Work Instruction

015 Research + Development

CATIA V5 - Drafting Basics

W_015_012

Rev.	*Date*	*Originator / Author*	*Date*	*Approver*	*Date*	*Releaser*	*Date*
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1 Purpose

The purpose of this work instruction is to optimise the quality of data generated by CATIA V5 at GRAMMER AG and to standardise the structure of CAD models. A further objective is to increase efficiency in the application of CATIA V5 through an identical approach to design. The aim is for models to be created using the new, uniform procedure and structured in such a way that their usability within the process chain is ensured. The subsequent processes shall draw the maximum benefit from the data provided.

2 Scope

This work instruction shall be binding for GRAMMER AG as well as for external partners that are part of GRAMMER AG's design/development process and create data for GRAMMER AG in this context or provide GRAMMER AG with such data.

This work instruction contains specifications for working with the CAD system CATIA version 5 (CATIA V5) in GRAMMER AG's Design department as well as in cooperation with external design and engineering partners that generate data for GRAMMER AG.

This work instruction as well as the methods and procedures described in it shall also apply to customer projects unless replaced completely or in part by separate agreements.

New knowledge regarding the handling of design tasks and design orders with CATIA V5 has been incorporated into this work instruction. Alongside this work instruction, the attachment “A_015_012_Sammlung_CAD_PDM_Dokumente_Collection_CAD_PDM_Documents” shall also be binding.

The following applies to the application of the new work instruction and the expiry of the previous work instructions / directives:

- For “ongoing old projects”, the rules specifically defined for that project shall apply. If such rules are missing completely or in part, this work instruction shall apply where necessary.
- If there are definition gaps, in case of doubt the rules applicable up to now as well as implemented methods shall apply in these situations.

3 Terminology

CATIA-specific descriptions of functions are written in *italics*.

CATPart	CATIA V5 part (single part)
CATProduct	CATIA V5 product (assembly of CATParts and subassemblies)
CATDrawing	CATIA V5 drawing (comprising one or more drawing sheets)
Component	CATIA V5 structuring element in the specification tree (without own physical document, e.g. on hard disk), as a representation either of a part without a geometric counterpart or of a product comprising CATParts, CATProducts or in turn Components
ALLCATPart	Merger of a product to create a CATPart (without history)
RPS	Reference point system
CATDUA	Additional application for repairing CATIA V5 documents

4 Responsibilities

The implementation of and compliance with this work instruction are the responsibility of the vice president R&D; queries should be addressed to the R&D Engineering Services Team.

5 Description

5.1 Creating drawings with CATIA V5

5.1.1 General information

This chapter describes/specifies the different techniques and methods for structuring and creating drawings.

A distinction is made in the definition of drawings between two types of drawing creation:

5.1.1.1 Generative Drafting

The most common technique, and the one generally used at GRAMMER AG, for generating technical drawings of parts and products. Generative Drafting involves deriving a technical drawing from previously generated 3D geometries. The 3D geometry is the master on which the drawing is dependent. This means that all changes are made to the 3D geometry and the drawing must be updated or adapted afterwards. It is not permissible to manage the 3D geometry based on the drawing derivation.

Dependency on the 3D geometry for dimensioning in the Generative Drafting technique is dictated by the format of the 3D data referenced. This means:

- for precisely described V5 native 3D data:
  -> full associativity exists for the dimensioning.

- with tessellated 3D data:
  -> drawing derivation is possible in principle, but without associative dimensioning.
  The dimensions are only approximated based on the tessellation.

5.1.1.2 Interactive Drafting

Interactive Drafting may only be used at GRAMMER AG for general layout drawings in specific customer situations (e.g. Deutsche Bahn) by prior arrangement with the specialist departments (Design department and/or Engineering Services) because there is no process-oriented and production-oriented design associated with this method.

If product-describing drawings of subsequent processes are needed, it must be essentially guaranteed that the 3D outline and drawing are identical in content. CATIA V5 automatically manages the link between the drawing and the 3D outline in the 2D data set. This means:

- that the drawing is associative to the 3D outline.
- This applies to the creation of drawings for both parts and products.

5.2 Types of drawing

Drawings are divided into different types, e.g. parts drawing, offer drawing, assembly drawing, etc.

5.2.1 Definition of customer and supplier drawings

Drawings that carry an external company identification in the basic title block (e.g. OEM [Deutsche Bahn or Automotive OEM]); these cannot therefore be designated GRAMMER AG property.

5.2.2 Drawings of external partners

Drawings that are created by external development partners carry the GRAMMER AG basic title block and are GRAMMER AG property. The corresponding CAD data is archived and released via the GRAMMER PDM system in CATIA native format. The aforementioned requirements must also be observed for supplier drawings.

For drawings created externally that do not include GRAMMER-specific frames from the catalogue or starting model, the frame size must also be evident in the title of the detail area in which the frame was defined.

Before drawings generated externally enter the GRAMMER release workflow, the following must at least be ensured:

- the drawing corresponds to the environment-specific starting model.
- a suitable drawing frame from the catalogue that corresponds to the sheet size was inserted in the background view should the supplier frame not conform to the naming convention so that the requirements in terms of process-compliant data quality are assured.

5.2.3 Drawing format and view scaling

Drawings and drawing sheets in DIN A4 format are avoided. The reason for this is the limited space available for displaying the view(s) because the title block and any change descriptions take up a lot of space here.

Grammer drawing sheets must not be scaled.

5.3 Link management

Drawings that have been created using the Generative Drafting method have the following (permitted) types of link:

- View Link
- MML (Multi-Model Link - e.g. to seating catalogues)
- Attribute Link

Automotive note: Catalogues must not possess any links to copies generated/extracted. Existing links with catalogues must be isolated.

Driver's seat note: View and object links must not be isolated (locked).

5.4 Starting model

Only the appropriate release version of the environment-specific standard starting model (2D) is to be used for drawing creation purposes.

Within GRAMMER AG, a corresponding starting model has been stored for each drawing format in CATIA V5 in the "*New documents*" function.

The following applies to external partners:
Please make sure that you always use the latest starting models! If you have any questions, please do not hesitate to contact the R&D Engineering Services Team.

Inventory numbers must be SAP-compliant. This is guaranteed within GRAMMER AG by the script-based "*New Documents*" function in CATIA V5 when creating new CATIA V5 documents. An SAP-compliant inventory number is generated for this and registered in the system.

General information on drawings (texts, catalogue elements, tables, etc.) that cannot be assigned to any of the projected view(s) is stored and managed as follows:

All departments / divisions
In every drawing starting model a neutral view has been predefined with the name 2D Notes.

5.4.1 Drawing structure

To ensure that drawings have process-compliant data quality, the following criteria must be considered (these notes are taken into account in the data quality check with the Q-Checker, among other things).

5.4.1.1 Drawing sheet

- A drawing may consist of several sheets.
- Empty drawing sheets and/or detailed drawing sheets should be avoided where possible.
- Unused details must be avoided.
- If several sheets are managed in a drawing, the name of the drawings sheets is defined in the following form:
  - *Sheet.consecutive numbering* (e.g. Sheet.1)
  - If sheet names are changed/adapted, an unambiguous and logical name must be used.

5.4.1.2 Drawing view, system of coordinates

- All views generated must be within a drawing sheet.
- Avoid views and detail views with interrupted links
- Background View and Background Detail View should not be active.
- CAD data set and drawing are essentially based on the same system of coordinates. Where exceptions exist, the transformation matrix must be documented.

5.4.1.3 Dimensions

- Non-associative dimensions or non-updated dimensions should be avoided.
- Dimensions must essentially be derived from the 3D geometry (solid model and/or wire-frame and surface geometry).
- The *Dimension not to scale* definition (so-called *FAKE dimensions*) is not allowed.
- RPS dimensions must be defined in accordance with the RPS manual.

5.4.1.4 Drawing frame and title block

All departments / divisions
The drawing frame has already been stored in the starting model.
External partners will find the drawing frame in the supplier pack catalogue and must insert this as a 2D detail in the origin in the Background View. The drawing frame must not be *exploded*.
The title block is completed by the PDM system at GRAMMER AG.
Manual changes to the drawing frame and/or title block are not allowed.

5.4.1.5 Catalogues and details

- Standardised catalogue elements and details can be used.
- The following applies to external data suppliers:
  - Only GRAMMER AG catalogues and details or catalogues and details approved by GRAMMER AG may be used.
  - You are obliged to check, at regular intervals, whether GRAMMER AG catalogues and details are up-to-date. The supplier pack for external data suppliers contains the latest catalogues and details.
- Catalogue names must not be changed under any circumstances.
- *If GRAMMER does not have sufficient internal catalog elements to specify a component sufficiently, texts from customer databases (customer catalogs of the OEM partners) may be used in their latest version. These have to be isolated after insertion. Fonts and text heights do not need to be changed to the currently valid GRAMMER standard in this case.*

DOUBLE INDICATION REGARDING SPECIFICATIONS, MATERIAL ETC. ARE PROHIBITED! ALL INFORMATION THAT CAN BE DESCRIBED WITH GRAMMER INTERNAL CATALOG ELEMENTS ARE IN ANY CASE PRIORITY!

All departments / divisions
References (links) from objects to catalogues must not be isolated with the functions "Disassemble 2D component" or "Make 2D component accessible", except for catalog elements from customer databases. Then isolation is absolutely necessary.
Within GRAMMER AG, only catalogues and details that are available/identified as the last checked-in version in the SmarTeam may be used *and only if these contribute to the drawing definition.*

Examples:

BMW

Narbe: BMW-Feinnarbe - GRAIN: BMW-FINE-GRAIN.....

ZV 11

In diesem Bereich BMW Feinnarbe -
IN THIS AREA BMW FINE-GRAIN...

ZV 11 Text

Allgemeine Formschraege-
GENERAL PATTERN DRAFT

ZV 13

Freigabemuster muss von EK- genehmigt sein.
MASTER RELEASE TO BE APPROVED BY EK-...

ZV 14

Fremdteilzeichnung SUPPLY PART DRAWING

ZV 15

VW

Der Lieferant ist verpflichtet, unter wirtschaftlichen Gesichtspunkten alternative Werkstoffe und Oberflaechenschutzarten gleicher oder aehnlicher Qualitaet fortlaufend zu pruefen und dem Konstrukteur vorzuschlagen. Die Serieneinfuehrung erfolgt vorbehaltlich der Zustimmung des Konzernlabors und Versuchs.

The supplier is bound to continuously test alternative materials and surface protection types of the same or similar quality with respect to the economical point of view and to recommend them to the design engineer. Start of production is subject to both the Group laboratory s and the testing department's approval.

Farbton und Narbung nach Farbkombination.
Color and grain acc. to color combination.

Temperaturbestaendig und funktionsfaehig von ...°C bis ...°C
Temperature resistant and operable from ...°C to ...°C

5.4.2 Identification of changes

Changes must be made and documented according to GRAMMER rules. In CATIA V5, changes are entered in the title block with the GRAMMER PDM system.

5.5 Geometry and structure check

To ensure that CAD data generation is of a uniformly high standard of quality, it is absolutely vital that the design data is checked constantly. This involves subjecting the data to a continuous geometry and structure check and making sure that the CAD data for the respective release version is up-to-date. The tools that are used for these processes include CATDUA or the Q-Checker among other things.

5.6 Supplier and customer drawings

Supplier/customer drawings are drawings that are provided by suppliers/customers or created for a customer/OEM on his behalf.

5.6.1 Supplier and customer drawings out of the area “suspended seats” and “railway”

In order to manage these drawings at GRAMMER through a PDM system, a GRAMMER drawing with a GRAMMER title block and a GRAMMER internal drawing number is created.

5.6.1.1 Supplier and customer drawings

In these drawings, the tiff drawing from suppliers/customers are always inserted into a GRAMMER drawing with GRAMMER title block. The supplier/customer drawing itself does not have to comply with the drawing guidelines of GRAMMER AG; all additional inserted data (iso views, tables, ...) must comply with the drawing guidelines of GRAMMER AG.

Example for supplier drawing:

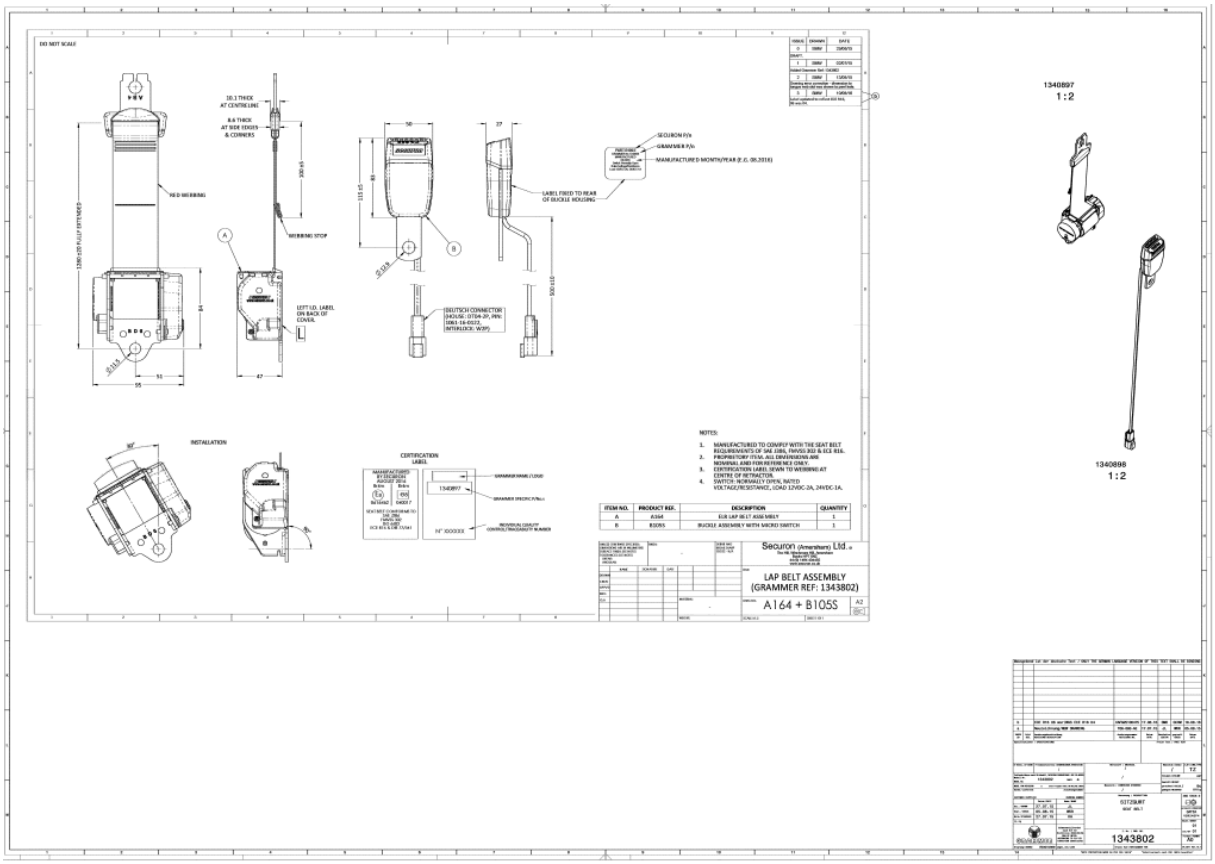


Fig.: Supplier drawing in GRAMMER drawing inserted

Example for customer drawing:

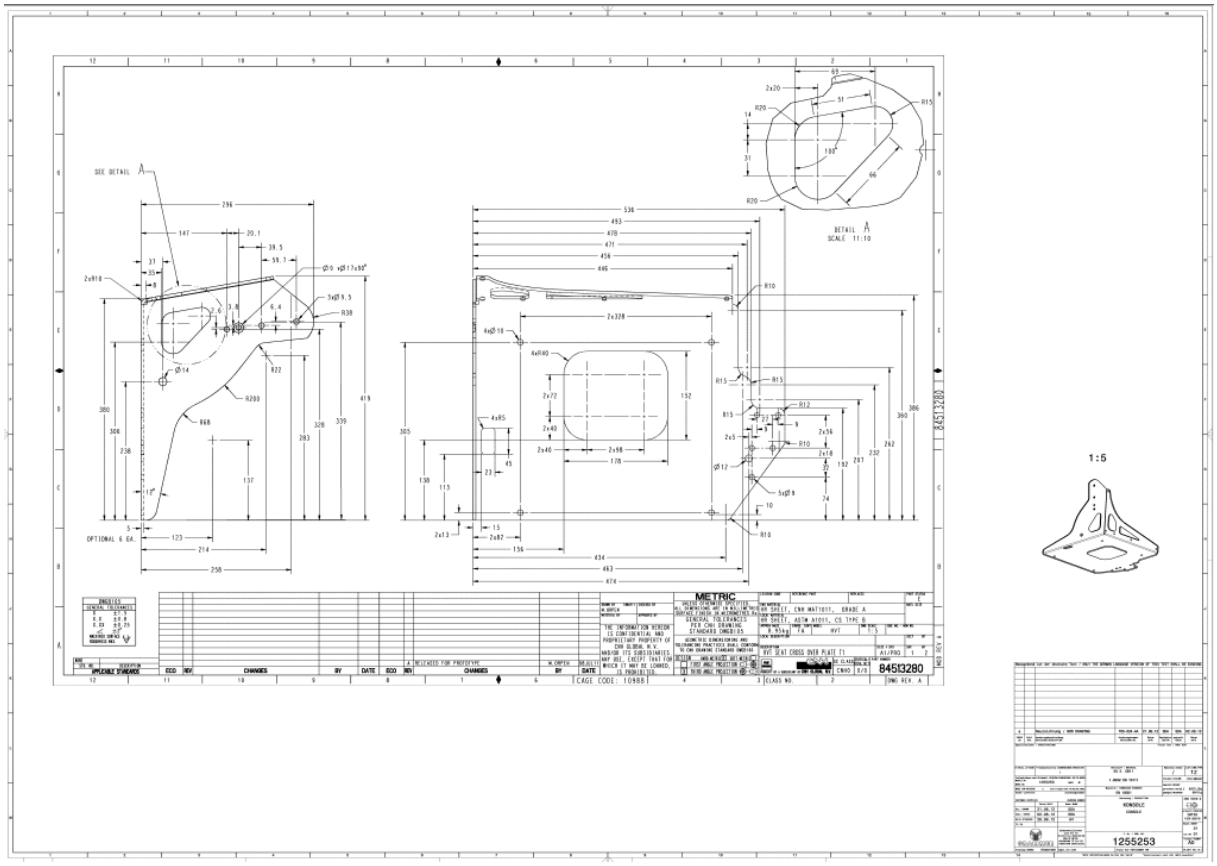
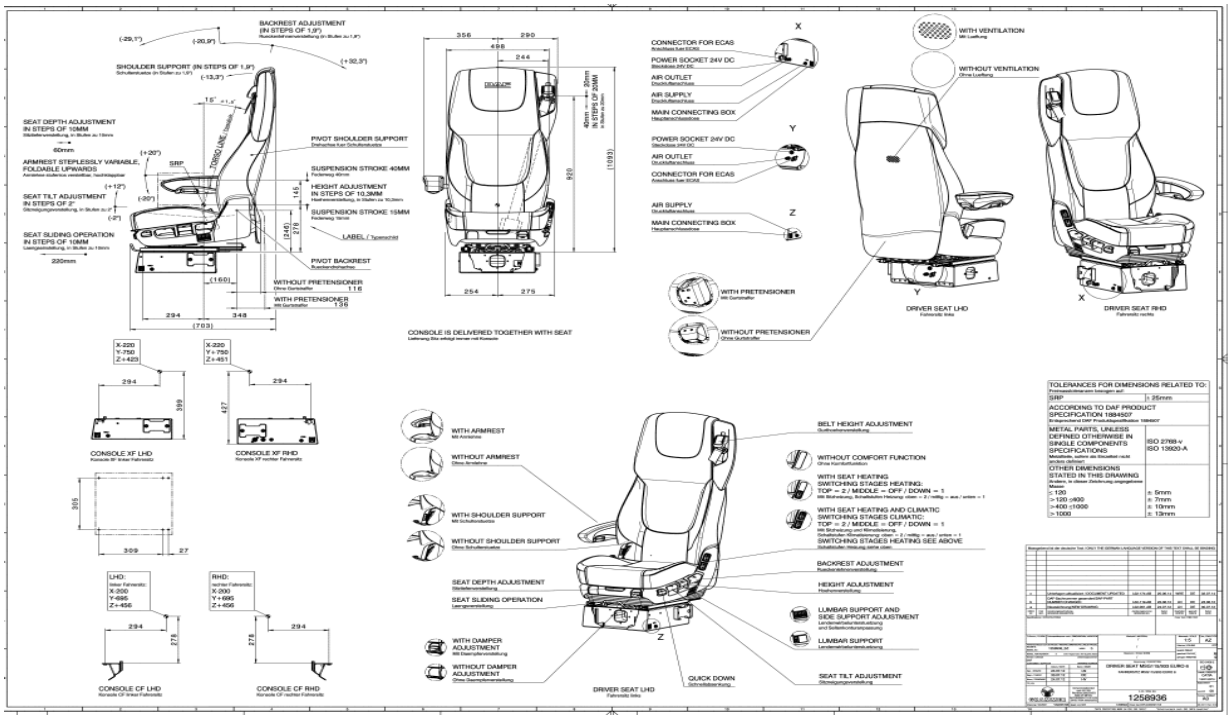


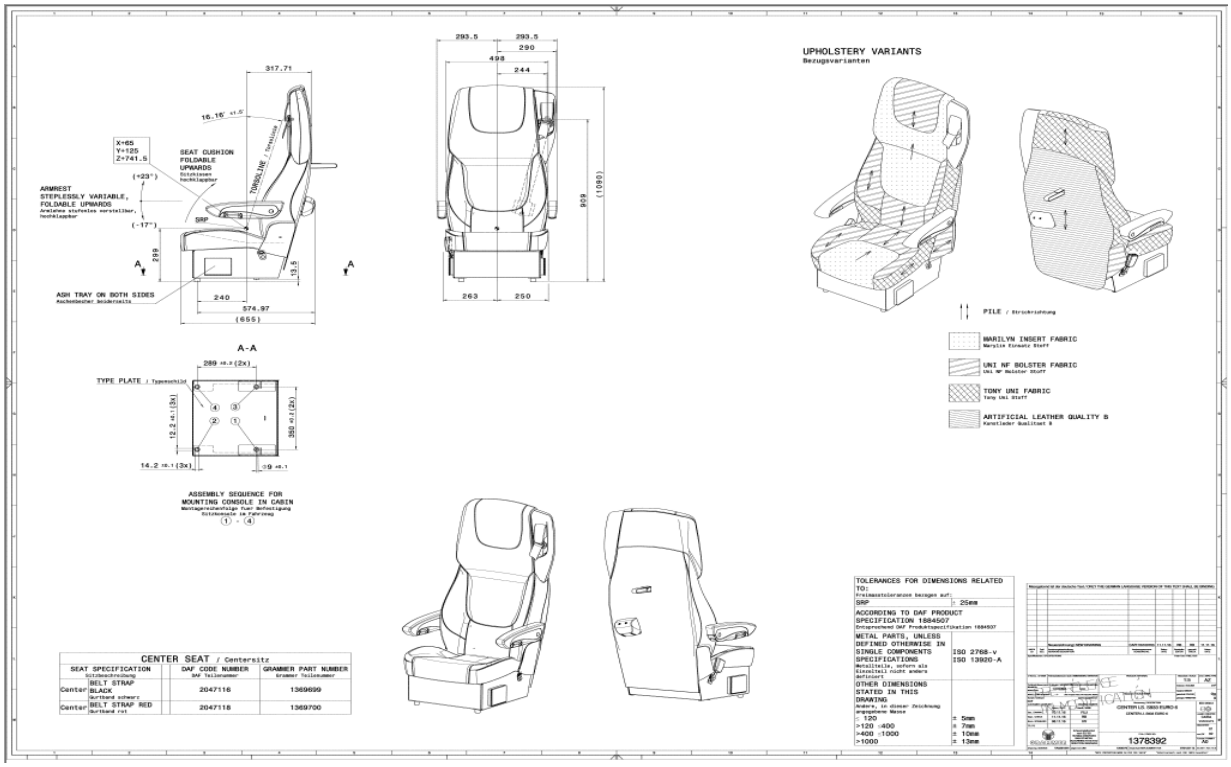
Fig.: Customer drawing in GRAMMER drawing inserted

5.6.1.2 Exceptions for example for DAF-AZs

Drawings are created according to the customer requests/requirements. No drawing guidelines of GRAMMER AG apply to these drawings.

Examples for GRAMMER drawing according to customer requirements:





5.6.2 Supplier and customer drawings out of the area "seat components" or "consoles"

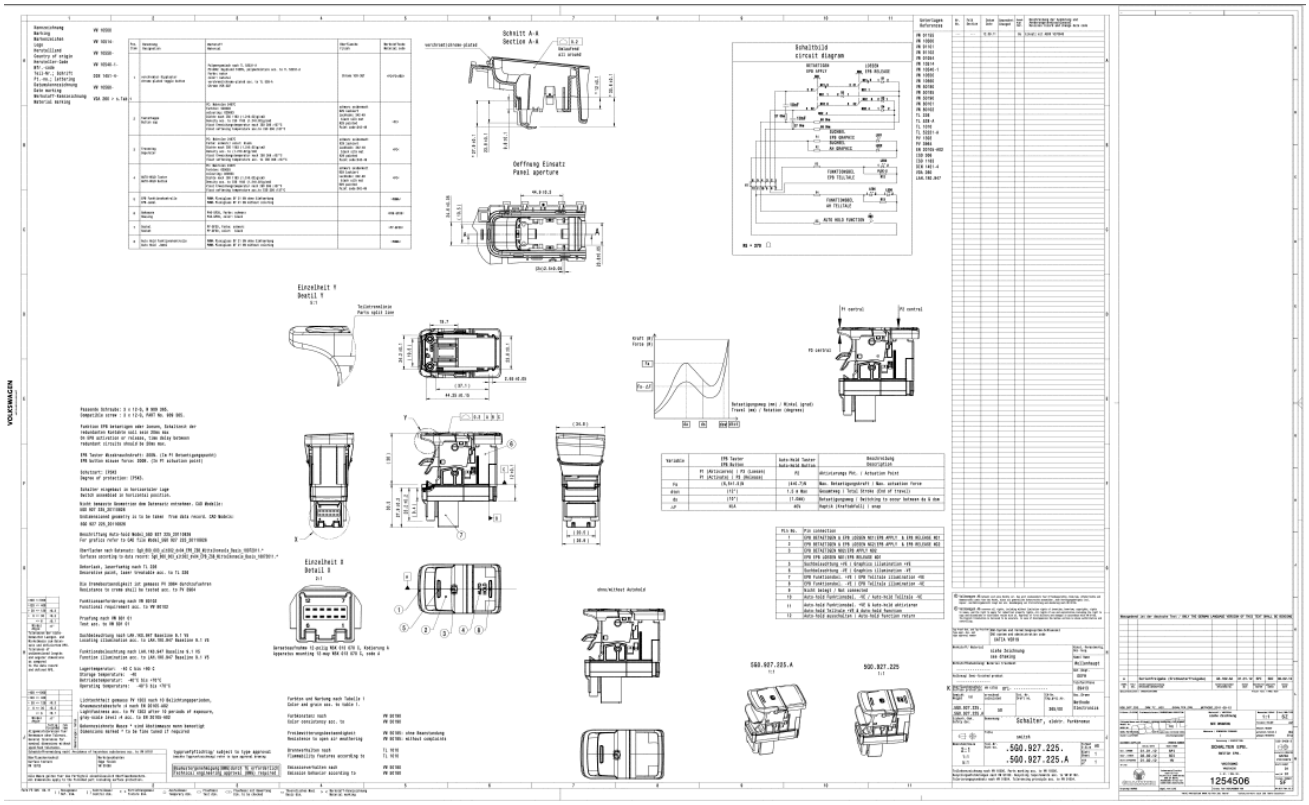
In order to manage these drawings at GRAMMER through a PDM System, a GRAMMER title block with a GRAMMER internal drawing number is added on the right side outside on the supplier/customer drawing. Add always the GRAMMER drawing frame with width 195 mm. These drawings are created in corresponding Catia V5 versions or in the customer-specified Catia environment.

The original drawing:

- ***Must not*** *be scaled*
- ***Must not*** *be embedded in a GRAMMER drawing frame*

Multi sheet drawings:

- *the first is the* ***native*** *(parametric) customer drawing*
- *add the GRAMMER* ***internal*** *drawing (if necessary) after the customer drawing*
- *special case BMW: tiff-drawing with title block* ***must be*** *inserted as extra sheet*


Schnitt A-A
Section A-A
Öffnung Einsatz
Panel aperture
Schaltbild
circuit diagram
Einzelheit Y
Detail Y
Einzelheit X
Detail X
500.927.225.A
500.927.225
.500.927.225.
.500.927.225.A
1254506

Process: release of customer drawings

The process is as follows:

- *The drawing is sent for customer approval*
- *Afterwards add the text field from the library (see below) and send it to a release or changing process.*
- *When the released drawing comes back from the customer this text field will be removed and replaced with a bagatelle change.*

6 Applicable documents

Attachment “Sammlung CAD-/PDM-Dokumente / Collection CAD / PDM Documents”	A_015_012

7 Changes

Replacement for Work Instruction “AA-09-04.2008-FE CATIA V5 - Drafting Basics”
Full revision/updating
Transfer to new template and updating