



Data format specification of the Official 3D Building Model LoD1 of Germany (LoD1-DE)

For the data distribution from the data stock of the Central Office for House
Coordinates and Building Polygons (ZSHH)

Version 1.4

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1. Description of the data format

The distribution format for the 3D building models is the CityGML format in accordance with the AdV-CityGML profile. The CityGML LoD1 example instance is obtained from the appendix to the “Product standard for 3D building models”. The description of the OGC standard is obtained from the OGC specification CityGML, version 1.0.0, OpenGIS® City Geography Markup Language (CityGML) Encoding Standard 08-007r1.

2. Data contents of the 3D building model LoD1

The 3D building model is an extension of the dataset of the building polygons including the third dimension.

A 3D building model is a digital, numerical surface model of the earth’s surface reduced to the object fields of buildings and structures defined in ALKIS (definition according to ALKIS-OK). Underground buildings are not included.

For the data stock of the 3D building models all the objects modelled as areas from the following object groups are used:

- AX_Gebaeude
- AX_Turm
- AX_BauwerkOderAnlageFuerIndustrieUndGewerbe
- AX_VorratsbehaelterSpeicherbauwerk
- AX_BauwerkOderAnlageFuerSportFreizeitUndErholung
- AX_SonstigesBauwerkOderSonstigeEinrichtung
- AX_HistorischesBauwerkOderSonstigeEinrichtung



A detailed list of all the defined building and structure functions for ALKIS and ALK can be found under the following link:

<http://repository.gdi-de.org/schemas/adv/citygml/Codelisten/BuildingFunctionTypeAdv.xml>

If the objects in the list are recorded in ALKIS (ALK) in the respective Land, they form part of the 3D building model.

The ground plan is generally taken from the official digital real estate map. Alternatively, outlines of structures and buildings from ATKIS can be used. The building is represented as a “block”. All buildings are represented with a flat roof. The positional accuracy corresponds to that of the ground plan it is based on. The height accuracy is 5m for the most part. Gross deviations are possible in individual cases with complex roof shapes.

Content of a building dataset: Besides the geometry description of the solid figure, the dataset of a building includes the following attributes:

- The height of the building is the difference in metres between the highest reference point and the lowest reference point of the building
- Object identifier
- Building function
- Indications of quality (metadata)
- Official municipality key
- Name (if recorded)

The coordinates for the geometries are specified by default as ETRS89/UTM coordinates in zones 32 and 33 (because of the image distortion only the eastern Laender can be delivered in zone 33) combined with the height data in the DHHN92_NH in metres with a point and three decimal places.

3. Data contents

- The naming of the “CityModel” is based on the level of detail of the building model and is formed as follows:

LoD<level>

- The filename is composed of the “CityModel” LoD<level>, the tile area (coordinates of the lower left corner [LU], coordinate values in km) and the edge length of the tiles in kilometres:

LoD<level>_<easting_LU>_<northing_LU>_<edge_length>.xml

Example of data name (ETRS example):

LoD1_EEE_NNNN_1.xml

Example of CityModels (ETRS example):

<gml:name>LoD1_EEE_NNNN_1</gml:name>



- Per CityModel (file) only one coordinate reference system (CRS) is defined, which is recorded at the highest geometry level according to AdV convention with six digits plus three decimal places:

```
ETRS89_UTM<zn>*DE_DHHN92_NH
```

- Likewise only one envelope (bounding box) per CityModel (file) is created. The coordinates and heights can either be specified in a list (posList) or as individual positions (pos).

Example:

```
<gml:name>LoD1_EEE_NNNN_1</gml:name>
<gml:boundedBy>
<gml:Envelope srsName="urn:adv:crs:ETRS89_UTM32*DE_DHHN92_NH">
<gml:lowerCorner srsDimension="3">EEEEEE.EEE NNNNNNN.NNN
HHHH.HHH</gml:lowerCorner>
<gml:upperCorner srsDimension="3">EEEEEE.EEE NNNNNNN.NNN
HHHH.HHH</gml:upperCorner>
</gml:Envelope>
</gml:boundedBy>
...
<gml:posList srsDimension="3">381954.215 5721415.891 66.542 381956.984 5721428.649
66.542 381957.034 5721428.638 66.542 381957.877 5721432.519 66.542 381957.829
5721432.530 66.542 381960.651 5721445.524 66.542 381962.801 5721445.057 66.542
381973.572 5721442.723 66.542 381970.857 5721430.094 66.542 381973.902
5721429.432 66.542 381972.911 5721424.874 66.542 381969.875 5721425.533 66.542
381967.185 5721413.131 66.542 381954.215 5721415.891 66.542</gml:posList>

or
<gml:pos srsDimension="3">381954.215 5721415.891 66.542</gml:pos>
<gml:pos srsDimension="3">381956.984 5721428.649 66.542</gml:pos>
...
```

- Object identifier:

Per building or building part (in the sense of a "3D-Bauteil" / 3D_component) there is an object identifier for each level of detail (LoD); it begins with "DE" and a two-character abbreviated designation of the Land "BL":

```
<bldg:Building gml:id="DEMV_110e8edf-dda2-4130-a564-87b2a3cb3f35">
```

- Reference to the 2D building:

In addition to the object identifier of the 3D building, a reference to the 2D building is recorded in the dataset. The ALK building indicator can be recorded here in the primary stage if it is unambiguous. If the ground plans from ATKIS are used, the OID of the ATKIS object is to be stated.



```
<core:externalReference>
<core:informationSystem>http://repository.gdi-
de.org/schemas/adv/citygml/fdv/art.htm#\_9100
</core:informationSystem>
<core:externalObject>
either ALK building indicator
<core:name>HA HA0556202080817700149____001</core:name>
or OID of the object type AX_Gebaeude (structure) from ALKIS or ATKIS
<core:name>DENW52AL05562020</core:name>
</core:externalObject>
</core:externalReference>
```

- Derivation date:

The derivation date states when the produced LoD1 data was imported into the database of the respective Land. This is a data processing derivation date, which is recorded as "creationDate" yyyy-mm-dd.

```
<core:creationDate>2008-08-13</core:creationDate>
```

- Metadata:

The metadata is recorded as generic attributes. The attribute names and values are to be used that have been adopted in the code lists of the AdV-CityGML profiles.

```
<!-- Anfang Metadaten als generische Attribute der AdV -->
  <!-- Anfang Datenquelle Dachhoehe -->
    <gen:stringAttribute name="DatenquelleDachhoehe">
      <gen:value>1000</gen:value>
    </gen:stringAttribute>
  <!-- Ende Datenquelle Dachhoehe -->
  <!-- Anfang Datenquelle Lage -->
    <gen:stringAttribute name="DatenquelleLage">
      <gen:value>1000</gen:value>
    </gen:stringAttribute>
  <!-- Ende Datenquelle Lage -->
  <!-- Anfang Datenquelle Bodenhoehe -->
    <gen:stringAttribute name="DatenquelleBodenhoehe">
      <gen:value>1000</gen:value>
    </gen:stringAttribute>
  <!-- Ende Datenquelle Bodenhoehe -->
  <!-- Anfang Bezugspunkt Dach -->
    <gen:stringAttribute name="BezugspunktDach">
      <gen:value>1000</gen:value>
    </gen:stringAttribute>
  <!-- Ende Bezugspunkt Dach -->
<!-- Ende Metadaten als generische Attribute der AdV -->
```

- Building function:

The building function in ALKIS or the building use in ALK is to be recorded as "function" only with the attribute values. In the case of several functions of the structure, only the first attribute



value is delivered. Since the ranges of values of building function and structure function overlap, with ALKIS buildings the attribute value is preceded by the identifier of the object type with an underscore.

ALKIS building function (object type identifier, underscore, building/structure function)

```
<bldg:function>31001_1121</bldg:function>
```

ALK building use

```
<bldg:function>1001</bldg:function>
```

- Municipality key:

Under the attribute *Gemeindeschlüssel*, the eight-character municipality key is to be recorded:

```
<gen:stringAttribute name="Gemeindeschlüssel"
```

```
<gen:value>09679122</gen:value>
```

```
</gen:stringAttribute>
```

- Height of the building from the difference between the height of the roof and the ground level:

Is to be recorded as "Measured Height" in metres with three decimal places in accordance with the conventions of the GeoInfoDok.

```
<bldg:measuredHeight uom="urn:adv:uom:m">7.700</bldg:measuredHeight>
```

- Name (only if recorded with the object in ALKIS or in the digital real estate map):

Under the attribute *Name*, only the proper name of the building should be stated, not the descriptive designation of the building/structure function:

```
<gml:name>Maria_Montessori_Schule</gml:name>
```

For more details on this information, please do not hesitate to contact ZSHH.

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<http://www.geodaten.bayern.de>