BL, DXF 90

`unknown_bl22`
BL, DXF 90

`unknown_bl23`
BL, DXF 90

`unknown_bl24`
BL, DXF 90

`unknown_bl25`
BL, DXF 90

`unknown_bl26`
BL, DXF 90

`unknown_bl27`
BL, DXF 90

`unknown_bl28`
BL, DXF 90

`unknown_bl29`
: BL, DXF 90

`unknown_bl30`
: BL, DXF 90

`unknown_bl31`
: BL, DXF 90

`unknown_bl32`
: BL, DXF 90

`unknown_bl33`
: BL, DXF 90

`unknown_bl34`
: BL, DXF 90

`unknown_bl35`
: BL, DXF 90

`unknown_bl36`
: BL, DXF 90

`unknown_b37`
: B, DXF 290

ASSOCPLANESURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
: BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
: BL, DXF 90

`class_version`
: BL, DXF 90

ASSOCPOINTREFACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
: BL, DXF 90

`name` T, DXF 1

`class_version`
: BS, DXF 90

`bs1` BS, DXF 90

`num_params`
BL, DXF 90

`params` H*, DXF 360

`has_child_param`
B

`child_status`
BS, DXF 90

`child_id` BL, DXF 90

`child_param`
H, DXF 330

`h330_2` H, DXF 330

`bl2` BL, DXF 90

`h330_3` H, DXF 330

ASSOCRESTOREENTITYSTATEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`class_version`
BL, DXF 90

`entity` H, DXF 330

ASSOCREVOLVEDSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCROTATEDDIMACTIONBODY

`parent` struct _dwg_object_object*

`aaab_version`
BS, DXF 90

`assoc_dep`
H, DXF 330

`aab_version`
BS, DXF 90

`actionbody`
H, DXF 360

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`class_version`
BS, DXF 90

`r_node` H, DXF 330

`d_node` H, DXF 330

ASSOCSWEPTSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

ASSOCTRIMSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`aab_version`
BL, DXF 90

`pab` Dwg_ASSOCPARAMBASEDACTIONBODY

`sab` Dwg_ASSOCSURFACEACTIONBODY

`pbsab_status`
BL, DXF 90

`class_version`
BL, DXF 90

`b1` B, DXF 290

`b2` B, DXF 290

`distance` BD, DXF 40

ASSOCVALUEDEPENDENCY

`parent` struct _dwg_object_object*

`assocdep` Dwg_Object_ASSOCDEPENDENCY

ASSOCVARIABLE

`parent` struct _dwg_object_object*

`av_class_version`
BS, DXF 90

`class_version`
BS, DXF 90

`geometry_status`
BL, DXF 90

`owningnetwork`
H, DXF 330

`actionbody`
H, DXF 360

`action_index`
BL, DXF 90

`max_assoc_dep_index`
BL, DXF 90

`num_deps` BL, DXF 90

`deps` Dwg_ASSOCACTION_Deps*

`num_owned_params`
BL

`owned_params`
H*

`num_values`
BL

`values` struct _dwg_VALUEPARAM*

`name` T, DXF 1

`t58` T, DXF 1

`evaluator`
T, DXF 1

`desc` T, DXF 1

`value` Dwg_EvalVariant

`has_t78` B, DXF 290

`t78` T, DXF 1

`b290` B, DXF 290

ASSOCVERTEXACTIONPARAM

`parent` struct _dwg_object_object*

`is_r2013` BS, DXF 90

`aap_version`
BL, DXF 90

`name` T, DXF 1

`asdap_class_version`
BL, DXF 90

`dep` H, DXF 330

`class_version`
BL, DXF 90

`pt` 3BD, DXF 10

BLKREFOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`rotation` BD, DXF 50

`ins_pt` 3BD, DXF 10

`scale_factor`
3BD_1, DXF 42

BLOCKALIGNEDCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`value` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKALIGNMENTGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

`orientation`
3BD_1, DXF 140

BLOCKALIGNMENTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`align_perpendicular`
B, DXF 280

BLOCKANGULARCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`center_pt`
3BD, DXF 1011

`end_pt` 3BD, DXF 1012

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`angle` BD, DXF 140

`orientation_on_both_grips`
B, DXF 280

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKARRAYACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`conn_pts` Dwg_BLOCKACTION_connectionpts

`column_offset`
BD, DXF 140

`row_offset`
BD, DXF 141

BLOCKBASEPOINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_pt` 3BD, DXF 1010

`num_propinfos`
BL, DXF 93

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`pt` 3BD, DXF 1011

`base_pt` 3BD, DXF 1012

BLOCKDIAMETRICCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`distance` BD, DXF 140

`orientation_on_both_grips`
B

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKFLIPACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`conn_pts` Dwg_BLOCKACTION_connectionpts

`action_offset_x`
BD

`action_offset_y`
BD

`angle_offset`
BD

BLOCKFLIPGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

`combined_state`
BL, DXF 93

`orientation`
3BD_1, DXF 140

`upd_state`
BS

`state` BS

BLOCKFLIPPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`flip_label`
T, DXF 305

`flip_label_desc`
T, DXF 306

`base_state_label`
T, DXF 307

`flipped_state_label`
T, DXF 308

`def_label_pt`
3BD, DXF 1012

`bl96` BL, DXF 96

`tooltip` T, DXF 309

BLOCKGRIPLOCATIONCOMPONENT

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`grip_type`
BL, DXF 91

`grip_expr`
T, DXF 300

BLOCKHORIZONTALCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`value` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKLINEARCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`value` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKLINEARGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

`orientation`
3BD_1, DXF 140

BLOCKLINEARPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`distance_name`
T, DXF 305

`distance_desc`
T, DXF 306

`distance` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKLOOKUPACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`numelems` BL

`numrows` BL, DXF 92

`numcols` BL, DXF 93

`lut` Dwg_BLOCKLOOKUPACTION_lut*

`exprs` TV*, DXF 302

`b280` B, DXF 280

BLOCKLOOKUPGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKLOOKUPPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_pt` 3BD, DXF 1010

`num_propinfos`
BL, DXF 93

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`lookup_name`
T, DXF 303

`lookup_desc`
T, DXF 304

`index` BL, DXF 94

`unknown_t`
T

BLOCKMOVEACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`conn_pts` Dwg_BLOCKACTION_connectionpts

`action_offset_x`
BD, DXF 140

`action_offset_y`
BD, DXF 141

`angle_offset`
BD

BLOCKPARAMDEPENDENCYBODY

`parent` struct _dwg_object_object*

`adb_version`
BS, DXF 90

`dimbase_version`
BS, DXF 90

`name` T, DXF 1

`class_version`
BS, DXF 90

BLOCKPOINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_pt` 3BD, DXF 1010

`num_propinfos`
BL, DXF 93

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`position_name`
T, DXF 303

`position_desc`
T, DXF 304

`def_label_pt`
3BD, DXF 1011

BLOCKPOLARGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKPOLARPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`angle_name`
T, DXF 305

`angle_desc`
T, DXF 306

`distance_name`
T, DXF 305

`distance_desc`
T, DXF 306

`offset` BD, DXF 140

`angle_value_set`
Dwg_BLOCKPARAMVALUESET

`distance_value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKPOLARSTRETCHACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`conn_pts` Dwg_BLOCKACTION_connectionpts

`num_pts` BL, DXF 72

`pts` 2RD*, DXF 10

`num_hdls` BL, DXF 73

`hdls` H*, DXF 331

`shorts` BS*, DXF 74

`num_codes`
BL, DXF 75

`codes` BL*, DXF 76

BLOCKPROPERTIESTABLE

`parent` struct _dwg_object_object*

BLOCKPROPERTIESTABLEGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKRADIALCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`distance` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKREPRESENTATION

`parent` struct _dwg_object_object*

`flag` BS, DXF 70

`block` H, DXF 340

BLOCKROTATEACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`offset` 3BD, DXF 1011

`conn_pts` Dwg_BLOCKACTION_connectionpts

`dependent`
B, DXF 280

`base_pt` 3BD, DXF 1012

BLOCKROTATIONGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKROTATIONPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`def_base_angle_pt`
3BD, DXF 1011

`angle_name`
T, DXF 305

`angle_desc`
T, DXF 306

`angle` BD, DXF 140

`angle_value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKSCALEACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`offset` 3BD, DXF 1011

`conn_pts` Dwg_BLOCKACTION_connectionpts

`dependent`
B, DXF 280

`base_pt` 3BD, DXF 1012

BLOCKSTRETCHACTION

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`display_location`
3BD, DXF 1010

`num_actions`
BL, DXF 70

`actions` BL*, DXF 91

`num_deps` BL, DXF 71

`deps` H*, DXF 330

`conn_pts` Dwg_BLOCKACTION_connectionpts

`num_pts` BL, DXF 72

`pts` 2RD*, DXF 1011

`num_hdls` BL, DXF 73

`hdls` H*, DXF 331

`shorts` BS*, DXF 74

`num_codes`
BL, DXF 75

`codes` BL*, DXF 76

`action_offset_x`
BD, DXF 140

`action_offset_y`
BD, DXF 141

`angle_offset`
BD

BLOCKUSERPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_pt` 3BD, DXF 1010

`num_propinfos`
BL, DXF 93

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`flag` BS, DXF 90

`assocvariable`
H, DXF 330

`expr` T, DXF 301

`value` Dwg_EvalVariant

`type` BS, DXF 170

BLOCKVERTICALCONSTRAINTPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`dependency`
H, DXF 330

`expr_name`
T, DXF 305

`expr_description`
T, DXF 306

`value` BD, DXF 140

`value_set`
Dwg_BLOCKPARAMVALUESET

BLOCKVISIBILITYGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKVISIBILITYPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_pt` 3BD, DXF 1010

`num_propinfos`
BL, DXF 93

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`is_initialized`
B, DXF 281

`unknown_bool`
B, DXF 91

`blockvisi_name`
T, DXF 301

`blockvisi_desc`
T, DXF 302

`num_blocks`
BL, DXF 93

`blocks` H*, DXF 331

`num_states`
BL, DXF 92

`states` Dwg_BLOCKVISIBILITYPARAMETER_state*

BLOCKXYGRIP

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`bg_bl91` BL, DXF 91

`bg_bl92` BL, DXF 92

`bg_location`
3BD, DXF 1010

`bg_insert_cycling`
B, DXF 280

`bg_insert_cycling_weight`
BLd, DXF 93

BLOCKXYPARAMETER

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

`name` T, DXF 300

`be_major` BL, DXF 98

`be_minor` BL, DXF 99

`eed1071` BL, DXF 1071

`show_properties`
B, DXF 280

`chain_actions`
B, DXF 281

`def_basept`
3BD, DXF 1010

`def_endpt`
3BD, DXF 1011

`prop1` Dwg_BLOCKPARAMETER_PropInfo

`prop2` Dwg_BLOCKPARAMETER_PropInfo

`prop3` Dwg_BLOCKPARAMETER_PropInfo

`prop4` Dwg_BLOCKPARAMETER_PropInfo

`prop_states`
BL*, DXF 91

`parameter_base_location`
BS, DXF 177

`upd_basept`
3BD

`basept` 3BD

`upd_endpt`
3BD

`endpt` 3BD

`x_label` T, DXF 305

`x_label_desc`
T, DXF 306

`y_label` T, DXF 307

`y_label_desc`
T, DXF 308

`x_value` BD, DXF 142

`y_value` BD, DXF 141

`x_value_set`
Dwg_BLOCKPARAMVALUESET

`y_value_set`
Dwg_BLOCKPARAMVALUESET

BLOCK_CONTROL

BLOCK_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

`model_space`
H

`paper_space`
H

BLOCK_HEADER

BLOCK_HEADER is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`__iterator`
BL

`flag2` RC

`flag3` RS

`anonymous`
B

`hasattrs` B

`blkisxref`
B

`xrefoverlaid`
B

`loaded_bit`
B

`num_owned`
BL

`base_pt` 3DPOINT, DXF 10

`xref_pname`
T, DXF 1

`num_inserts`
RL

`description`
T, DXF 4

`preview_size`
BL

`preview` TF, DXF 310

`insert_units`
BS, DXF 70

`explodable`
B, DXF 280

`block_scaling`
RC, DXF 281

`block_entity`
H

`first_entity`
H

`last_entity`
H

`entities` H*

`endblk_entity`
H

`inserts` H*, DXF 331

`layout` H, DXF 340

CELLSTYLEMAP

`parent` struct _dwg_object_object*

`num_cells`
BL, DXF 90

`cells` Dwg_TABLESTYLE_CellStyle*

CONTEXTDATAMANAGER

`parent` struct _dwg_object_object*

`objectcontext`
H

`num_submgrs`
BL

`submgrs` Dwg_CONTEXTDATA_submgr*

CSACDOCUMENTOPTIONS

`parent` struct _dwg_object_object*

`class_version`
BS

CURVEPATH

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`entity` H, DXF 340

DATALINK

`parent` struct _dwg_object_object*

`class_version`
BS

`data_adapter`
T, DXF 1

`description`
T, DXF 300

`tooltip` T, DXF 301

`connection_string`
T, DXF 302

`option` BL, DXF 90

`update_option`
BL, DXF 91

`bl92` BL, DXF 92

`year` BS, DXF 170

`month` BS, DXF 171

`day` BS, DXF 172

`hour` BS, DXF 173

`minute` BS, DXF 174

`seconds` BS, DXF 175

`msec` BS, DXF 176

`path_option`
BS, DXF 177

`bl93` BL, DXF 93

`update_status`
T, DXF 304

`num_customdata`
BL, DXF 94

`customdata`
Dwg_DATALINK_customdata*

`hardowner`
H, DXF 360

DATATABLE

`parent` struct _dwg_object_object*

`flags` BS, DXF 70

`num_cols` BL, DXF 90

`num_rows` BL, DXF 91

`table_name`
T, DXF 1

`cols` Dwg_DATATABLE_column*

DBCOLOR

`parent` struct _dwg_object_object*

`color` CMC, DXF 62

DETAILVIEWSTYLE

`parent` struct _dwg_object_object*

`mdoc_class_version`
BS, DXF 70

`desc` T, DXF 3

`is_modified_for_recompute`
B, DXF 290

`display_name`
T, DXF 300

`viewstyle_flags`
BL, DXF 90

`class_version`
BS, DXF 70

`flags` BL, DXF 90

`identifier_style`
H, DXF 340

`identifier_color`
CMC, DXF 62

`identifier_height`
BD, DXF 40

`identifier_exclude_characters`
T, DXF 300

`identifier_offset`
BD, DXF 40

`identifier_placement`
RC, DXF 280

`arrow_symbol`
H, DXF 340

`arrow_symbol_color`
CMC, DXF 62

`arrow_symbol_size`
BD, DXF 40

`boundary_ltype`
H, DXF 340

`boundary_linewt`
BLd, DXF 90

`boundary_line_color`
CMC, DXF 62

`viewlabel_text_style`
H, DXF 340

`viewlabel_text_color`
CMC, DXF 62

`viewlabel_text_height`
BD, DXF 40

`viewlabel_attachment`
BL, DXF 90

`viewlabel_offset`
BD, DXF 40

`viewlabel_alignment`
BL, DXF 90

`viewlabel_pattern`
T, DXF 300

`connection_ltype`
H, DXF 340

`connection_linewt`
BLd, DXF 90

`connection_line_color`
CMC, DXF 62

`borderline_ltype`
H, DXF 340

`borderline_linewt`
BLd, DXF 90

`borderline_color`
CMC, DXF 62

`model_edge`
RC, DXF 280

DICTIONARY

`parent` struct _dwg_object_object*

`numitems` BL

`is_hardowner`
RC, DXF 280

`cloning` BS, DXF 281

`texts` T*, DXF 3

`itemhandles`
H*, DXF 350

`cloning_r14`
RC

DICTIONARYVAR

`parent` struct _dwg_object_object*

`schema` RC, DXF 280

`strvalue` T, DXF 1

DICTIONARYWDFLT

`parent` struct _dwg_object_object*

`numitems` BL

`is_hardowner`
RC, DXF 280

`cloning` BS, DXF 281

`texts` T*, DXF 3

`itemhandles`
H*, DXF 350

`cloning_r14`
RL

`defaultid`
H, DXF 340

DIMASSOC

`parent` struct _dwg_object_object*

`dimensionobj`
H, DXF 330

`associativity`
BL, DXF 90

`trans_space_flag`
B, DXF 70

`rotated_type`
RC, DXF 71

`ref` Dwg_DIMASSOC_Ref*

DIMSTYLE

DIMSTYLE is a table object.

`parent` struct _dwg_object_object*

`flag` RC, DXF 70

`name` T

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`DIMTOL` B, DXF 71

`DIMLIM` B, DXF 72

`DIMTIH` B, DXF 73

`DIMTOH` B, DXF 74

`DIMSE1` B, DXF 75

`DIMSE2` B, DXF 76

`DIMALT` B, DXF 170

`DIMTOFL` B, DXF 172

`DIMSAH` B, DXF 173

`DIMTIX` B, DXF 174

`DIMSOXD` B, DXF 175

`DIMALTD` BS, DXF 171

`DIMZIN` BS, DXF 78

`DIMSD1` B, DXF 281

`DIMSD2` B, DXF 282

`DIMTOLJ` BS, DXF 283

`DIMJUST` BS, DXF 280

`DIMFIT` BS, DXF 287

`DIMUPT` B, DXF 288

`DIMTZIN` BS, DXF 284

`DIMMALTZ` BS, DXF 285

`DIMMALTTZ`
BS, DXF 286

`DIMTAD` BS, DXF 77

`DIMUNIT` BS, DXF 270

`DIMAUNIT` BS, DXF 275

`DIMDEC` BS, DXF 271

`DIMTDEC` BS, DXF 272

`DIMALTU` BS, DXF 273

`DIMALTTD` BS, DXF 274

`DIMSCALE` BD, DXF 40

`DIMASZ` BD, DXF 41

`DIMEXO` BD, DXF 42

`DIMDLI` BD, DXF 43

`DIMEXE` BD, DXF 44

`DIMRND` BD, DXF 45

`DIMDLE` BD, DXF 46

`DIMTP` BD, DXF 47

`DIMTM` BD, DXF 48

`DIMFXL` BD, DXF 49

`DIMJOGANG`
BD, DXF 50

`DIMTFILL` BS, DXF 69

`DIMTFILLCLR`
CMC, DXF 70

`DIMAZIN` BS, DXF 79

`DIMARCSYM`
BS, DXF 90

`DIMTXT` BD, DXF 140

`DIMCEN` BD, DXF 141

`DIMTSZ` BD, DXF 142

`DIMALTF` BD, DXF 143

`DIMLFAC` BD, DXF 144

`DIMTVP` BD, DXF 145

`DIMTFAC` BD, DXF 146

`DIMGAP` BD, DXF 147

`DIMPOST` T, DXF 3

`DIMAPOST` T, DXF 4

`DIMBLK_T` TV, DXF 5

`DIMBLK1_T`
: TV, DXF 6

`DIMBLK2_T`
: TV, DXF 7

`DIMALTRND`
: BD, DXF 148

`DIMCLRD_N`
: RS, DXF 176

`DIMCLRE_N`
: RS, DXF 177

`DIMCLRT_N`
: RS, DXF 178

`DIMCLRD` CMC, DXF 176

`DIMCLRE` CMC, DXF 177

`DIMCLRT` CMC, DXF 178

`DIMADEC` BS, DXF 179

`DIMFRAC` BS, DXF 276

`DIMLUNIT` BS, DXF 277

`DIMDSEP` BS, DXF 278

`DIMTMOVE` BS, DXF 279

`DIMALTZ` BS, DXF 285

`DIMALTTZ` BS, DXF 286

`DIMATFIT` BS, DXF 289

`DIMFXLON` B, DXF 290

`DIMTXTDIRECTION`
: B, DXF 295

`DIMALTMZF`
: BD

`DIMALTMZS`
: T

`DIMMZF` BD

`DIMMZS` T

`DIMLWD` BSd, DXF 371

`DIMLWE` BSd, DXF 372

`flag0` B

`DIMTXSTY` H, DXF 340

`DIMLDRBLK`
H, DXF 341

`DIMBLK` H, DXF 342

`DIMBLK1` H, DXF 343

`DIMBLK2` H, DXF 344

`DIMLTYPE` H, DXF 345

`DIMLTEX1` H, DXF 346

`DIMLTEX2` H, DXF 347

DIMSTYLE_CONTROL

DIMSTYLE_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

`num_morehandles`
RC, DXF 71

`morehandles`
H*, DXF 340

DMDIMOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`dimension`
Dwg_OCD_Dimension

`first_arc_pt`
3BD, DXF 11

`def_pt` 3BD, DXF 12

DUMMY

`parent` struct _dwg_object_object*

DYNAMICBLOCKPROXYNODE

`parent` struct _dwg_object_object*

`evalexpr` Dwg_EvalExpr

DYNAMICBLOCKPURGEPREVENTER

`parent` struct _dwg_object_object*

`flag` BS, DXF 70

`block` H

EVALUATION_GRAPH

`parent` struct _dwg_object_object*

`major` BL

`minor` BL

`first_nodeid`
BLd, DXF 96

`first_nodeid_copy`
BLd, DXF 97

`num_nodes`
BL

`nodes` Dwg_EVAL_Node*

`has_graph`
B

`num_edges`
BL

`edges` Dwg_EVAL_Edge*

FCFOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`location` 3BD, DXF 10

`horiz_dir`
3BD, DXF 11

FIELD

`parent` struct _dwg_object_object*

`id` T, DXF 1

`code` T, DXF 2

`num_childs`
BL, DXF 90

`childs` H*, DXF 360

`num_objects`
BL, DXF 97

`objects` H*, DXF 331

`format` TV, DXF 4

`evaluation_option`
BL, DXF 91

`filing_option`
BL, DXF 92

`field_state`
BL, DXF 94

`evaluation_status`
BL, DXF 95

`evaluation_error_code`
BL, DXF 96

`evaluation_error_msg`
T, DXF 300

`value` Dwg_TABLE_value

`value_string`
T, DXF 301

`value_string_length`
BL, DXF 98

`num_childval`
BL, DXF 93

`childval` Dwg_FIELD_ChildValue*

FIELDLIST

`parent` struct _dwg_object_object*

`num_fields`
BL, DXF 90

`unknown` B

`fields` H*, DXF 330

GEODATA

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`host_block`
H, DXF 330

`coord_type`
BS, DXF 70

`design_pt`
3BD, DXF 10

`ref_pt` 3BD_1, DXF 11

`obs_pt` 3BD, DXF 11

`scale_vec`
3BD_1, DXF 43

`unit_scale_horiz`
BD, DXF 40

`units_value_horiz`
BL, DXF 91

`unit_scale_vert`
BD, DXF 41

`units_value_vert`
BL, DXF 92

`up_dir` 3BD, DXF 210

`north_dir`
3BD, DXF 12

`scale_est`
BL, DXF 95

`user_scale_factor`
BD, DXF 141

`do_sea_level_corr`
B, DXF 294

`sea_level_elev`
BD, DXF 142

`coord_proj_radius`
BD, DXF 143

`coord_system_def`
T, DXF 301

`geo_rss_tag`
T, DXF 302

`coord_system_datum`
T, DXF 303

`coord_system_wkt`
T, DXF 304

`observation_from_tag`
T, DXF 305

`observation_to_tag`
T, DXF 306

`observation_coverage_tag`
T, DXF 307

`num_geomesh_pts`
BL, DXF 93

`geomesh_pts`
Dwg_GEODATA_meshpt*

`num_geomesh_faces`
BL, DXF 96

`geomesh_faces`
Dwg_GEODATA_meshface*

`has_civil_data`
B

`obsolete_false`
B, DXF 292

`ref_pt2d` 2RD, DXF 15

`zero1` 3BD, DXF 16

`unknown1` BL, DXF 93

`unknown2` BL, DXF 94

`unknown_b`
B, DXF 293

`north_dir_angle_deg`
BD, DXF 54

`north_dir_angle_rad`
BD, DXF 140

GEOMAPIMAGE

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`pt0` 3BD, DXF 10

`size` 2RD, DXF 13

`display_props`
BS, DXF 70

`clipping` B, DXF 280

`brightness`
RC, DXF 281

`contrast` RC, DXF 282

`fade` RC, DXF 283

`rotation` BD

`image_width`
BD

`image_height`
BD

`name` T

`image_file`
BD

`image_visibility`
BD

`transparency`
BS

`height` BD

`width` BD

`show_rotation`
B

`scale_factor`
BD

`geoimage_brightness`
BS

`geoimage_contrast`
BS

`geoimage_fade`
BS

`geoimage_position`
BS

`geoimage_width`
BS

`geoimage_height`
BS

GRADIENT_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`color_top`
BLx, DXF 90

`color_middle`
BLx, DXF 91

`color_bottom`
BLx, DXF 92

`horizon` BD, DXF 140

`height` BD, DXF 141

`rotation` BD, DXF 142

GROUND_PLANE_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`color_sky_zenith`
BLx, DXF 90

`color_sky_horizon`
BLx, DXF 91

`color_underground_horizon`
BLx, DXF 92

`color_underground_azimuth`
BLx, DXF 93

`color_near`
BLx, DXF 94

`color_far`
BLx, DXF 95

GROUP

`parent` struct _dwg_object_object*

`name` T, DXF 300

`unnamed` BS, DXF 70

`selectable`
BS, DXF 71

`num_groups`
BL

`groups` H*, DXF 340

IBL_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`enable` B, DXF 290

`name` T, DXF 1

`rotation` BD, DXF 40

`display_image`
B, DXF 290

`secondary_background`
H, DXF 340

IDBUFFER

`parent` struct _dwg_object_object*

`unknown` RC

`num_obj_ids`
BL

`obj_ids` H*, DXF 330

IMAGEDEF

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`image_size`
2RD, DXF 10

`file_path`
T, DXF 1

`is_loaded`
B, DXF 280

`resunits` RC, DXF 281

`pixel_size`
2RD, DXF 11

IMAGEDEF_REACTOR

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

IMAGE_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`filename` T, DXF 300

`fit_to_screen`
B, DXF 290

`maintain_aspect_ratio`
B, DXF 291

`use_tiling`
B, DXF 292

`offset` 2BD_1, DXF 140

`scale` 2BD_1, DXF 142

INDEX

`parent` struct _dwg_object_object*

`last_updated`
TIMEBLL, DXF 40

LAYER

LAYER is a table object.

`parent` struct _dwg_object_object*

`flag` BS

`name` T

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`frozen` B

`on` B

`frozen_in_new`
B

`locked` B

`plotflag` B, DXF 290

`linewt` RC, DXF 370

`color` CMC, DXF 62

`color_rs` short, DXF 62

`ltype_rs` RS, DXF 7

`plotstyle`
H, DXF 390

`material` H, DXF 347

`ltype` H, DXF 6

`visualstyle`
H, DXF 348

LAYERFILTER

`parent` struct _dwg_object_object*

`num_names`
BL

`names` TV*, DXF 8

LAYER_CONTROL

LAYER_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

LAYER_INDEX

`parent` struct _dwg_object_object*

`last_updated`
TIMEBLL, DXF 40

`num_entries`
BL

`entries` Dwg_LAYER_entry*

LAYOUT

`parent` struct _dwg_object_object*

`plotsettings`
Dwg_Object_PLOTSETTINGS

`layout_name`
T, DXF 1

`tab_order`
BS, DXF 71

`layout_flags`
BS, DXF 70

`INSBASE` 3DPOINT, DXF 12

`LIMMIN` 2DPOINT, DXF 10

`LIMMAX` 2DPOINT, DXF 11

`UCSORG` 3DPOINT, DXF 13

`UCSXDIR` 3DPOINT, DXF 16

`UCSYDIR` 3DPOINT, DXF 17

`ucs_elevation`
BD, DXF 146

`UCSORTHOVIEW`
BS, DXF 76

`EXTMIN` 3DPOINT, DXF 14

`EXTMAX` 3DPOINT, DXF 15

`block_header`
H, DXF 330

`active_viewport`
H, DXF 331

`base_ucs` H, DXF 346

`named_ucs`
H, DXF 345

`num_viewports`
BL

`viewports`
H*

LAYOUTPRINTCONFIG

`parent` struct _dwg_object_object*

`class_version`
BS

`flag` BS, DXF 93

LEADEROBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`num_points`
BL, DXF 70

`points` 3DPOINT*, DXF 10

`b290` B, DXF 290

`x_direction`
3DPOINT, DXF 11

`inspt_offset`
3DPOINT, DXF 12

`endptproj`
3DPOINT, DXF 13

LIGHTLIST

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`num_lights`
BL, DXF 90

`lights` Dwg_LIGHTLIST_light*

LONG_TRANSACTION

`parent` struct _dwg_object_object*

LTYPE

LTYPE is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`description`
T, DXF 3

`pattern_len`
BD, DXF 40

`alignment`
RC, DXF 72

`num_dashes`
: RC, DXF 73

`dashes`
: Dwg_LTYPE_dash*

`dashes_r11`
: RD*

`has_strings_area`
: B

`strings_area`
: TF

LTYPE_CONTROL

LTYPE_CONTROL is a table_control object.

`parent`
: struct _dwg_object_object*

`num_entries`
: BS, DXF 70

`entries`
: H*

`bylayer`
: H

`byblock`
: H

MATERIAL

`parent`
: struct _dwg_object_object*

`name`
: T, DXF 1

`description`
: T, DXF 2

`ambient_color`
: Dwg_MATERIAL_color

`diffuse_color`
: Dwg_MATERIAL_color

`diffusemap`
: Dwg_MATERIAL_mapper

`specular_gloss_factor`
: BD, DXF 44

`specular_color`
: Dwg_MATERIAL_color

`specularmap`
: Dwg_MATERIAL_mapper

`reflectionmap`
: Dwg_MATERIAL_mapper

`opacity_percent`
BD, DXF 140

`opacitymap`
Dwg_MATERIAL_mapper

`bumpmap` Dwg_MATERIAL_mapper

`refraction_index`
BD, DXF 145

`refractionmap`
Dwg_MATERIAL_mapper

`color_bleed_scale`
BD, DXF 460

`indirect_bump_scale`
BD, DXF 461

`reflectance_scale`
BD, DXF 462

`transmittance_scale`
BD, DXF 463

`two_sided_material`
B, DXF 290

`luminance`
BD, DXF 464

`luminance_mode`
BS, DXF 270

`translucence`
BD, DXF 148

`self_illumination`
BD, DXF 149

`reflectivity`
BD, DXF 468

`illumination_model`
BL, DXF 93

`channel_flags`
BL, DXF 94

`mode` BL, DXF 282

`genprocname`
T

`genproctype`
BS

`genprocvalbool`
B

`genprocvalint`
BS

`genprocvalreal`
BD

`genprocvaltext`
T

`genprocvalcolor`
CMC

`genproctableend`
B

`num_gentextures`
BS

`gentextures`
Dwg_MATERIAL_gentexture*

MENTALRAYRENDERSETTINGS

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`name` T, DXF 1

`fog_enabled`
B, DXF 290

`fog_background_enabled`
B, DXF 290

`backfaces_enabled`
B, DXF 290

`environ_image_enabled`
B, DXF 290

`environ_image_filename`
T, DXF 1

`description`
T, DXF 1

`display_index`
BL, DXF 90

`has_predefined`
B, DXF 290

`mr_version`
BL, DXF 90

`sampling1`
BL, DXF 90

`sampling2`
BL, DXF 90

`sampling_mr_filter`
BS, DXF 70

`sampling_filter1`
BD, DXF 40

`sampling_filter2`
BD, DXF 40

`sampling_contrast_color1`
BD, DXF 40

`sampling_contrast_color2`
BD, DXF 40

`sampling_contrast_color3`
BD, DXF 40

`sampling_contrast_color4`
BD, DXF 40

`shadow_mode`
BS, DXF 70

`shadow_maps_enabled`
B, DXF 290

`ray_tracing_enabled`
B, DXF 290

`ray_trace_depth1`
BL, DXF 90

`ray_trace_depth2`
BL, DXF 90

`ray_trace_depth3`
BL, DXF 90

`global_illumination_enabled`
B, DXF 290

`gi_sample_count`
BL, DXF 90

`gi_sample_radius_enabled`
B, DXF 290

`gi_sample_radius`
BD, DXF 40

`gi_photons_per_light`
BL, DXF 90

`photon_trace_depth1`
BL, DXF 90

`photon_trace_depth2`
BL, DXF 90

`photon_trace_depth3`
BL, DXF 90

`final_gathering_enabled`
B, DXF 290

`fg_ray_count`
BL, DXF 90

`fg_sample_radius_state1`
B, DXF 290

`fg_sample_radius_state2`
B, DXF 290

`fg_sample_radius_state3`
B, DXF 290

`fg_sample_radius1`
BD, DXF 40

`fg_sample_radius2`
BD, DXF 40

`light_luminance_scale`
BD, DXF 40

`diagnostics_mode`
BS, DXF 70

`diagnostics_grid_mode`
BS, DXF 70

`diagnostics_grid_float`
BD, DXF 40

`diagnostics_photon_mode`
BS, DXF 70

`diagnostics_bsp_mode`
BS, DXF 70

`export_mi_enabled`
B, DXF 290

`mr_description`
T, DXF 1

`tile_size`
BL, DXF 90

`tile_order`
BS, DXF 70

`memory_limit`
BL, DXF 90

`diagnostics_samples_mode`
B, DXF 290

`energy_multiplier`
BD, DXF 40

MLEADEROBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

MLEADERSTYLE

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 179

`content_type`
BS, DXF 170

`mleader_order`
BS, DXF 171

`leader_order`
BS, DXF 172

`max_points`
BL, DXF 90

`first_seg_angle`
BD, DXF 40

`second_seg_angle`
BD, DXF 41

`type` BS, DXF 173

`line_color`
CMC, DXF 91

`line_type`
H, DXF 340

`linewt` BLd, DXF 92

`has_landing`
B, DXF 290

`has_dogleg`
B, DXF 291

`landing_gap`
BD, DXF 42

`landing_dist`
BD, DXF 43

`description`
T, DXF 3

`arrow_head`
H, DXF 341

`arrow_head_size`
BD, DXF 44

`text_default`
T, DXF 300

`text_style`
H, DXF 342

`attach_left`
BS, DXF 174

`attach_right`
BS, DXF 178

`text_angle_type`
BS, DXF 175

`text_align_type`
BS, DXF 176

`text_color`
CMC, DXF 93

`text_height`
BD, DXF 45

`has_text_frame`
B, DXF 292

`text_always_left`
B, DXF 297

`align_space`
BD, DXF 46

`block` H, DXF 343

`block_color`
CMC, DXF 94

`block_scale`
3BD

`use_block_scale`
B, DXF 293

`block_rotation`
BD, DXF 141

`use_block_rotation`
B, DXF 294

`block_connection`
BS, DXF 177

`scale` BD, DXF 142

`is_changed`
B, DXF 295

`is_annotative`
B, DXF 296

`break_size`
BD, DXF 143

`attach_dir`
BS, DXF 271

`attach_top`
BS, DXF 273

`attach_bottom`
BS, DXF 272

`text_extended`
B, DXF 298

MLINESTYLE

`parent` struct _dwg_object_object*

`name` T, DXF 2

`description`
T, DXF 3

`flag` BS, DXF 70

`fill_color`
CMC, DXF 62

`start_angle`
BD, DXF 51

`end_angle`
BD, DXF 52

`num_lines`
RC, DXF 71

`lines` Dwg_MLINESTYLE_line*

MOTIONPATH

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`camera_path`
H, DXF 340

`target_path`
H, DXF 340

`viewtable`
H, DXF 340

`frames` BS, DXF 90

`frame_rate`
BS, DXF 90

`corner_decel`
B, DXF 290

MTEXTATTRIBUTEOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`horizontal_mode`
BS, DXF 70

`rotation` BD, DXF 50

`ins_pt` 2RD, DXF 10

`alignment_pt`
2RD, DXF 11

`enable_context`
B, DXF 290

`context` struct _dwg_object*

MTEXTOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`attachment`
BL, DXF 70

`ins_pt` 3BD, DXF 10

`x_axis_dir`
3BD, DXF 11

`rect_height`
BD, DXF 41

`rect_width`
BD, DXF 40

`extents_width`
BD, DXF 42

`extents_height`
BD, DXF 43

`column_type`
BL, DXF 71

`column_width`
BD, DXF 44

`gutter` BD, DXF 45

`auto_height`
B, DXF 73

`flow_reversed`
B, DXF 74

`num_column_heights`
BL, DXF 72

`column_heights`
BD*, DXF 46

NAVISWORKSMODELDEF

`parent` struct _dwg_object_object*

`flags` BS, DXF 70

`path` T, DXF 1

`status` B, DXF 290

`min_extent`
3BD, DXF 10

`max_extent`
3BD, DXF 11

`host_drawing_visibility`
B, DXF 290

OBJECT_PTR

`parent` struct _dwg_object_object*

ORDDIMOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`dimension`
Dwg_OCD_Dimension

`feature_location_pt`
3BD, DXF 11

`leader_endpt`
3BD, DXF 12

PARTIAL_VIEWING_INDEX

`parent` struct _dwg_object_object*

`num_entries`
BL

`has_entries`
B

`entries` Dwg_PARTIAL_VIEWING_INDEX_Entry*

PERSUBENTMGR

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`unknown_0`
BL, DXF 90

`unknown_2`
BL, DXF 90

`numassocsteps`
BL, DXF 90

`numassocsubents`
BL, DXF 90

`num_steps`
BL, DXF 90

`steps` BL*, DXF 90

`num_subents`
BL, DXF 90

`subents` BL*, DXF 90

PLACEHOLDER

`parent` struct _dwg_object_object*

PLOTSETTINGS

`parent` struct _dwg_object_object*

`printer_cfg_file`
T, DXF 1

`paper_size`
T, DXF 2

`canonical_media_name`
T, DXF 4

`plot_flags`
BS, DXF 70

`plotview` H, DXF 6

`plotview_name`
T, DXF 6

`left_margin`
BD, DXF 40

`bottom_margin`
BD, DXF 41

`right_margin`
BD, DXF 42

`top_margin`
BD, DXF 43

`paper_width`
BD, DXF 44

`paper_height`
BD, DXF 45

`plot_origin`
2BD_1, DXF 46

`plot_window_ll`
2BD_1, DXF 48

`plot_window_ur`
2BD_1, DXF 140

`plot_paper_unit`
BS, DXF 72

`plot_rotation_mode`
BS, DXF 73

`plot_type`
BS, DXF 74

`paper_units`
BD, DXF 142

`drawing_units`
BD, DXF 143

`stylesheet`
T, DXF 7

`std_scale_type`
BS, DXF 75

`std_scale_factor`
BD, DXF 147

`paper_image_origin`
2BD_1, DXF 148

`shadeplot_type`
BS, DXF 76

`shadeplot_reslevel`
BS, DXF 77

`shadeplot_customdpi`
BS, DXF 78

`shadeplot`
H, DXF 333

POINTCLOUDCOLORMAP

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`def_intensity_colorscheme`
T, DXF 1

`def_elevation_colorscheme`
T, DXF 1

`def_classification_colorscheme`
T, DXF 1

`num_colorramps`
BL, DXF 90

`colorramps`
Dwg_POINTCLOUDCOLORMAP_Ramp*

`num_classification_colorramps`
BL, DXF 90

`classification_colorramps`
Dwg_POINTCLOUDCOLORMAP_Ramp*

POINTCLOUDDEF

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`source_filename`
T, DXF 1

`is_loaded`
B, DXF 280

`numpoints`
RLL, DXF 160

`extents_min`
3BD, DXF 10

`extents_max`
3BD, DXF 11

POINTCLOUDDEFEX

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`source_filename`
T, DXF 1

`is_loaded`
B, DXF 280

`numpoints`
RLL, DXF 160

`extents_min`
3BD, DXF 10

`extents_max`
3BD, DXF 11

POINTCLOUDDEF_REACTOR

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

POINTCLOUDDEF_REACTOR_EX

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

POINTPATH

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 90

`point` 3BD, DXF 10

PROXY_OBJECT

`parent` struct _dwg_object_object*

`class_id` BL, DXF 91

`version` BL, DXF 71

`maint_version`
BL, DXF 97

`from_dxf` B, DXF 70

`data_numbits`
BL

`data_size`
BL, DXF 93

`data` TF, DXF 310

`num_objids`
BL

`objids` H*, DXF 340

RADIMLGOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`dimension`
Dwg_OCD_Dimension

`ovr_center`
3BD, DXF 12

`jog_point`
3BD, DXF 13

RADIMOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`dimension`
Dwg_OCD_Dimension

`first_arc_pt`
3BD, DXF 11

RAPIDRTRENDERSETTINGS

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`name` T, DXF 1

`fog_enabled`
B, DXF 290

`fog_background_enabled`
B, DXF 290

`backfaces_enabled`
B, DXF 290

`environ_image_enabled`
B, DXF 290

`environ_image_filename`
T, DXF 1

`description`
T, DXF 1

`display_index`
BL, DXF 90

`has_predefined`
B, DXF 290

`rapidrt_version`
BL, DXF 90

`render_target`
BL, DXF 70

`render_level`
BL, DXF 90

`render_time`
BL, DXF 90

`lighting_model`
BL, DXF 70

`filter_type`
BL, DXF 70

`filter_width`
BD, DXF 40

`filter_height`
BD, DXF 40

RASTERVARIABLES

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`image_frame`
BS, DXF 70

`image_quality`
BS, DXF 71

`units` BS, DXF 72

RENDERENTRY

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`image_file_name`
T, DXF 1

`preset_name`
T, DXF 1

`view_name`
T, DXF 1

`dimension_x`
BL, DXF 90

`dimension_y`
BL, DXF 90

`start_year`
BS, DXF 70

`start_month`
BS, DXF 70

`start_day`
BS, DXF 70

`start_minute`
BS, DXF 70

`start_second`
BS, DXF 70

`start_msec`
BS, DXF 70

`render_time`
BD, DXF 40

`memory_amount`
BL, DXF 90

`material_count`
BL, DXF 90

`light_count`
BL, DXF 90

`triangle_count`
BL, DXF 90

`display_index`
BL, DXF 90

RENDERENVIRONMENT

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`fog_enabled`
B, DXF 290

`fog_background_enabled`
B, DXF 290

`fog_color`
CMC, DXF 280

`fog_density_near`
BD, DXF 40

`fog_density_far`
BD, DXF 40

`fog_distance_near`
BD, DXF 40

`fog_distance_far`
BD, DXF 40

`environ_image_enabled`
B, DXF 290

`environ_image_filename`
T, DXF 1

RENDERGLOBAL

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`procedure`
BL, DXF 90

`destination`
BL, DXF 90

`save_enabled`
B, DXF 290

`save_filename`
T, DXF 1

`image_width`
BL, DXF 90

`image_height`
BL, DXF 90

`predef_presets_first`
B, DXF 290

`highlevel_info`
B, DXF 290

RENDERSETTINGS

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`name` T, DXF 1

`fog_enabled`
B, DXF 290

`fog_background_enabled`
B, DXF 290

`backfaces_enabled`
B, DXF 290

`environ_image_enabled`
B, DXF 290

`environ_image_filename`
T, DXF 1

`description`
T, DXF 1

`display_index`
BL, DXF 90

`has_predefined`
B, DXF 290

SCALE

`parent` struct _dwg_object_object*

`flag` BS, DXF 70

`name` T, DXF 300

`paper_units`
BD, DXF 140

`drawing_units`
BD, DXF 141

`is_unit_scale`
B, DXF 290

SECTIONVIEWSTYLE

`parent` struct _dwg_object_object*

`mdoc_class_version`
BS, DXF 70

`desc` T, DXF 3

`is_modified_for_recompute`
B, DXF 290

`display_name`
T, DXF 300

`viewstyle_flags`
BL, DXF 90

`class_version`
BS, DXF 70

`flags` BL, DXF 90

`identifier_style`
H, DXF 340

`identifier_color`
CMC, DXF 62

`identifier_height`
BD, DXF 40

`arrow_start_symbol`
H, DXF 340

`arrow_end_symbol`
H, DXF 340

`arrow_symbol_color`
CMC, DXF 62

`arrow_symbol_size`
BD, DXF 40

`identifier_exclude_characters`
T, DXF 300

`identifier_position`
BLd, DXF 90

`identifier_offset`
BD, DXF 40

`arrow_position`
BLd, DXF 90

`arrow_symbol_extension_length`
BD, DXF 40

`plane_ltype`
H, DXF 340

`plane_linewt`
BLd, DXF 90

`plane_line_color`
CMC, DXF 62

`bend_ltype`
H, DXF 340

`bend_linewt`
BLd, DXF 90

`bend_line_color`
CMC, DXF 62

`bend_line_length`
BD, DXF 40

`end_line_overshoot`
BD, DXF 40

`end_line_length`
BD, DXF 40

`viewlabel_text_style`
H, DXF 340

`viewlabel_text_color`
CMC, DXF 62

`viewlabel_text_height`
BD, DXF 40

`viewlabel_attachment`
BL, DXF 90

`viewlabel_offset`
BD, DXF 40

`viewlabel_alignment`
BL, DXF 90

`viewlabel_pattern`
T, DXF 300

`hatch_color`
CMC, DXF 62

`hatch_bg_color`
CMC, DXF 62

`hatch_pattern`
T, DXF 300

`hatch_scale`
BD, DXF 40

`hatch_transparency`
BLd, DXF 90

`unknown_b1`
B, DXF 290

`unknown_b2`
B, DXF 290

`num_hatch_angles`
BL, DXF 90

`hatch_angles`
BD*, DXF 40

SECTION_MANAGER

`parent` struct _dwg_object_object*

`is_live` B, DXF 70

`num_sections`
BS, DXF 90

`sections` H*, DXF 330

SECTION_SETTINGS

`parent` struct _dwg_object_object*

`curr_type`
BS, DXF 90

`num_types`
BL, DXF 91

`types` Dwg_SECTION_typesettings*

SKYLIGHT_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`sunid` H, DXF 340

SOLID_BACKGROUND

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`color` BLx, DXF 90

SORTENTSTABLE

`parent` struct _dwg_object_object*

`num_ents` BL

`sort_ents`
H*, DXF 5

`block_owner`
H

`ents` H*, DXF 331

SPATIAL_FILTER

`parent` struct _dwg_object_object*

`num_clip_verts`
BS, DXF 70

`clip_verts`
: 2RD*, DXF 10

`extrusion`
: BE, DXF 210

`origin` 3BD, DXF 11

`display_boundary_on`
: BS, DXF 71

`front_clip_on`
: BS, DXF 72

`front_clip_z`
: BD, DXF 40

`back_clip_on`
: BS, DXF 73

`back_clip_z`
: BD, DXF 41

`inverse_transform`
: BD*, DXF 40

`transform`
: BD*, DXF 40

SPATIAL_INDEX

`parent` struct _dwg_object_object*

`last_updated`
: TIMEBLL, DXF 40

`num1` BD, DXF 40

`num_hdls` BL, DXF 90

`hdls` H*, DXF 330

`bindata_size`
: BL, DXF 90

`bindata` TF, DXF 310

STYLE

STYLE is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
: B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`is_shape` B

`is_vertical`
B

`text_size`
BD, DXF 40

`width_factor`
BD, DXF 41

`oblique_angle`
BD, DXF 50

`generation`
RC, DXF 71

`last_height`
BD, DXF 42

`font_file`
T, DXF 3

`bigfont_file`
T, DXF 4

STYLE_CONTROL

STYLE_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

SUN

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`is_on` B, DXF 290

`color` CMC, DXF 63

`intensity`
BD, DXF 40

`has_shadow`
B, DXF 291

`julian_day`
BL, DXF 91

`msecs` BL, DXF 92

`is_dst` B, DXF 292

`shadow_type`
BL, DXF 70

`shadow_mapsize`
BS, DXF 71

`shadow_softness`
RC, DXF 280

SUNSTUDY

`parent` struct _dwg_object_object*

`class_version`
BL, DXF 90

`setup_name`
T, DXF 1

`description`
T, DXF 2

`output_type`
BL, DXF 70

`sheet_set_name`
T, DXF 3

`use_subset`
B, DXF 290

`sheet_subset_name`
T, DXF 4

`select_dates_from_calendar`
B, DXF 291

`num_dates`
BL, DXF 91

`dates` Dwg_SUNSTUDY_Dates*

`select_range_of_dates`
B, DXF 292

`start_time`
BL, DXF 93

`end_time` BL, DXF 94

`interval` BL, DXF 95

`num_hours`
BL, DXF 91

`hours` B*, DXF 290

`shade_plot_type`
BL, DXF 74

`numvports`
BL, DXF 75

`numrows` BL, DXF 76

`numcols` BL, DXF 77

`spacing` BD, DXF 40

`lock_viewports`
B, DXF 293

`label_viewports`
B, DXF 294

`page_setup_wizard`
H, DXF 340

`view` H, DXF 341

`visualstyle`
H, DXF 342

`text_style`
H, DXF 343

TABLECONTENT

`parent` struct _dwg_object_object*

`ldata` Dwg_LinkedData

`tdata` Dwg_LinkedTableData

`fdata` Dwg_FormattedTableData

`tablestyle`
H, DXF 340

TABLEGEOMETRY

`parent` struct _dwg_object_object*

`numrows` BL, DXF 90

`numcols` BL, DXF 91

`num_cells`
BL, DXF 92

`cells` Dwg_TABLEGEOMETRY_Cell*

TABLESTYLE

`parent` struct _dwg_object_object*

`class_version`
BS

`name` T, DXF 3

`flags` BS, DXF 71

`flow_direction`
BS, DXF 70

`horiz_cell_margin`
BD, DXF 40

`vert_cell_margin`
BD, DXF 41

`is_title_suppressed`
B, DXF 280

`is_header_suppressed`
B, DXF 281

`unknown_rc`
RC, DXF 70

`unknown_bl1`
BL

`unknown_bl2`
BL

`cellstyle`
H

`sty` Dwg_TABLESTYLE_CellStyle

`numoverrides`
BL

`unknown_bl3`
BL

`ovr` Dwg_TABLESTYLE_CellStyle

`num_rowstyles`
BL

`rowstyles`
Dwg_TABLESTYLE_rowstyles*

TEXTOBJECTCONTEXTDATA

`parent` struct _dwg_object_object*

`class_version`
BS, DXF 70

`is_default`
B, DXF 290

`scale` H, DXF 340

`horizontal_mode`
BS, DXF 70

`rotation` BD, DXF 50

`ins_pt` 2RD, DXF 10

`alignment_pt`
2RD, DXF 11

TVDEVICEPROPERTIES

`parent` struct _dwg_object_object*

`flags` BL

`max_regen_threads`
BS

`use_lut_palette`
BL

`alt_hlt` BLL

`alt_hltcolor`
BLL

`geom_shader_usage`
BLL

`blending_mode`
BL

`antialiasing_level`
BD

`bd2` BD

UCS

UCS is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`ucsorg` 3BD, DXF 10

`ucsxdir` 3BD, DXF 11

`ucsydir` 3BD, DXF 12

`ucs_elevation`
BD, DXF 146

`UCSORTHOVIEW`
BS, DXF 79

`base_ucs` H, DXF 346

`named_ucs`
H

`num_orthopts`
BS

`orthopts` Dwg_UCS_orthopts*

UCS_CONTROL

UCS_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

UNKNOWN_OBJ

`parent` struct _dwg_object_object*

VBA_PROJECT

`parent` struct _dwg_object_object*

`data_size`
BL, DXF 90

`data` TF, DXF 310

VIEW

VIEW is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
: B

`is_xref_resolved`
: BS

`is_xref_dep`
: B

`xref` H

`VIEWSIZE` BD, DXF 40

`view_width`
: BD, DXF 41

`aspect_ratio`
: BD

`VIEWCTR` 2RD, DXF 10

`view_target`
: 3BD, DXF 12

`VIEWDIR` 3BD, DXF 11

`twist_angle`
: BD, DXF 50

`lens_length`
: BD, DXF 42

`front_clip_z`
: BD, DXF 43

`back_clip_z`
: BD, DXF 44

`VIEWMODE` 4BITS, DXF 71

`render_mode`
: RC, DXF 281

`use_default_lights`
: B, DXF 292

`default_lightning_type`
: RC, DXF 282

`brightness`
: BD, DXF 141

`contrast` BD, DXF 142

`ambient_color`
: CMC, DXF 63

`is_pspace`
: B

`associated_ucs`
B, DXF 72

`ucsorg` 3BD, DXF 110

`ucsxdir` 3BD, DXF 111

`ucsydir` 3BD, DXF 112

`ucs_elevation`
BD, DXF 146

`UCSORTHOVIEW`
BS, DXF 79

`is_camera_plottable`
B, DXF 73

`background`
H, DXF 332

`visualstyle`
H, DXF 348

`sun` H, DXF 361

`base_ucs` H, DXF 346

`named_ucs`
H, DXF 345

`livesection`
H, DXF 334

VIEW_CONTROL

VIEW_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

VISUALSTYLE

`parent` struct _dwg_object_object*

`description`
T, DXF 2

`style_type`
BL, DXF 70

`ext_lighting_model`
BS, DXF 177

`internal_only`
B, DXF 291

`face_lighting_model`
BL, DXF 71

`face_lighting_model_int`
BS, DXF 176

`face_lighting_quality`
BL, DXF 72

`face_lighting_quality_int`
BS, DXF 176

`face_color_mode`
BL, DXF 73

`face_color_mode_int`
BS, DXF 176

`face_opacity`
BD, DXF 40

`face_opacity_int`
BS, DXF 176

`face_specular`
BD, DXF 41

`face_specular_int`
BS, DXF 176

`face_modifier`
BL, DXF 90

`face_modifier_int`
BS, DXF 176

`face_mono_color`
CMC, DXF 63

`face_mono_color_int`
BS, DXF 176

`edge_model`
BS, DXF 74

`edge_model_int`
BS, DXF 176

`edge_style`
BL, DXF 91

`edge_style_int`
BS, DXF 176

`edge_intersection_color`
CMC, DXF 64

`edge_intersection_color_int`
BS, DXF 176

`edge_obscured_color`
CMC, DXF 65

`edge_obscured_color_int`
BS, DXF 176

`edge_obscured_ltype`
BL, DXF 75

`edge_obscured_ltype_int`
BS, DXF 176

`edge_intersection_ltype`
BL, DXF 175

`edge_intersection_ltype_int`
BS, DXF 176

`edge_crease_angle`
BD, DXF 42

`edge_crease_angle_int`
BS, DXF 176

`edge_modifier`
BL, DXF 92

`edge_modifier_int`
BS, DXF 176

`edge_color`
CMC, DXF 66

`edge_color_int`
BS, DXF 176

`edge_opacity`
BD, DXF 43

`edge_opacity_int`
BS, DXF 176

`edge_width`
BL, DXF 76

`edge_width_int`
BS, DXF 176

`edge_overhang`
BL, DXF 77

`edge_overhang_int`
BS, DXF 176

`edge_jitter`
BL, DXF 78

`edge_jitter_int`
BS, DXF 176

`edge_silhouette_color`
CMC, DXF 67

`edge_silhouette_color_int`
BS, DXF 176

`edge_silhouette_width`
BL, DXF 79

`edge_silhouette_width_int`
BS, DXF 176

`edge_halo_gap`
BL, DXF 170

`edge_halo_gap_int`
BS, DXF 176

`edge_isolines`
BL, DXF 171

`edge_isolines_int`
BS, DXF 176

`edge_do_hide_precision`
B, DXF 290

`edge_do_hide_precision_int`
BS, DXF 176

`edge_style_apply`
BL, DXF 174

`edge_style_apply_int`
BS

`display_settings`
BL, DXF 93

`display_settings_int`
BS, DXF 176

`display_brightness_bl`
BLd, DXF 44

`display_brightness`
BD, DXF 44

`display_brightness_int`
BS, DXF 176

`display_shadow_type`
BL, DXF 173

`display_shadow_type_int`
BS, DXF 176

`bd2007_45`
BD, DXF 45

`num_props`
BS, DXF 70

`b_prop1c` B, DXF 290

`b_prop1c_int`
BS, DXF 176

`b_prop1d` B, DXF 290

`b_prop1d_int`
BS, DXF 176

`b_prop1e` B, DXF 290

`b_prop1e_int`
BS, DXF 176

`b_prop1f` B, DXF 290

`b_prop1f_int`
BS, DXF 176

`b_prop20` B, DXF 290

`b_prop20_int`
BS, DXF 176

`b_prop21` B, DXF 290

`b_prop21_int`
BS, DXF 176

`b_prop22` B, DXF 290

`b_prop22_int`
BS, DXF 176

`b_prop23` B, DXF 290

`b_prop23_int`
BS, DXF 176

`b_prop24` B, DXF 290

`b_prop24_int`
BS, DXF 176

`bl_prop25`
BL, DXF 90

`bl_prop25_int`
: BS, DXF 176

`bd_prop26`
: BD, DXF 40

`bd_prop26_int`
: BS, DXF 176

`bd_prop27`
: BD, DXF 40

`bd_prop27_int`
: BS, DXF 176

`bl_prop28`
: BL, DXF 90

`bl_prop28_int`
: BS, DXF 176

`c_prop29` CMC, DXF 62

`c_prop29_int`
: BS, DXF 176

`bl_prop2a`
: BL, DXF 90

`bl_prop2a_int`
: BS, DXF 176

`bl_prop2b`
: BL, DXF 90

`bl_prop2b_int`
: BS, DXF 176

`c_prop2c` CMC, DXF 62

`c_prop2c_int`
: BS, DXF 176

`b_prop2d` B, DXF 290

`b_prop2d_int`
: BS, DXF 176

`bl_prop2e`
: BL, DXF 90

`bl_prop2e_int`
: BS, DXF 176

`bl_prop2f`
: BL, DXF 90

`bl_prop2f_int`
: BS, DXF 176

`bl_prop30`
: BL, DXF 90

`bl_prop30_int`
: BS, DXF 176

`b_prop31` B, DXF 290

`b_prop31_int`
: BS, DXF 176

`bl_prop32`
: BL, DXF 90

`bl_prop32_int`
: BS, DXF 176

`c_prop33` CMC, DXF 62

`c_prop33_int`
: BS, DXF 176

`bd_prop34`
: BD, DXF 40

`bd_prop34_int`
: BS, DXF 176

`edge_wiggle`
: BL, DXF 90

`edge_wiggle_int`
: BS, DXF 176

`strokes` T, DXF 1

`strokes_int`
: BS, DXF 176

`b_prop37` B, DXF 290

`b_prop37_int`
: BS, DXF 176

`bd_prop38`
: BD, DXF 40

`bd_prop38_int`
: BS, DXF 176

`bd_prop39`
: BD, DXF 40

`bd_prop39_int`
: BS, DXF 176

VPORT

VPORT is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`VIEWSIZE` BD, DXF 40

`view_width`
BD

`aspect_ratio`
BD, DXF 41

`VIEWCTR` 2RD, DXF 12

`view_target`
3BD, DXF 17

`VIEWDIR` 3BD, DXF 16

`view_twist`
BD, DXF 51

`lens_length`
BD, DXF 42

`front_clip_z`
BD, DXF 43

`back_clip_z`
BD, DXF 44

`VIEWMODE` 4BITS, DXF 71

`render_mode`
RC, DXF 281

`use_default_lights`
B, DXF 292

`default_lightning_type`
RC, DXF 282

`brightness`
BD, DXF 141

`contrast` BD, DXF 142

`ambient_color`
CMC, DXF 63

`lower_left`
2RD, DXF 10

`upper_right`
2RD, DXF 11

`UCSFOLLOW`
B, DXF 71

`circle_zoom`
BS, DXF 72

`FASTZOOM` B, DXF 73

`UCSICON` RC, DXF 74

`GRIDMODE` B, DXF 76

`GRIDUNIT` 2RD, DXF 15

`SNAPMODE` B, DXF 75

`SNAPSTYLE`
B, DXF 77

`SNAPISOPAIR`
BS, DXF 78

`SNAPANG` BD, DXF 50

`SNAPBASE` 2RD, DXF 13

`SNAPUNIT` 2RD, DXF 14

`ucs_at_origin`
B

`UCSVP` B, DXF 71

`ucsorg` 3BD, DXF 110

`ucsxdir` 3BD, DXF 111

`ucsydir` 3BD, DXF 112

`ucs_elevation`
BD, DXF 146

`UCSORTHOVIEW`
BS, DXF 79

`grid_flags`
BS, DXF 60

`grid_major`
BS, DXF 61

`background`
H, DXF 332

`visualstyle`
H, DXF 348

`sun` H, DXF 361

`named_ucs`
H, DXF 345

`base_ucs` H, DXF 346

VPORT_CONTROL

VPORT_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

VX_CONTROL

VX_CONTROL is a table_control object.

`parent` struct _dwg_object_object*

`num_entries`
BS, DXF 70

`entries` H*

VX_TABLE_RECORD

VX_TABLE_RECORD is a table object.

`parent` struct _dwg_object_object*

`flag` RC

`name` TV

`used` RS

`is_xref_ref`
B

`is_xref_resolved`
BS

`is_xref_dep`
B

`xref` H

`is_on` B, DXF 290

`viewport` H, DXF 338

`prev_entry`
H, DXF 340

WIPEOUTVARIABLES

`parent` struct _dwg_object_object*

`display_frame`
BS, DXF 70

XRECORD

`parent` struct _dwg_object_object*

`cloning` BS, DXF 280

`xdata_size`
BL

`num_xdata`
BL

`xdata` Dwg_Resbuf*

`num_objid_handles`
BL

`objid_handles`
H*, DXF 340

PDFDEFINITION

`parent` struct _dwg_object_object*

`filename` T, DXF 1

`name` T, DXF 2

DGNDEFINITION

See [UNDERLAYDEFINITION], page 213,

DWFDEFINITION

See [UNDERLAYDEFINITION], page 213,

ASSOCARRAYMODIFYPARAMETERS

`parent` struct _dwg_object_object*

`aap_version`
BL

`num_items`
BL

`classname`
TV

`items` Dwg_ASSOCARRAYITEM*

`numitems` BL

`numrows` BL

`numlevels`
BL

ASSOCARRAYPATHPARAMETERS

See [ASSOCARRAYPARAMETERS], page 213,

ASSOCARRAYPOLARPARAMETERS

See [ASSOCARRAYPARAMETERS], page 213,

ASSOCARRAYRECTANGULARPARAMETERS

See [ASSOCARRAYPARAMETERS], page 213,

Dwg_3DSOLID_material

`parent` struct _dwg_entity_3DSOLID*

`array_index`
BL

`mat_absref`
BL

`material_handle`
H

Dwg_3DSOLID_silhouette

`parent` struct _dwg_entity_3DSOLID*

`vp_id` BL

`vp_target`
3BD

`vp_dir_from_target`
3BD

`vp_up_dir`
3BD

`vp_perspective`
B

`has_wires`
B

`num_wires`
BL

`wires` Dwg_3DSOLID_wire*

Dwg_3DSOLID_wire

`parent` struct _dwg_entity_3DSOLID*

`type` RC

`selection_marker`
BLd

`color` BL

`acis_index`
BLd

`num_points`
BL

`points` 3BD*

`transform_present`
B

`axis_x` 3BD

`axis_y` 3BD

`axis_z` 3BD

`translation`
3BD

`scale` 3BD

`has_rotation`
B

`has_reflection`
B

`has_shear`
B

Dwg_ACSH_HistoryNode

`major` BL

`minor` BL

`trans` BD*, DXF 40

`color` CMC

`step_id` BL

`material` H

Dwg_ACSH_SubentColor

`major` BL

`minor` BL

`transparency`
BL

`bl93` BL

`is_face_variable`
B

Dwg_ACSH_SubentMaterial

`major` BL

`minor` BL

`reflectance`
BL

`displacement`
BL

Dwg_ACTIONBODY

`parent` struct _dwg_object_ASSOCNETWORK*

`evaluatorid`
T

`expression`
T

`value` BL

Dwg_ARRAYITEMLOCATOR

`parent` struct _dwg_object_ASSOCARRAYMODIFYACTIONBODY*

`itemloc1` BL, DXF 90

`itemloc2` BL, DXF 90

`itemloc3` BL, DXF 90

Dwg_ASSOCACTIONBODY_action

`parent` struct _dwg_object_ASSOCMLEADERACTIONBODY*

`depid` BL

`dep` H, DXF 330

Dwg_ASSOCACTION_Deps

`parent` struct _dwg_object_ASSOCACTION*

`is_owned` B

`dep` H

Dwg_ASSOCARRAYITEM

`parent` struct _dwg_abstractobject_ASSOCARRAYPARAMETERS*

`class_version`
BL, DXF 90

`itemloc[3]`
BL

`flags` BL

`is_default_transmatrix`
int

`x_dir` 3BD

`transmatrix`
BD*

`rel_transform`
BD*

`has_h1` int

`h1` H

`h2` H

Dwg_ASSOCPARAMBASEDACTIONBODY

`parent` struct _dwg_object_object*

`version` BL

`minor` BL

`num_deps` BL, DXF 90

`deps` H*

`l4` BL

`l5` BL

`assocdep` H

`num_values`
BL

`values` struct _dwg_VALUEPARAM*

Dwg_ASSOCSURFACEACTIONBODY

`parent` struct _dwg_object_object*

`version` BL

`is_semi_assoc`
B

`l2` BL

`is_semi_ovr`
B

`grip_status`
BS

`assocdep` H

Dwg_AcDs

`file_signature`
RL

`file_header_size`
RL

`unknown_1`
RL

`version` RL

`unknown_2`
RL

`ds_version`
RL

`segidx_offset`
RL

`segidx_unknown`
RL

`num_segidx`
RL

`schidx_segidx`
RL

`datidx_segidx`
RL

`search_segidx`
RL

`prvsav_segidx`
RL

`file_size`
RL

`total_segments`
BL

`segidx` Dwg_AcDs_SegmentIndex*

`datidx` Dwg_AcDs_DataIndex

`data` Dwg_AcDs_Data*

`blob01` Dwg_AcDs_DataBlob

`schidx` Dwg_AcDs_SchemaIndex

`schdat` Dwg_AcDs_SchemaData

`search` Dwg_AcDs_Search

`segments` Dwg_AcDs_Segment*

Dwg_AcDs_Data

`record_hdrs`
Dwg_AcDs_Data_RecordHdr*

`records` Dwg_AcDs_Data_Record*

Dwg_AcDs_DataBlob

`data_size`
RLL

`page_count`
RL

`record_size`
RL

`page_size`
RL

`unknown_1`
RL

`unknown_2`
RL

`ref` Dwg_AcDs_DataBlobRef*

Dwg_AcDs_DataBlob01

`total_data_size`
RLL

`page_start_offset`
RLL

`page_index`
int32_t

`page_count`
int32_t

`page_data_size`
RLL

`page_data`
RC*

Dwg_AcDs_DataBlobRef

`total_data_size`
RLL

`num_pages`
RL

`record_size`
RL

`page_size`
RL

`unknown_1`
RL

`unknown_2`
RL

`pages` Dwg_AcDs_DataBlobRef_Page*

Dwg_AcDs_DataBlobRef_Page

`segidx` RL

`size` RL

Dwg_AcDs_DataIndex

`num_entries`
RL

`di_unknown`
RL

`entries` Dwg_AcDs_DataIndex_Entry*

Dwg_AcDs_DataIndex_Entry

`segidx` RL

`offset` RL

`schidx` RL

Dwg_AcDs_Data_Record

`data_size`
RL

`blob` RC*

Dwg_AcDs_Data_RecordHdr

`entry_size`
RL

`unknown` RL

`handle` RLL

`offset` RL

Dwg_AcDs_Schema

`num_index`
RS

`index` RLL*

`num_props`
RS

`props` Dwg_AcDs_Schema_Prop*

Dwg_AcDs_SchemaData

`num_uprops`
RL

`uprops` Dwg_AcDs_SchemaData_UProp*

`num_schemas`
RL

`schemas` Dwg_AcDs_Schema*

`num_propnames`
RL

`propnames`
TV*

Dwg_AcDs_SchemaData_UProp

`size` RL

`flags` RL

Dwg_AcDs_SchemaIndex

`num_props`
RL

`si_unknown_1`
RL

`props` Dwg_AcDs_SchemaIndex_Prop*

`si_tag` RLL

`num_prop_entries`
RL

`si_unknown_2`
RL

`prop_entries`
Dwg_AcDs_SchemaIndex_Prop*

Dwg_AcDs_SchemaIndex_Prop

`index` RL

`segidx` RL

`offset` RL

Dwg_AcDs_Schema_Prop

`flags` RL

`namidx` RL

`type` RL

`type_size`
RL

`unknown_1`
RL

`unknown_2`
RL

`num_values`
RS

`values` RC*

Dwg_AcDs_Search

`num_search`
RL

`search` Dwg_AcDs_Search_Data*

Dwg_AcDs_Search_Data

`schema_namidx`
RL

`num_sortedidx`
RL

`sortedidx`
RLL*

`num_ididxs`
RL

`unknown` RL

`ididxs` Dwg_AcDs_Search_IdIdxs*

Dwg_AcDs_Search_IdIdx

`handle` RLL

`num_ididx`
RL

`ididx` RLL*

Dwg_AcDs_Search_IdIdxs

`num_ididx`
RL

`ididx` Dwg_AcDs_Search_IdIdx*

Dwg_AcDs_Segment

`signature`
RL

`name[7]` RC

`type` RCd

`segment_idx`
RL

`is_blob01`
RL

`segsize` RL

`unknown_2`
RL

`ds_version`
RL

`unknown_3`
RL

`data_algn_offset`
RL

`objdata_algn_offset`
RL

`padding[9]`
RC

Dwg_AcDs_SegmentIndex

`offset` RLL

`size` RL

Dwg_BLOCKACTION_connectionpts

`code` BL

`name` TV

Dwg_BLOCKLOOKUPACTION_lut

`parent` struct _dwg_object_BLOCKLOOKUPACTION*

`conn_pts` Dwg_BLOCKACTION_connectionpts

`b282` B, DXF 282

`b281` B, DXF 281

Dwg_BLOCKPARAMETER_PropInfo

`num_connections`
BL

`connections`
Dwg_BLOCKPARAMETER_connection*

Dwg_BLOCKPARAMETER_connection

`code` BL

`name` T

Dwg_BLOCKPARAMVALUESET

`desc` TV

`flags` BL

`minimum` BD

`maximum` BD

`increment`
BD

`num_valuelist`
BS

`valuelist`
BD*

Dwg_BLOCKVISIBILITYPARAMETER_state

`parent` struct _dwg_object_BLOCKVISIBILITYPARAMETER*

`name` T, DXF 303

`num_blocks`
BL, DXF 94

`blocks` H*, DXF 332

`num_params`
BL, DXF 95

`params` H*, DXF 333

Dwg_COMPOUNDOBJECTID

`parent` struct _dwg_object_object*

`has_object`
B

`name` T

`object` H

Dwg_CONSTRAINTGROUPNODE

`parent` struct _dwg_object_ASSOC2DCONSTRAINTGROUP*

`nodeid` BL

`status` RC

`num_connections`
BL

`connections`
BL*

Dwg_CONTEXTDATA_dict

`parent` struct _dwg_CONTEXTDATA_submgr*

`text` T, DXF 3

`itemhandle`
H, DXF 350

Dwg_CONTEXTDATA_submgr

`parent` struct _dwg_object_CONTEXTDATAMANAGER*

`handle` H

`num_entries`
BL, DXF 90

`entries` Dwg_CONTEXTDATA_dict*

Dwg_CellContentGeometry

`dist_top_left`
3BD, DXF 10

`dist_center`
3BD, DXF 11

`content_width`
BD, DXF 43

`content_height`
BD, DXF 44

`width` BD, DXF 45

`height` BD, DXF 46

`unknown` BL, DXF 95

`cell_parent`
struct _dwg_TableCell*

`geom_parent`
struct _dwg_TABLEGEOMETRY_Cell*

Dwg_CellStyle

`type` BL, DXF 90

`data_flags`
BS, DXF 170

`property_override_flags`
BL, DXF 91

`merge_flags`
BL, DXF 92

`bg_color` CMC, DXF 62

`content_layout`
BL, DXF 93

`content_format`
Dwg_ContentFormat

`margin_override_flags`
BS, DXF 171

`vert_margin`
BD, DXF 40

`horiz_margin`
BD, DXF 40

`bottom_margin`
BD, DXF 40

`right_margin`
BD, DXF 40

`margin_horiz_spacing`
BD, DXF 40

`margin_vert_spacing`
BD, DXF 40

`num_borders`
BL, DXF 94

`borders` Dwg_GridFormat*

`tablerow_parent`
struct _dwg_TableRow*

`tabledatacolumn_parent`
struct _dwg_TableDataColumn*

Dwg_ColorRamp

`parent` struct _dwg_POINTCLOUDCOLORMAP_Ramp*

`colorscheme`
T, DXF 1

`unknown_bl`
BL, DXF 91

`unknown_b`
B, DXF 290

Dwg_ContentFormat

`property_override_flags`
BL, DXF 90

`property_flags`
BL, DXF 91

`value_data_type`
BL, DXF 92

`value_unit_type`
BL, DXF 93

`value_format_string`
T, DXF 300

`rotation` BD, DXF 40

`block_scale`
BD, DXF 140

`cell_alignment`
BL, DXF 94

`content_color`
CMC, DXF 62

`text_style`
H

`text_height`
BD, DXF 144

Dwg_DATALINK_customdata

`parent` struct _dwg_object_DATALINK*

`target` H

`text` T, DXF 304

Dwg_DATATABLE_column

`parent` struct _dwg_object_DATATABLE*

`type` BL, DXF 92

`text` T, DXF 2

`rows` Dwg_DATATABLE_row*

Dwg_DATATABLE_row

`parent` struct _dwg_DATATABLE_column*

`value` Dwg_TABLE_value

Dwg_DIMASSOC_Ref

`parent` struct _dwg_object_DIMASSOC*

`classname`
T, DXF 1

`osnap_type`
RC, DXF 72

`osnap_dist`
BD, DXF 40

`osnap_pt` 3BD, DXF 10

`num_xrefs`
BS

`xrefs` H*, DXF 331

`main_subent_type`
BS, DXF 73

`main_gsmarker`
BL, DXF 91

`num_xrefpaths`
BS

`xrefpaths`
TV*, DXF 301

`has_lastpt_ref`
B, DXF 75

`lastpt_ref`
3BD

`num_intsectobj`
BL, DXF 74

`intsectobj`
H*, DXF 332

Dwg_DIMENSION_common

`parent` struct _dwg_object_entity*

`class_version`
RC, DXF 280

`extrusion`
BE, DXF 210

`def_pt` 3BD, DXF 10

`text_midpt`
2RD, DXF 11

`elevation`
BD, DXF 31

`flag` RC, DXF 70

`flag1` RC

`user_text`
: TV, DXF 1

`text_rotation`
: BD, DXF 53

`horiz_dir`
: BD, DXF 51

`ins_scale`
: 3BD

`ins_rotation`
: BD, DXF 54

`attachment`
: BS, DXF 71

`lspace_style`
: BS, DXF 72

`lspace_factor`
: BD, DXF 41

`act_measurement`
: BD, DXF 42

`unknown` B, DXF 73

`flip_arrow1`
: B, DXF 74

`flip_arrow2`
: B, DXF 75

`clone_ins_pt`
: 2RD, DXF 12

`dimstyle` H, DXF 3

`block` H

Dwg_EVAL_Edge

`parent` struct _dwg_object_EVALUATION_GRAPH*

`id` BL, DXF 92

`nextid` BLd, DXF 93

`e1` BLd, DXF 94

`e2` BLd, DXF 91

`e3` BLd, DXF 91

`out_edge[5]`
: BLd

Dwg_EVAL_Node

`parent` struct _dwg_object_EVALUATION_GRAPH*

`id` BL, DXF 91

`edge_flags`
BL, DXF 93

`nextid` BLd, DXF 95

`evalexpr` H, DXF 360

`node[4]` BLd

`active_cycles`
B

Dwg_EvalExpr

`parentid` BLd

`major` BL

`minor` BL

`value_code`
BSd

`value.num40`
BD

`value.pt2d`
2RD

`value.pt3d`
3BD

`value.text1`
TV

`value.long90`
BL

`value.handle91`
H

`value.short70`
BS

`nodeid` BL

Dwg_EvalVariant

`code` BS

`u.bd` BD

`u.bl` BL

`u.bs` BS

`u.rc` RC

`u.text` TV

`u.handle` H

Dwg_FIELD_ChildValue

`parent` struct _dwg_object_FIELD*

`key` TV, DXF 6

`value` Dwg_TABLE_value

Dwg_FileDepList_Files

`filename` T32

`filepath` T32

`fingerprint`
T32

`version` T32

`feature_index`
RL

`timestamp`
RL

`filesize` RL

`affects_graphics`
RS

`refcount` RL

Dwg_FormattedTableData

`parent` struct _dwg_object_TABLECONTENT*

`cellstyle`
Dwg_CellStyle

`num_merged_cells`
BL, DXF 90

`merged_cells`
Dwg_FormattedTableMerged*

Dwg_FormattedTableMerged

`parent` struct _dwg_FormattedTableData*

`top_row` BL, DXF 91

`left_col` BL, DXF 92

`bottom_row`
BL, DXF 93

`right_col`
BL, DXF 94

Dwg_GEODATA_meshface

`face1` BL

`face2` BL

`face3` BL

Dwg_GEODATA_meshpt

`source_pt`
2RD

`dest_pt` 2RD

Dwg_GridFormat

`parent` struct _dwg_CellStyle*

`index_mask`
BL, DXF 95

`border_overrides`
BL, DXF 90

`border_type`
BL, DXF 91

`color` CMC, DXF 62

`linewt` BLd, DXF 92

`ltype` H, DXF 340

`visible` B, DXF 93

`double_line_spacing`
BD, DXF 40

Dwg_HATCH_Color

`parent` struct _dwg_entity_HATCH*

`shift_value`
BD, DXF 463

`color` CMC, DXF 63

Dwg_HATCH_ControlPoint

`parent` struct _dwg_HATCH_PathSeg*

`point` 2RD, DXF 10

`weight` BD, DXF 40

Dwg_HATCH_DefLine

`parent` struct _dwg_entity_HATCH*

`angle` BD, DXF 53

`pt0` 2BD, DXF 43

`offset` 2BD, DXF 45

`num_dashes`
BS, DXF 79

`dashes` BD*

Dwg_HATCH_Path

`parent` struct _dwg_entity_HATCH*

`flag` BL, DXF 92

`num_segs_or_paths`
BL, DXF 93

`segs` Dwg_HATCH_PathSeg*

`bulges_present`
B, DXF 72

`closed` B, DXF 73

`polyline_paths`
Dwg_HATCH_PolylinePath*

`num_boundary_handles`
BL, DXF 97

`boundary_handles`
H*, DXF 330

Dwg_HATCH_PathSeg

`parent` struct _dwg_HATCH_Path*

`curve_type`
RC, DXF 72

`first_endpoint`
2RD, DXF 10

`second_endpoint`
2RD, DXF 11

`center` 2RD, DXF 10

`radius` BD, DXF 40

`start_angle`
BD, DXF 50

`end_angle`
BD, DXF 51

`is_ccw` B, DXF 73

`endpoint` 2RD, DXF 11

`minor_major_ratio`
BD, DXF 40

`degree` BL, DXF 94

`is_rational`
B, DXF 73

`is_periodic`
B, DXF 74

`num_knots`
BL, DXF 95

`num_control_points`
BL, DXF 96

`knots` BD*

`control_points`
Dwg_HATCH_ControlPoint*

`num_fitpts`
BL, DXF 97

`fitpts` 2RD*

`start_tangent`
2RD

`end_tangent`
2RD

Dwg_HATCH_PolylinePath

`parent` struct _dwg_HATCH_Path*

`point` 2RD, DXF 10

`bulge` BD, DXF 42

Dwg_LAYER_entry

`parent` struct _dwg_object_LAYER_INDEX*

`numlayers`
BL, DXF 90

`name` T, DXF 8

`handle` H, DXF 360

Dwg_LEADER_ArrowHead

`parent` struct _dwg_entity_MULTILEADER*

`is_default`
B, DXF 94

`arrowhead`
H, DXF 345

Dwg_LEADER_BlockLabel

`parent` struct _dwg_entity_MULTILEADER*

`attdef` H, DXF 330

`label_text`
TV, DXF 302

`ui_index` BS, DXF 177

`width` BD, DXF 44

Dwg_LEADER_Break

`parent` struct _dwg_LEADER_Line*

`start` 3BD, DXF 11

`end` 3BD, DXF 12

Dwg_LEADER_Line

`parent` struct _dwg_LEADER_Node*

`num_points`
BL

`points` 3DPOINT*

`num_breaks`
BL

`breaks` Dwg_LEADER_Break*

`line_index`
BL, DXF 91

`type` BS, DXF 170

`color` CMC, DXF 92

`ltype` H, DXF 340

`linewt` BLd, DXF 171

`arrow_size`
BD, DXF 40

`arrow_handle`
H, DXF 341

`flags` BL, DXF 93

Dwg_LEADER_Node

`parent` struct _dwg_entity_MULTILEADER*

`has_lastleaderlinepoint`
B, DXF 290

`has_dogleg`
B, DXF 291

`lastleaderlinepoint`
3BD, DXF 10

`dogleg_vector`
3BD, DXF 11

`branch_index`
BL, DXF 90

`dogleg_length`
BD, DXF 40

`num_lines`
BL

`lines` Dwg_LEADER_Line*

`num_breaks`
BL

`breaks` Dwg_LEADER_Break*

`attach_dir`
BS, DXF 271

Dwg_LIGHTLIST_light

`parent` struct _dwg_object_LIGHTLIST*

`name` T, DXF 1

`handle` H, DXF 5

Dwg_LTYPE_dash

`parent` struct _dwg_object_LTYPE*

`length` BD, DXF 49

`complex_shapecode`
BS, DXF 75

`style` H, DXF 340

`x_offset` RD, DXF 44

`y_offset` RD, DXF 45

`scale` BD, DXF 46

`rotation` BD, DXF 50

`shape_flag`
BS, DXF 74

`text` T, DXF 9

Dwg_LWPOLYLINE_width

`start` BD, DXF 40

`end` BD, DXF 41

Dwg_LinkedData

`name` T, DXF 1

`description`
T, DXF 300

Dwg_LinkedTableData

`num_cols` BL, DXF 90

`cols` Dwg_TableDataColumn*

`num_rows` BL, DXF 90

`rows` Dwg_TableRow*

`num_field_refs`
BL

`field_refs`
H*

Dwg_MATERIAL_color

`parent` struct _dwg_object_object*

`flag` RC

`factor` BD

`rgb` BL

Dwg_MATERIAL_gentexture

`parent` struct _dwg_object_MATERIAL*

`genprocname`
T

`material` struct _dwg_object_MATERIAL*

Dwg_MATERIAL_mapper

`parent` struct _dwg_object_object*

`blendfactor`
BD

`transmatrix`
BD*

`filename` T

`color1` Dwg_MATERIAL_color

`color2` Dwg_MATERIAL_color

`source` RC

`projection`
RC

`tiling` RC

`autotransform`
RC

`texturemode`
BS

Dwg_MESH_edge

`parent` struct _dwg_entity_MESH*

`idxfrom` BL, DXF 90

`idxto` BL, DXF 90

Dwg_MLEADER_AnnotContext

`num_leaders`
BL

`leaders` Dwg_LEADER_Node*

`attach_dir`
BS

`scale_factor`
BD, DXF 40

`content_base`
3BD, DXF 10

`text_height`
BD, DXF 41

`arrow_size`
BD, DXF 140

`landing_gap`
BD, DXF 145

`text_left`
BS, DXF 174

`text_right`
BS, DXF 175

`text_angletype`
BS, DXF 176

`text_alignment`
BS, DXF 177

`has_content_txt`
B, DXF 290

`has_content_blk`
B, DXF 296

`content` Dwg_MLEADER_Content

`base` 3BD, DXF 110

`base_dir` 3BD, DXF 111

`base_vert`
3BD, DXF 112

`is_normal_reversed`
B, DXF 297

`text_top` BS, DXF 273

`text_bottom`
BS, DXF 272

Dwg_MLEADER_Content_Block

`type` RC

`normal` 3BD

`location` 3BD

`rotation` BD

`block_table`
H

`scale` 3BD

`color` CMC

`transform`
BD*

Dwg_MLEADER_Content_MText

`type` RC

`normal` 3BD

`location` 3BD

`rotation` BD

`default_text`
T

`style` H

`direction`
3BD

`width` BD

`height` BD

`line_spacing_factor`
BD

`line_spacing_style`
BS

`color` CMC

`alignment`
BS

`flow` BS

`bg_color` CMC

`bg_scale` BD

`bg_transparency`
BL

`is_bg_fill`
B

`is_bg_mask_fill`
B

`col_type` BS

`is_height_auto`
B

`col_width`
BD

`col_gutter`
BD

`is_col_flow_reversed`
B

`num_col_sizes`
BL

`col_sizes`
BD*

`word_break`
B

`unknown` B

Dwg_MLINESTYLE_line

`parent` struct _dwg_object_MLINESTYLE*

`offset` BD, DXF 49

`color` CMC, DXF 62

`lt_index` BSd, DXF 6

`lt_ltype` H, DXF 6

Dwg_MLINE_line

`parent` struct _dwg_MLINE_vertex*

`num_segparms`
BS, DXF 74

`segparms` BD*

`num_areafillparms`
BS, DXF 75

`areafillparms`
BD*

Dwg_MLINE_vertex

`parent` struct _dwg_entity_MLINE*

`vertex` 3BD, DXF 11

`vertex_direction`
3BD, DXF 12

`miter_direction`
3BD, DXF 13

`num_lines`
RC

`lines` Dwg_MLINE_line*

Dwg_OCD_Dimension

`b293` B, DXF 293

`def_pt` 2RD, DXF 10

`is_def_textloc`
B, DXF 294

`text_rotation`
BD, DXF 140

`block` H, DXF 2

`dimtofl` B, DXF 298

`dimosxd` B, DXF 291

`dimatfit` B, DXF 70

`dimtix` B, DXF 292

`dimtmove` B, DXF 71

`override_code`
: RC, DXF 280

`has_arrow2`
: B, DXF 295

`flip_arrow2`
: B, DXF 296

`flip_arrow1`
: B, DXF 297

Dwg_PARTIAL_VIEWING_INDEX_Entry

`parent` struct _dwg_object_PARTIAL_VIEWING_INDEX*

`extents_min`
: 3BD

`extents_max`
: 3BD

`object` H

Dwg_POINTCLOUDCOLORMAP_Ramp

`parent` struct _dwg_object_POINTCLOUDCOLORMAP*

`class_version`
: BS, DXF 70

`num_ramps`
: BL, DXF 90

`ramps` Dwg_ColorRamp*

Dwg_POINTCLOUDEX_Croppings

`parent` struct _dwg_entity_POINTCLOUDEX*

`type` BS, DXF 280

`is_inside`
: B, DXF 290

`is_inverted`
: B, DXF 290

`crop_plane`
: 3BD, DXF 13

`crop_x_dir`
: 3BD, DXF 213

`crop_y_dir`
: 3BD, DXF 213

`num_pts` BL, DXF 93

`pts` 3BD*

Dwg_POINTCLOUD_Clippings

`parent` struct _dwg_entity_POINTCLOUD*

`is_inverted`
B

`type` BS

`num_vertices`
BL

`vertices` 2RD*

`z_min` BD

`z_max` BD

Dwg_POINTCLOUD_IntensityStyle

`parent` struct _dwg_entity_POINTCLOUD*

`min_intensity`
BD

`max_intensity`
BD

`intensity_low_treshold`
BD

`intensity_high_treshold`
BD

Dwg_PROXY_LWPOLYLINE

`parent` struct _dwg_entity_PROXY_ENTITY*

`size` RL

`flags` BS

`const_width`
BD

`elevation`
BD

`thickness`
BD

`extrusion`
BE

`num_points`
BL

`points` 2RD*

`num_bulges`
BL

`bulges` BD*

`num_widths`
BL

`widths` Dwg_LWPOLYLINE_width*

`unknown_1`
RC

`unknown_2`
RC

`unknown_3`
RC

Dwg_R2004_Header

`file_ID_string[12]`
RC

`header_address`
RLx

`header_size`
RL

`x04` RL

`root_tree_node_gap`
RLd

`lowermost_left_tree_node_gap`
RLd

`lowermost_right_tree_node_gap`
RLd

`unknown_long`
RL

`last_section_id`
RL

`last_section_address`
RLL

`second_header_address`
RLL

`numgaps` RL

`numsections`
RL

`x20` RL

`x80` RL

`x40` RL

`section_map_id`
RL

`section_map_address`
RLL

`section_info_id`
RLd

`section_array_size`
RL

`gap_array_size`
RL

`crc32` RLx

`padding[12]`
RC

`section_type`
RL

`decomp_data_size`
RL

`comp_data_size`
RL

`compression_type`
RL

`checksum` RLx

Dwg_SECTION_geometrysettings

`parent` struct _dwg_SECTION_typesettings*

`num_geoms`
BL, DXF 90

`hexindex` BL, DXF 91

`flags` BL, DXF 92

`color` CMC, DXF 62

`layer` T, DXF 8

`ltype` T, DXF 6

`ltype_scale`
BD, DXF 40

`plotstyle`
T, DXF 1

`linewt` BLd, DXF 370

`face_transparency`
BS, DXF 70

`edge_transparency`
BS, DXF 71

`hatch_type`
BS, DXF 72

`hatch_pattern`
T, DXF 2

`hatch_angle`
BD, DXF 41

`hatch_spacing`
BD, DXF 42

`hatch_scale`
BD, DXF 43

Dwg_SECTION_typesettings

`parent` struct _dwg_object_SECTION_SETTINGS*

`type` BS, DXF 90

`generation`
BS, DXF 91

`num_sources`
BL, DXF 92

`sources` H*, DXF 330

`destblock`
H, DXF 331

`destfile` T, DXF 1

`num_geom` BL, DXF 93

`geom` Dwg_SECTION_geometrysettings*

Dwg_SPLINE_control_point

`parent` struct _dwg_entity_SPLINE*

`x` BD

`y` BD

`z` BD

`w` BD, DXF 41

Dwg_SUNSTUDY_Dates

`julian_day`
BL, DXF 90

`msecs` BL, DXF 90

Dwg_SummaryInfo_Property

`tag` TU

`value` TU

Dwg_TABLEGEOMETRY_Cell

`parent` struct _dwg_object_TABLEGEOMETRY*

`geom_data_flag`
BL, DXF 93

`width_w_gap`
BD, DXF 40

`height_w_gap`
BD, DXF 41

`tablegeometry`
H, DXF 330

`num_geometry`
BL, DXF 94

`geometry` Dwg_CellContentGeometry*

Dwg_TABLESTYLE_CellStyle

`parent` struct _dwg_object_TABLESTYLE*

`id` BL, DXF 90

`type` BL, DXF 91

`name` T, DXF 300

`cellstyle.type`
BL

`cellstyle.data_flags`
BS

`cellstyle.property_override_flags`
BL

`cellstyle.merge_flags`
BL

`cellstyle.bg_color`
CMC

`cellstyle.content_layout`
BL

`cellstyle.content_format`
Dwg_ContentFormat

`cellstyle.margin_override_flags`
BS

`cellstyle.vert_margin`
BD

`cellstyle.horiz_margin`
BD

`cellstyle.bottom_margin`
BD

`cellstyle.right_margin`
BD

`cellstyle.margin_horiz_spacing`
BD

`cellstyle.margin_vert_spacing`
BD

`cellstyle.num_borders`
BL

`cellstyle.borders`
Dwg_GridFormat*

`cellstyle.tablerow_parent`
struct _dwg_TableRow*

`cellstyle.tabledatacolumn_parent`
struct _dwg_TableDataColumn*

`cellstyle`
struct _dwg_CellStyle

Dwg_TABLESTYLE_border

`linewt` BSd

`visible` B

`color` CMC

Dwg_TABLESTYLE_rowstyles

`parent` struct _dwg_object_TABLESTYLE*

`text_style`
H, DXF 7

`text_height`
BD, DXF 140

`text_alignment`
BS, DXF 170

`text_color`
CMC, DXF 62

`fill_color`
CMC, DXF 63

`has_bgcolor`
B, DXF 283

`num_borders`
BL

`borders` Dwg_TABLESTYLE_border*

`data_type`
BL, DXF 90

`unit_type`
BL, DXF 91

`format_string`
TU, DXF 1

Dwg_TABLE_AttrDef

`parent` struct _dwg_TABLE_Cell*

`attdef` H, DXF 331

`index` BS, DXF 179

`text` T, DXF 300

Dwg_TABLE_BreakHeight

`parent` struct _dwg_entity_TABLE*

`position` 3BD

`height` BD

`flag` BL

Dwg_TABLE_BreakRow

`parent` struct _dwg_entity_TABLE*

`position` 3BD

`start` BL

`end` BL

Dwg_TABLE_Cell

`parent` struct _dwg_entity_TABLE*

`type` BS, DXF 171

`flags` RC, DXF 172

`is_merged_value`
B, DXF 173

`is_autofit_flag`
B, DXF 174

`merged_width_flag`
BL, DXF 175

`merged_height_flag`
BL, DXF 176

`rotation` BD, DXF 145

`text_value`
T, DXF 1

`text_style`
H, DXF 7

`block_handle`
H, DXF 340

`block_scale`
BD, DXF 144

`additional_data_flag`
B

`cell_flag_override`
BL, DXF 177

`virtual_edge_flag`
RC, DXF 178

`cell_alignment`
RS, DXF 170

`bg_fill_none`
B, DXF 283

`bg_color` CMC, DXF 63

`content_color`
CMC, DXF 64

`text_height`
BD, DXF 140

`top_grid_color`
CMC, DXF 69

`top_grid_linewt`
BS, DXF 279

`top_visibility`
BS, DXF 289

`right_grid_color`
CMC, DXF 65

`right_grid_linewt`
BS, DXF 275

`right_visibility`
BS, DXF 285

`bottom_grid_color`
CMC, DXF 66

`bottom_grid_linewt`
BS, DXF 276

`bottom_visibility`
BS, DXF 286

`left_grid_color`
CMC, DXF 68

`left_grid_linewt`
BS, DXF 278

`left_visibility`
BS, DXF 288

`unknown` BL

`value` Dwg_TABLE_value

`num_attr_defs`
BL

`attr_defs`
Dwg_TABLE_AttrDef*

Dwg_TABLE_CustomDataItem

`name` T, DXF 300

`value` Dwg_TABLE_value

`cell_parent`
struct _dwg_TableCell*

`row_parent`
struct _dwg_TableRow*

Dwg_TABLE_value

`flags` BL

`format_flags`
BL

`data_type`
BL, DXF 90

`data_size`
BL, DXF 92

`data_long`
BL, DXF 91

`data_double`
BD, DXF 140

`data_string`
T, DXF 1

`data_date`
TF

`data_point`
2RD, DXF 11

`data_3dpoint`
3RD, DXF 11

`data_handle`
H

`unit_type`
BL, DXF 94

`format_string`
T, DXF 300

`value_string`
T, DXF 302

Dwg_TableCell

`flag` BL, DXF 90

`tooltip` TV, DXF 300

`customdata`
BL, DXF 91

`num_customdata_items`
BL, DXF 90

`customdata_items`
Dwg_TABLE_CustomDataItem*

`has_linked_data`
BL

`data_link`
H

`num_rows` BL

`num_cols` BL

`unknown` BL

`num_cell_contents`
BL

`cell_contents`
Dwg_TableCellContent*

`style_id` BL

`has_geom_data`
BL

`geom_data_flag`
BL

`width_w_gap`
BD

`height_w_gap`
BD

`tablegeometry`
H

`num_geometry`
BL

`geometry` Dwg_CellContentGeometry*

`style_parent`
struct _dwg_CellStyle*

`row_parent`
struct _dwg_TableRow*

Dwg_TableCellContent

`parent` struct _dwg_TableCell*

`type` BL, DXF 90

`value` Dwg_TABLE_value

`handle` H, DXF 340

`num_attrs`
BL, DXF 91

`attrs` Dwg_TableCellContent_Attr*

`has_content_format_overrides`
BS

`content_format`
Dwg_ContentFormat

Dwg_TableCellContent_Attr

`parent` struct _dwg_TableCellContent*

`attdef` H, DXF 330

`value` TV, DXF 301

`index` BL, DXF 92

Dwg_TableDataColumn

`parent` struct _dwg_LinkedTableData*

`name` T, DXF 300

`custom_data`
BL, DXF 91

`cellstyle`
Dwg_CellStyle

`cellstyle_id`
BL

`width` BL

Dwg_TableRow

`parent` struct _dwg_LinkedTableData*

`num_cells`
BL

`cells` Dwg_TableCell*

`custom_data`
BL

`num_customdata_items`
BL

`customdata_items`
Dwg_TABLE_CustomDataItem*

`cellstyle`
Dwg_CellStyle

`style_id` BL

`height` BL

Dwg_UCS_orthopts

`parent` struct _dwg_object_UCS*

`type` BS, DXF 71

`pt` 3BD, DXF 13

Dwg_VALUEPARAM

`parent` struct _dwg_object_object*

`class_version`
BL

`name` T

`unit_type`
BL

`num_vars` BL

`vars` Dwg_VALUEPARAM_vars*

`controlled_objdep`
H

Dwg_VALUEPARAM_vars

`value` Dwg_EvalVariant

`handle` H

Dwg_MLEADER_Content

`txt` Dwg_MLEADER_Content_MText

`blk` Dwg_MLEADER_Content_Block

Common Entity fields

`__iterator`
BL

`color` CMC, DXF 62

`color_r11`
RC, DXF 62

`dwg` struct _dwg_struct*

`edge_visualstyle`
H, DXF 348

`eed` Dwg_Eed*

`elevation_r11`
RD

`entmode` BB, DXF 67

`extra_r11`
RC

`face_visualstyle`
H, DXF 348

`flag_r11` RC

`full_visualstyle`
H, DXF 348

`has_ds_data`
B

`has_edge_visualstyle`
B

`has_face_visualstyle`
B

`has_full_visualstyle`
B

`invisible`
BS, DXF 60

`is_xdic_missing`
B

`isbylayerlt`
B

`kind_r11` RS

`layer` H, DXF 8

`layer_r11`
RS

`linewt` RC, DXF 370

`ltype` H, DXF 6

`ltype_flags`
BB

`ltype_r11`
RS

`ltype_scale`
BD, DXF 48

`material` H, DXF 347

`material_flags`
BB

`next_entity`
H

`nolinks` B

`num_eed` BL

`num_reactors`
BL

`objid` BL

`opts_r11` RS

`ownerhandle`
H, DXF 330

`paper_r11`
RS, DXF 67

`plotstyle`
H, DXF 390

`plotstyle_flags`
BB

`prev_entity`
H

`preview` TF, DXF 310

`preview_exists`
B

`preview_is_proxy`
B

`preview_size`
BLL, DXF 160

`reactors` H*, DXF 330

`shadow` H

`shadow_flags`
RC, DXF 284

`thickness_r11`
RD

`xdicobjhandle`
H, DXF 360

Common Object fields

`dwg` struct _dwg_struct*

`eed` Dwg_Eed*

`handleref`
Dwg_Handle*

`has_ds_data`
B

`is_xdic_missing`
B

`num_eed` BL

`num_reactors`
BL

`objid` BL

`ownerhandle`
H, DXF 330

`reactors` H*, DXF 330

`xdicobjhandle`
: H, DXF 360

SummaryInfo fields

see Section 5.7 [SummaryInfo], page 260,

`TITLE` TU16, DXF 1

`SUBJECT` TU16, DXF 1

`AUTHOR` TU16, DXF 1

`KEYWORDS` TU16, DXF 1

`COMMENTS` TU16, DXF 1

`LASTSAVEDBY`
: TU16, DXF 1

`REVISIONNUMBER`
: TU16, DXF 1

`HYPERLINKBASE`
: TU16, DXF 1

`TDINDWG` TIMERLL

`TDCREATE` TIMERLL

`TDUPDATE` TIMERLL

`num_props`
: RS

`props` Dwg_SummaryInfo_Property*

`unknown1` RL

`unknown2` RL

5 Sections

The r2000 format (used for r13-r2000) knows the following 6 sections:

HEADER CLASSES HANDLES 2NDHEADER MEASUREMENT AUXHEADER (only r2000)

The r2004 and r2007 format (used for r2004-r2018) knows the following sections:

R2004_Header UNKNOWN SUMMARYINFO PREVIEW VBAPROJECT APPINFO APPINFOHISTORY FILEDEPLIST ACDS REVHISTORY SECURITY OBJECTS OBJFREESPACE TEMPLATE HANDLES CLASSES AUXHEADER HEADER SIGNATURE INFO SYSTEM_MAP

5.1 HEADER Section

See Chapter 4 [Objects], page 8.

5.2 OBJECTS Section

The OBJECTS Section is usually split up into multiple pages (seperate sections of type AcDbObjects) and contains all entities and objects. It is indexed by Section 5.4 [HANDLES], page 260.

See Chapter 4 [Objects], page 8.

5.3 CLASSES Section

The **Classes** Section contains the basic info for all dynamically loaded types for entities and objects. It's types start with 500, and are variable. An entity which has no class loaded is displayed as proxy.

LibreDWG contains support for many classes, but not all. See `src/classes.inc` and `src/classes.c`. We define a stability for each class, one of stable, unstable, debugging and unhandled.

Objects in **stable** classes are treated as the fixed-type objects with full support. Changes are treated as API breaking.

Objects in **unstable** classes are sometimes written to DXF or JSON, but not to DWG. Changes are not treated as API breaking. Usually such objects are converted to UNKNOWN_OBJ or UNKNOWN_ENT objects, and when written to DWG converted to PLACEHOLDER, DUMMY or POINT objects with EED pointing to the original class and content. Only when rewriting from-to the very same version with the full known unknown_bits blob (e.g. dwgrewrite or json) such classes can persist as such.

Objects in **debugging** classes are only handled with the develper `configure --enable-debug` flag, otherwise ignored. See unstable above.

Objects in **undhandled** classes are always ignored. There are no fields known, only it's type.

5.4 HANDLES Section

The Handles section contains a sorted list of all object handles and it's position in the Objects stream. All values are stored relatively, as offsets. Handles only increase and can contain holews when an object is deleted, offsets can jump back also.

5.5 R2004_Header

The R2004_Header section at fixed position `0x100` in the DWG contains some meta-data for r2004 sections to find the two important sections INFO and SYSTEM_MAP.

5.6 UNKNOWN Section

The content of the UNKNOWN section with type 0 is unknown and does not always exist.

5.7 SummaryInfo

All Section SummaryInfo fields:

`TITLE`	TU16, DXF 1
`SUBJECT`	TU16, DXF 1
`AUTHOR`	TU16, DXF 1
`KEYWORDS`	TU16, DXF 1
`COMMENTS`	TU16, DXF 1
`LASTSAVEDBY`	TU16, DXF 1
`REVISIONNUMBER`	TU16, DXF 1
`HYPERLINKBASE`	TU16, DXF 1
`TDINDWG`	TIMERLL
`TDCREATE`	TIMERLL
`TDUPDATE`	TIMERLL
`num_props`	RS
`props`	Dwg_SummaryInfo_Property*
`unknown1`	RL
`unknown2`	RL

See [Dwg_SummaryInfo_Property], page 247,

5.8 Preview

The optional Preview section contains the thumbnail stream of BMP or WMF data of the drawing. Note that blocks or proxy objects can also contain it's own preview fields. The program **dwgbmp** can extract the bitmap from this section.

5.9 VBAProject

5.10 AppInfo

Which product and version exactly created that DWG.

5.11 AppInfoHistory

5.12 FileDepList

Features and File Dependencies. Image files, fonts, xrefs, plotconfigs.

5.13 AcDS

The AcDsPrototype_1b DataStorage, used mostly for binary ACIS blobs, embedded fonts, ...

5.14 RevHistory

Revision History

5.15 Security

Password Info

5.16 ObjFreeSpace

Some Objects meta-data

5.17 Template

Contains one Measurement Header variable.

5.18 AuxHeader

In case the original Header gets lost.

5.19 Signature

5.20 INFO

The info of all used sections.

5.21 SYSTEM_MAP

The map of all used sections and its chunked pages.

6 Structures

6.1 EED

"Extended Entity Data" (EED) may be optionally attached to each object. They consist of a handle to the registered APPID, and a list of typed data. Each block is preceded with a size, the processing stops with size 0.

Internally libredwg stores each eed line as an array of num_eed structs. If the size > 0, then new block starts with a handle, an optional raw string (when reading from a DWG), and a number of typed data entries. Only the first eed struct of each block has a size, all subsequent eed structs have size 0.

Example:

```
EED[0] size: 109 [BS]
EED[0] handle: 5.2.762
EED[0] code: 70 [RC] short: 2 [RS]
EED[1] code: 70 [RC] short: 0 [RS]
EED[2] code: 70 [RC] short: 0 [RS]
EED[3] code: 11 [RC] 3dpoint: (0.000000, 0.000000, 0.000000) [3RD]
EED[4] code: 11 [RC] 3dpoint: (1.000000, 0.000000, 0.000000) [3RD]
EED[5] code: 11 [RC] 3dpoint: (0.000000, 1.000000, 0.000000) [3RD]
EED[6] code: 11 [RC] 3dpoint: (0.000000, 0.000000, 1.000000) [3RD]
EED[7] size: 6 [BS]
EED[7] handle: 5.2.763
EED[7] code: 70 [RC] short: 0 [RS]
EED[8] code: 70 [RC] short: 0 [RS]
EED[9] size: 23 [BS]
EED[9] handle: 5.1.12
EED[9] code: 0 [RC] string: "RTMaterial" len=10 cp=30
EED[10] code: 5 [RC] entity: 0x6507000000000000 [RLL]
- size: 0 [BS]
```

These 10 num_eed structs consist of 3 blocks with 3 size and handle entries. EED[0] starts with size 109, the handle pointing to object 762, 3 shorts and 4 points. The next block at EED[7] has size 6, the handle pointing to object 763 and 2 shorts. The last block at EED[9] has size 9, the handle pointing to object 12 (the APPID.ACAD application) and a string and an entity reference. The size is calculated by the needed room for all data code + values, without the handle. E.g. EED[7] size: 6 is 1 + 2 for EED[7] RC + RS, and 1 + 2 for EED[8] RC + RS.

Each data block consists of a RC code, and a variable value. A string may be a an old pre-r2007 ASCII string with a RC length (max 255 chars), a codepage and the string. Or a r2007+ wide string with a RS length (max 32767 chars) and a UCS-2 wide string.

decode stores both, the raw data, and the structured data. in_dxf just the data. encode prefers raw over the data.

6.2 XDATA

XRECORD XDATA are very similar to the EED array, but internally it is a single linked-list, consisting of something like the EED data code + value pairs. There's only one size, xdata_size, and only one handle to the APPID, which handles this XRECORD XDATA.

7 Functions

You can use LibreDWG immediately upon loading, without any particular initialization. Only when using some see Section 7.4 [dynapi], page 267, functions you might need to initialize the version via `dwg_api_init_version(&dwg)`, when you need other formats than r2000 and you call an API function which does not store the version internally. Most do. This limitation will soon be fixed.

You usually use one set of functions - either decoding or encoding - at a time. All functions use the common data types (see Chapter 3 [Types], page 6). All functions return an error code, and the high-level functions for multiple objects add the error bitmask, which is sorted by severity. When the error exceeds DWG_ERR_CRITICAL, processing is stopped.

The new see Section 7.4 [dynapi], page 267, has dynamic get and set functions for all objects and its fields. You can get and set a property value from any object pointer by the object name and the field name.

7.1 Decoding

The highest level function for decoding a file is `dwg_read_file`.

`int dwg_read_file` (*char *filename, Dwg_Data *dwg*) [Function]

Open *filename* and decode it, saving information into *dwg*. Return 0 if successful.

You can then iterate over the entities in model space or paper space via two ways:

1. by using the `dwg.h` data structures. Via `dwg->object[0]`, which is of type `Dwg_Object_BLOCK_CONTROL`, and a custom `void process_BLOCK_HEADER(Dwg_Object_Ref* ref)`:

```
Dwg_Object_BLOCK_CONTROL* block_control = dwg->block_control;
// first all entities in the model space
process_BLOCK_HEADER(dwg->header_vars.BLOCK_RECORD_MSPACE);
// then all entities in the blocks
for (i=0; i < block_control->num_entries; i++)
  {
    process_BLOCK_HEADER(block_control->block_headers[i]);
  }
// and last all entities in the paper space
process_BLOCK_HEADER(dwg->header_vars.BLOCK_RECORD_PSPACE);
```

or 2. by using the API functions from `dwg_api.h`:

```
Dwg_Object_BLOCK_CONTROL* block_control = dwg_block_control(dwg);
process_BLOCK_HEADER(dwg_model_space_ref(dwg));
for (i=0; i < block_control->num_entries; i++)
  {
    process_BLOCK_HEADER(block_control->block_headers[i]);
  }
process_BLOCK_HEADER(dwg_paper_space_ref(dwg));
```

and inside the `process_BLOCK_HEADER` function, you iterate over the entities from the block_header via:

```
Dwg_Object* obj = get_first_owned_entity(ref->obj);
while (obj)
  {
    process_object(obj);
    obj = get_next_owned_entity(ref->obj, obj);
  }
```

where `process_object` checks the type of each entity under the *Dwg_Object* obj*.

For each entity or object type (i.e. a non-graphical dwg object, also tables) there also exist the simple and expensive `dwg_getall_ENTITY` and `dwg_getall_OBJECT` functions:

`int dwg_getall_ENTITY` (*Dwg_Object_Ref *block_header_ref*) [Function]
Return a malloc'ed NULL-terminated array of all such entities for Model Space, Paper Space or an individual block.

`int dwg_getall_OBJECT` (*Dwg_Data *dwg*) [Function]
Return a malloc'ed NULL-terminated array of all such DWG objects.

The decoder is driven by the fields definition in the `src/dwg.spec`, which adds each field to the object. This is done in the `src/decode.c` or `src/decode_r2007.c`.

`int dwg_decode_OBJECT` (*Bit_Chain *dat*, *Dwg_Object *obj*) [Function]
Sets the fields for the object from the DWG bitstream.

7.2 Encoding

Encoding DWG files, i.e. DWG write support, can be disabled via `./configure --disable-write`. The default format and only useful one is currently r13-r2000. Experimentally work is ongoing for the r2004 format, which is also used for r2010, r2013, and r2018. Only the pre-r13 and r2007 versions are not covered yet.

See `src/in_dxf.c` for a high-level usage example. The default codepage is Latin-1, 30.

The highest level function for encoding a bitstream to a file is `dwg_write_file`, which dumps the dwg to a file.

`int dwg_write_file` (*char *filename*, *Dwg_Data *dwg*) [Function]
Open *filename* and write the *dwg* to it. Return 0 if successful.

See Section 7.3 [add api], page 266, for:

`Dwg_Data* dwg_add_Document` (*const Dwg_Version_Type version*, const int *imperial*, const int *loglevel*) [Function]
Creates an initial template dwg structure in memory, suitable to be written to a DWG or DXF file, without any additional table records or entities. Creates ModelSpace, PaperSpace and most Tables and basic Dictionaries.

and how to add entities and objects from scratch.

Low level-functions:

`int dwg_add_object` (*Dwg_Data* ***dwg***) [Function]

Adds a new uninitialized object to the *dwg->object*[] array. Return 0 or -1 if successful, otherwise DWG_ERR_OUTOFMEM. -1 is the array was re-allocated.

Then for each object or entity type there is a

`int dwg_setup_<OBJECT>` (*Dwg_Object* ***obj***) [Function]

Initializes an object for the given OBJECT or ENTITY type, with all fields being zero'ed. This does not initialize the *obj* size, type, address, handlestream_size, bitsize fields.

The encoder is driven by the fields definition in the `src/dwg.spec` and the generated `src/dynapi.c`, which adds each field to the object. This is done by `src/encode.c` or any `src/in_*.c` import module.

`int dwg_encode_<OBJECT>` (*Bit_Chain* ***dat***, *Dwg_Object* ***obj***) [Function]

Encodes the DWG bitstream from the fields of the object.

The iterator is similar to above, but you want to encode all data structures, not just the entities. But note that you need many helper functions, such as the Section 7.4 [dynapi], page 267, to create all needed sections to store a DWG if you didn't read a DWG into the right a *Dwg_Data** *dwg* struct already. This is especially important when importing from DXF or from an earlier or later DWG version.

7.3 add api

The add api functions are useful for CAD programs which want to write DWG. All the other API's are mostly to convert from and to DWG, so the main structures and links already do exist. With the add api you can easily create an empty DWG from scratch, add table entries (into fixed Tables or variables Dictionaries), and add entities. To set more entity fields use the Section 7.4 [dynapi], page 267.

For each almost each entity and table exists a function at to add it, with arguments to initialize some fields as in the VBA object model. The other objects are either created automatically, or handled seperately.

All BITCODE_T strings are encoded as UTF-8, as with the dynapi. See Section 7.5 [strings], page 269. Most names are copied, since most names are considered to be constant. If not, you need to free them by yourself. Exceptions are dxfname (there exists a seperate dxfname_u variant), the VX name, which does not exists anymore since r2000.

A very simple example using the add API is the example program See [dwgadd], page 274.

`Dwg_Data dwg_add_Document` (*const Dwg_Version_Type* ***version***, *const int* ***imperial***, *const int* ***loglevel***)) [Function]

Creates an initial template dwg structure in memory, suitable to be written to a DWG or DXF file, without any additional table records or entities. Creates ModelSpace, PaperSpace and most Tables and basic Dictionaries.

When writing DWG, a *version* of R_2000 is recommended, only R_13 - R-2000 are supported yet. For DXF you can try all versions >= R_13.

For each OBJECT and ENTITY type there exists a specific `dwg_add_<OBJECT>` function, which takes the owner and some default arguments. Entities are normally added to a block header, like modelspace, paperspace or any block. Objects are normally added to the dwg, or to some other object or entity. E.g.

`Dwg_Entity_LINE *line` = *dwg_add_LINE* (*Dwg_Object_BLOCK_HEADER *modelspace*, dwg_point_3d *start_pt, dwg_point_3d *end_pt) [Function]

`Dwg_Entity_TEXT* dwg_add_TEXT` (*Dwg_Object_BLOCK_HEADER *restrict* `blkhdr`, *const char** *restrict* `text_value`, *const dwg_point_3d *restrict* `ins_pt`, *const double height*) [Function]

Adds a TEXT entity to the ModelSpace, PaperSpace or a Block. Entity specific arguments are here the text, the point (as pointer to the struct of 3 doubles), and the text height.

`Dwg_Object_LAYER *layer` = *dwg_add_LAYER* (*Dwg_Data *dwg, const char *name*) [Function]

Adds a new layer the Layer Table, i.e. creates the new LAYER object, and adds it to LAYER_CONTROL object, the list of layers.

Names and strings are encoded as UTF-8 and will be translated to type BITCODE_T (i.e. versions specific TU or TV types, either UCS-2 unicode or single-byte codepage) internally, as with the **dynapi**. Only internally you will have to deal with 2 different DWG text representations: UCS-2 since r2007, single-byte before. see Section 7.5 [strings], page 269.

To understand the object model for the add API see some VBA Object model documentation, such as e.g. `http://entercad.ru/acadauto.en/`.

The new add API mostly handles the direct `Dwg_Entity_ENTITY` structs, not all the generic `Dwg_Object` structs. Thus you can access the object specific fields directly, the common fields, not so easily.

The DWG Document consists of 3 basic entity containers `ModelSpace`, `PaperSpace` and `Blocks`, plus `Tables` (`Layers`, `Linetypes`, ...), `Dictionaries` as generic replacements of `Tables` with a root Dictionary, the `NOD` ("Named Object Dictionary"), and more support objects and complex entity groups.

Helper functions:

`dwg_add_u8_input (Dwg_Data` *restrict* `dwg`, *const char *restrict* `u8str`) [Function]

Convert UTF-8 strings to BITCODE_T fields. Returns a copy of the string. All external API's only deal with UTF-8 strings.

7.4 dynapi

The new dynapi replaced the old dwg_api functions to access each object field. The old dwg_api functions were deprecated, and need to be re-enabled by defining `CFLAGS="-DUSE_DEPRECATED_API"`. See see Chapter 4 [Objects], page 8, for an description of each object and its fields..

For each of header, entity, common or subclass there is a function to get and set the value of any type, or converted utf8 string.

`bool dwg_dynapi_entity_value` (*void *entity*, *const char *dxfname*, *const char *fieldname*, *void *out*, *Dwg_DYNAPI_field *fp*) [Function]

entity is of type `dwg_ent_generic`, that is the pointer to the object specific struct. *dxfname* is the dxfname of the object, *fieldname* is the field or property name of the field to be read from, **out* the result pointer and the optiona **fp* is filled by the information for this field.

`bool dwg_dynapi_common_value` (*void *entity*, *const char *fieldname*, *void *out*, *Dwg_DYNAPI_field *fp*) [Function]

This accesses the common `Dwg_Object_Object*` or `Dwg_Object_Entity*` fields.

`bool dwg_dynapi_header_value` (*void *dwg*, *const char *fieldname*, *void *out*, *Dwg_DYNAPI_field *fp*) [Function]

This accesses the Header (or sometimes also called Database) fields.

`bool dwg_dynapi_subclass_value` (*void *ptr*, *const char *subclass*, *const char *fieldname*, *void *out*, *Dwg_DYNAPI_field *fp*) [Function]

This accesses a subclass, a structure within the object.

The utf8text functions convert version-specific text strings to UTF-8 strings. Internally the dwg stores strings as TU (unicode) or TV (single-byte codepage). The API treats all strings as UTF-8, as with JSON, DXF or the add API.

`bool dwg_dynapi_entity_utf8text` (*void *entity*, *const char *dxfname*, *const char *fieldname*, *char *textp*, *int *isnewp*, *Dwg_DYNAPI_field *fp*) [Function]

isnewp is set to 1 f the string is a fresh copy, for unicode strings.

`bool dwg_dynapi_common_utf8text` (*void *entity*, *const char *fieldname*, *char *textp*, *int *isnewp*, *Dwg_DYNAPI_field *fp*) [Function]

`bool dwg_dynapi_header_utf8text` (*void *dwg*, *const char *fieldname*, *char *textp*, *int *isnewp*, *Dwg_DYNAPI_field *fp*) [Function]

This accesses the Header (or sometimes also called Database) fields.

`bool dwg_dynapi_subclass_utf8text` (*void *ptr*, *const char *subclass*, *const char *fieldname*, *char *textp*, *int *isnewp*, *Dwg_DYNAPI_field *fp*) [Function]

This accesses a subclass, a structure within the object.

The setters don't differentiate betwen common values and strings.

`bool dwg_dynapi_entity_set_value` (*dwg_ent_generic *_obj*, *const char *fieldname*, *const void *value*, *const bool is_utf8*) [Function]

Sets the ENTITY.fieldname to a value. A malloc'ed struct is passed by ptr, not by the content. A non-malloc'ed struct is set by content. Arrays or strings must be malloced before. We just set the new pointer, the old value will be freed. If is_utf8 is set, the given value is a UTF-8 string, and will be converted to TV or TU

`bool dwg_dynapi_header_set_value` (*Dwg_Data* **dwg*, *const char* **fieldname*, *const void* **value*, *const bool* *is_utf8*) [Function]

`bool dwg_dynapi_common_set_value` (*dwg_ent_generic* **_obj*, *const char* **fieldname*, *const void* **value*, *const bool* *is_utf8*) [Function]

See the sourcecode of the importers or programs for the usage of the API's.

7.5 strings

Internally the DWG consists of multiple different string formats, see Chapter 3 [Types], page 6. The most important are `BITCODE_TV` (i.e. `char*`) encoded according to `dwg->header.codepage`, and `BITCODE_TU` (i.e. `wchar_t` on Windows, UCS-2).

Externally most functions get and set strings as UTF-8, as in DXF or JSON.

Before r2007 DWG's the TV and T strings are encoded in its codepage, they are not yet converted from and to their proper codepage to UTF-8, but will eventually. Not via libiconv, just via the locale specific libc btowc(). To encode unicode characters special \U+XXXX sequences are used, and with japanese shift-jis for Katagana and Hiregana \M+1XXXX sequences.

On DWG's r2007 and later most strings (T and TU) are encoded in the Microsoft specific two-byte UCS-2 Unicode encoding, without proper support for surrogate pairs and the upper planes (i.e. emojis).

Fixed TF strings are not encoded and have a length stored also. Normal strings are all zero-delimited. EED and XDATA strings do have a length though, but have length limitations.

Strings in DXF and JSON also have quoting rules for special characters, like \r, \n, \" and so on.

Transformations:

DWG to DWG: decode reads the T and TU strings in its natural format into the field. encode translate it to TV or TU. encode needs `header.from_version` and how it was read, from DWG or from an importer (in_dxf or in_json) or the Section 7.3 [add api], page 266, (DWG_OPTS_IN).

DXF/JSON to DWG: in_dxf/json keeps the T and TU strings as TV. encode to <r2007 keeps it as TV, r2007+ translates it to TU. it sets DWG_OPTS_IN.

DWG to DXF/JSON: decode keeps the T and TU strings as TV or TU. out_dxf/json translate them to TV or UTF-8 and quote them via \U+XXXX

add api to DWG/DXF: add reads strings as UTF-8, and encodes it from UTF-8 to TV or TU. (TU not yet, as we don't encode R2004+ yet). add sets DWG_OPTS_IN.

7.6 Other Formats

7.6.1 DXF

We can write ASCII DXF files in various versions, with much more data than other free DWG libraries, but not as stable as the unfree Teigha library yet. AutoCAD fails to import some of our files still (~10% failure rate).

Options: `--minimal` (see `dwg2dxf` or `dwgread`) creates only a short header with a ACADVER and HANDSEED element, and the entities, without any subclass markers, reactors or handles.

Reading DXF is under construction and works for most entities.

7.6.2 DXFB

We can almost write Binary DXF files in various versions.

Reading DXFB is under construction and un-tested.

7.6.3 JSON

We write to and read back from our own JSON format, which is a readable 1:1 mapping of the DWG structures, and carries much more information than the DXF format. The idea is to dump a DWG to JSON and filter/query or postprocess it with more powerful JSON query tools such as **jq** (`https://stedolan.github.io/jq/`), and optionally import it back in. See Chapter 9 [Programs: dwgfilter], page 272. JSON is much better structured than DXF.

The current first level objects are all the section names, like "HEADER", "CLASSES", "OBJECTS". For more see the specs.

7.6.4 GeoJSON

`dwgread` supports writing to the GeoJSON format as specified at `http://geojson.org/geojson-spec.html`. See `dwgread` with the `--fmt GeoJSON` option.

We write in the RFC7946 format, the new GeoJSON format since 2016, which means smaller, less precision, and normalized polygons with proper right-hande rule orientation.

We write all coordinates as [x, y], not [y, x]. z-coordinates are optional, and only written if not 0.0. Colors are either written as palette index as integer if not 256 (ByLayer), or as TrueColor RGB hex string values for all r2004+ DWG's.

Missing entities: No 3D entities, HATCH by definition. ELLIPSE, ARC, CIRCLE would need segmention into lines. MLINE, SPLINE, MINSERT, SOLID, TRACE, RAY(?), XLINE(?)

Due to implementation quirks with ending commas in JSON, we mostly add an empty dummy feature at the very end, with null properties and null geometry.

8 Errors

LibreDWG is mostly a library, and as such collects error codes from the highest level function down to the lowest level functions. The error codes are sorted by severity, and only if the error exceeds *DWG_ERR_CRITICAL*, i.e. `DWG_ERR_CLASSESNOTFOUND`, processing is stopped.

All error bitmasks are collected during read or write and returned at the end.

`DWG_ERR_WRONGCRC`
: 1

`DWG_ERR_NOTYETSUPPORTED`
: 2

`DWG_ERR_UNHANDLEDCLASS`
: 4

`DWG_ERR_INVALIDTYPE`
: 8

`DWG_ERR_INVALIDHANDLE`
: 16

`DWG_ERR_INVALIDEED`
: 32

`DWG_ERR_VALUEOUTOFBOUNDS`
: 64

`DWG_ERR_CLASSESNOTFOUND`
: 128 = `DWG_ERR_CRITICAL`

`DWG_ERR_SECTIONNOTFOUND`
: 256

`DWG_ERR_PAGENOTFOUND`
: 512

`DWG_ERR_INTERNALERROR`
: 1024

`DWG_ERR_INVALIDDWG`
: 2048

`DWG_ERR_IOERROR`
: 4096

`DWG_ERR_OUTOFMEM`
: 8192

Additionally, verbose warning and error messages are printed to stderr.

Unhandled class and Invalid type errors of objects are not severe. A DWG format can store a serialization of many third party classes and objects, and thus we will never be able read all possible types. Unknown types are just stored as binary blob without any DXF codes.

9 Programs

LibreDWG installs some binary programs to read or write DWG files.

`dwgread`

This reads a DWG file, and optionally converts its content to some output formats: JSON, GeoJSON, DXF, DXFB (i.e. Binary DXF), SVG.

`dwgread [OPTION]... DWGFILE`

Options:

-v[0-9], –verbose [0-9] verbosity

-O fmt, –format fmt fmt: JSON, DXF, DXFB, GeoJSON.

More planned formats: YAML, XML/OGR, GPX, SVG, PS.

-o outfile, –file outfile also defines the output fmt. Default: stdout

-a rNNNN, –as rNNNN writes the output format as another version. Valid versions are r13, r14, r2000, r2004, r2007, r2010, r2013, r2018.

–help display this help and exit

–version output version information and exit

`dwgwrite`

Create a DWG from a given input file (see Section 7.6.1 [DXF], page 269, see Section 7.6.2 [DXFB], page 270, see Section 7.6.3 [JSON], page 270), optionally via `--as=rNNNN` as another version. For now can only create r13-r2018, but not r2007 DWG files.

`dxfwrite`

Create a DXF from a given input file (`DWG`, see Section 7.6.1 [DXF], page 269, see Section 7.6.2 [DXFB], page 270, see Section 7.6.3 [JSON], page 270), optionally via `--as=rNNNN` as another version. Highly experimental. Supports the same options as `dwg2dxf`.

`dwg2dxf`

Converts DWG files to DXF, optionally via `--as=rNNNN` as another version, an earlier or later version, or via `-m` or `--minimal` as a minimal DXF version, skipping most headers vars, classes, tables and objects.

`--binary` as a binary DXF file, with full precision, under construction.

The DXF files are created in the current directory and not overwritten, unless the option `--overwrite` or `-y` is given.

`dxf2dwg`

Converts DXF (or Binary DXF) files to DWG, optionally via `--as=rVER` as another version, an earlier or later version.

The DWG files are created in the current directory and not overwritten, unless the option `--overwrite` or `-y` is given.

This program is experimental and AutoCAD may fail to import it. For now can only create r13-r2018, but not r2007 DWG files. Currently the default is writing as r2000.

`dwgrewrite`

Read and write the DWG, optionally via `--as=rNNNN` as another version, an earlier or later version. The default is writing as r2000. Pre-r13 and r2007 DWG files cannot be written yet.

`dwglayers`

Prints all layers in a DWG. With `-x` or `--extnames` prints the extended displayed layer name with spaces, not the internally stored old-style name with _ instead. Only relevant with old r13 and r14 DWGs, after that layers are always stored in the extended format. With `-f` or `--flags` also the status of frown, on/off and locked. With `--on` only the visible layers, which are on and not frozen.

You can get the same effect via this json filter:

```
dwgfilter '.OBJECTS[]' example.dwg | \
  grep -A22 '"object": "LAYER"' | grep name
```

`dwggrep`

Search regex pattern in all text values in a list of DWGs. dwggrep uses PCRE.

With `-i` searches case-insensitive. With `-c` prints only the count of found texts. With `-h` or `--no-filename` does not print the filename. With `--type NAME` search only NAME entities or objects. With `--dxf NUM` search only in DXF group NUM fields. With `--text` searches only TEXT-like entities: TEXT, MTEXT, ATTRIB, ATTDEF.

`dwgfilter`

Search and modify a single DWG file via `jq`, using the powerful JQ query expression language on a temporary json file. See `man jq`.

With `-i` replaces the DWG in-place. This only makes sense with an JQ expression which changes values.

`dwg2SVG`

Convert a DWG to a limited SVG. All paperspace or modelspace enties of type: TEXT, LINE, CIRCLE, ARC, POLYLINE_2D, LWPOLYLINE, INSERT, ELLIPSE (unrotated), SOLID, 3DFACE, RAY, XLINE.

With `-m` or `--mspace` all paper-space entities are ignored, and only model-space is printed. The default is to print all paper-space entities. But if there are none, print all model-space entities instead.

Limitations: Many other graphical entities and some properties are still missing.

`dwg2ps`

Convert a DWG to a very limited Postscript file. All paperspace and modelspace entities of type LINE, POLYLINE_2D, LWPOLYLINE, ARC and CIRCLE.

This requires installation of pslib `http://pslib.sourceforge.net/doc/pslib.html`.

Note that the graphical representation for PS and SVG output is severely lacking, block references (insert entities) are not yet exploded, UCS and paper space transformations per entity are not yet done.

Planned is **dwgplot**, via GNU Plotutils `https://www.gnu.org/software/plotutils/`, to replace `dwg2SVG` and `dwg2ps`. This supports much more bitmap and vector formats.

There are also some more examples in the source distribution:

`load_dwg` loads a DWG and adds some entities.

`dwg2svg2` converts a DWG to SVG similar to `dwg2SVG`, but via the `dwg_api.h` only. The graphical representation for PS and SVG output is severely lacking, block references (insert entities) are not yet exploded , UCS and paper space transformations per entity are not yet done.

`unknown` lists the not yet reverse-engineered blobs from our examples files, and is the framework to guess the field layout for these. It is optionally using picat (`http://picat-lang.org/`) to solve some of the field-packing problems.

`dwgfuzz` afl++ fuzzing frontend, to test and debug various fast shared-memory options for afl-clang-fast, with the following runtime options: `-indxf`, `-injson`, `-rw`, `-dwg`, `-dxf`, `-dxfb`, `-json`, `-geojson`. All other output formats, like BMP, SVG, PS need to be fuzzed via their programs, which is the recommended way. The now default and fastest method INMEM does not need the 2nd file argument `@@`, the 2nd method STDIN neither.

See also `https://github.com/LibreDWG/libredwg-fuzz` for our fuzzing setup to test new fuzzing campaigns automatically and find regressions.

`dwgadd` is the easiest way to create DWG's (or DXF, JSON) from scratch or add entities to an existing DWG. It accepts a very simple file with commands to create entities or objects. See `man 1 dwgadd` and `man 5 dwgadd`.

10 Bindings

LibreDWG generates library bindings to python and perl5 via swig. These can be quite huge, and it is recommended to use `ccache`. You can easily add bindings to other swig-supported languages, like Go, C#, ruby, php, D, lua, tcl, common lisp, ocaml, or others by yourself. Patches accepted.

Bindings for gambas (which looks very close to VBA) are at GitHub (`https://github.com/LibreDWG/gambas3-bindings`) and will soon be added to gambas3 as gb.dwg component. This is in development and about 80% finished.

11 Reference API

See the separate refman (`https://www.gnu.org/software/libredwg/refman/`) manual (in pdf or html format, the pdf has ~1800 pages) for a detailed API description, or see the relevant `dwg.h`, `dwg_api.h` or the `*.spec` files.

For reference you might also want to check the public AutoCAD DXF reference manuals, the VBA object model and the ODA `OpenDesign_Specification_for_dwg_files.pdf`.

12 Reporting bugs

To report bugs or suggest enhancements for GNU LibreDWG, please "submit a bug" at Savannah (`http://savannah.gnu.org/projects/libredwg`) or send electronic mail to `libredwg@gnu.org`. (If you use the web interface, you don't need to also send email, since that is done automatically.) Pull requests at the github mirror (`https://github.com/LibreDWG/libredwg`) are also accepted for now.

For bug reports, please include enough information for the maintainers to reproduce the problem. Generally speaking, that means:

- The version numbers of LibreDWG and any other program(s) or manual(s) involved.
- Hardware and operating system names and versions.
- The contents of any input files necessary to reproduce the bug.
- The expected behavior and/or output.
- A description of the problem and samples of any erroneous output.
- Options you gave to `configure` other than specifying installation directories.
- Anything else that you think would be helpful. Usually that's the failing part of the object processed with `dwgread -v5`, but only the failing part, not the whole output.

When in doubt whether something is needed or not, include it. It's better to include too much than to leave out something important.

Patches are welcome; if possible, please make them with '`git format-patch`' and include `ChangeLog` entries (see Section "Change Log" in *The GNU Emacs Manual*). Please follow the existing GNU coding conventions. See `CONTRIBUTING` in the source distribution.

Appendix A GNU Free Documentation License

Version 1.3, 3 November 2008

0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document *free* in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or non-commercially. Secondarily, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released

under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

The "publisher" means any person or entity that distributes copies of the Document to the public.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

3. COPYING IN QUANTITY

   If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

   If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

   If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

   It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

4. MODIFICATIONS

   You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

   A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any,

be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.

B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.

C. State on the Title page the name of the publisher of the Modified Version, as the publisher.

D. Preserve all the copyright notices of the Document.

E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.

F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.

G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.

H. Include an unaltered copy of this License.

I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.

J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.

K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.

L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.

M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.

N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.

O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their

titles to the list of Invariant Sections in the Modified Version's license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains nothing but endorsements of your Modified Version by various parties—for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

5. COMBINING DOCUMENTS

   You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

   The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

   In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements."

6. COLLECTIONS OF DOCUMENTS

   You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

   You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

7. AGGREGATION WITH INDEPENDENT WORKS

   A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

   If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

8. TRANSLATION

   Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

   If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

9. TERMINATION

   You may not copy, modify, sublicense, or distribute the Document except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, or distribute it is void, and will automatically terminate your rights under this License.

   However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

   Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice.

   Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, receipt of a copy of some or all of the same material does not give you any rights to use it.

10. FUTURE REVISIONS OF THIS LICENSE

    The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See `http://www.gnu.org/copyleft/`.

    Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation. If the Document specifies that a proxy can decide which future versions of this License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Document.

11. RELICENSING

    "Massive Multiauthor Collaboration Site" (or "MMC Site") means any World Wide Web server that publishes copyrightable works and also provides prominent facilities for anybody to edit those works. A public wiki that anybody can edit is an example of such a server. A "Massive Multiauthor Collaboration" (or "MMC") contained in the site means any set of copyrightable works thus published on the MMC site.

    "CC-BY-SA" means the Creative Commons Attribution-Share Alike 3.0 license published by Creative Commons Corporation, a not-for-profit corporation with a principal place of business in San Francisco, California, as well as future copyleft versions of that license published by that same organization.

    "Incorporate" means to publish or republish a Document, in whole or in part, as part of another Document.

    An MMC is "eligible for relicensing" if it is licensed under this License, and if all works that were first published under this License somewhere other than this MMC, and subsequently incorporated in whole or in part into the MMC, (1) had no cover texts or invariant sections, and (2) were thus incorporated prior to November 1, 2008.

    The operator of an MMC Site may republish an MMC contained in the site under CC-BY-SA on the same site at any time before August 1, 2009, provided the MMC is eligible for relicensing.

ADDENDUM: How to use this License for your documents

To use this License in a document you have written, include a copy of the License in the document and put the following copyright and license notices just after the title page:

```
Copyright (C)  year  your name.
Permission is granted to copy, distribute and/or modify this document
under the terms of the GNU Free Documentation License, Version 1.3
or any later version published by the Free Software Foundation;
with no Invariant Sections, no Front-Cover Texts, and no Back-Cover
Texts.  A copy of the license is included in the section entitled ``GNU
Free Documentation License''.
```

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the "with. . .Texts." line with this:

```
with the Invariant Sections being list their titles, with
the Front-Cover Texts being list, and with the Back-Cover Texts
being list.
```

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.

13 Index

13.1 General Index

F

G

H

J

L

O

13.2 Object and Field Index

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y

Z