Design Specifications for Gauges and GOM Measuring Fixtures

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev.</th>
<th>Created</th>
<th>Checked</th>
<th>Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.11.2013</td>
<td>004</td>
<td>Fleper</td>
<td>Kowalke</td>
<td>Willeke</td>
</tr>
<tr>
<td>03.02.2017</td>
<td>005</td>
<td>Fleper</td>
<td>Kowalke</td>
<td>Willeke</td>
</tr>
</tbody>
</table>
**Contents**

1. **Objective** ......................................................................................................................................................... 4

2. **Abbreviations** ................................................................................................................................................. 5

3. **Design of Gauges** ........................................................................................................................................... 6
   3.1 **General**........................................................................................................................................................................................... 6
   3.2 **Reference to vehicle coordinate system** .............................................................................................................................. 6

4. **Baseplates** ....................................................................................................................................................... 7

5. **Gauge/fixture body** ....................................................................................................................................... 8
   5.1 **Basics**............................................................................................................................................................................................... 8
   5.2 **Alignment and clamping** ......................................................................................................................................................... 9
   5.3 **Datum surfaces** ......................................................................................................................................................................... 10
   5.4 **Dial gauges** ................................................................................................................................................................................. 10

6. **Test Criteria** .................................................................................................................................................. 11
   6.1 **Contour** ........................................................................................................................................................................................ 11
   6.2 **Trim edges** .................................................................................................................................................................................. 11
   6.3 **Hole positions** ............................................................................................................................................................................. 13
   6.4 **Hole diameters** .......................................................................................................................................................................... 14

7. **Tolerances** ................................................................................................................................................... 15
   7.1 **Datums** ......................................................................................................................................................................................... 15
   7.2 **Other surfaces and positions** ................................................................................................................................................ 15
   7.3 **Surface finish** .............................................................................................................................................................................. 15
   7.4 **Fits** .................................................................................................................................................................................................. 15

8. **Weight** ........................................................................................................................................................... 16

9. **Coloring** ......................................................................................................................................................... 16

10. **Gauge marking** ............................................................................................................................................. 17
   10.1 **Gauge label** ................................................................................................................................................................................. 17

<table>
<thead>
<tr>
<th>Date</th>
<th>Rev.</th>
<th>Created</th>
<th>Checked</th>
<th>Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.11.2013</td>
<td>004</td>
<td>Fleper</td>
<td>Kowalke</td>
<td>Willeke</td>
</tr>
<tr>
<td>03.02.2017</td>
<td>005</td>
<td>Fleper</td>
<td>Kowalke</td>
<td>Willeke</td>
</tr>
</tbody>
</table>
10.2 Marking of the baseplate ....................................................................................................................................................... 18
10.3 Marking of exchanges parts and loose parts .................................................................................................................. 19

11 Operational safety .......................................................................................................................................................... 19

12 Specifics for GOM Measuring Fixtures ......................................................................................................................... 20
  12.1 Introduction ........................................................................................................................................................................ 20
  12.2 Baseplate ........................................................................................................................................................................... 21
  12.3 Basics ................................................................................................................................................................................. 22
  12.4 Datum surfaces ............................................................................................................................................................... 23
  12.5 Clamps ................................................................................................................................................................................. 24
  12.6 Color .................................................................................................................................................................................. 24
  12.7 General requirements ........................................................................................................................................................ 24

13 Ordering process of gauges ............................................................................................................................................. 25

14 Scope of delivery ............................................................................................................................................................... 26

15 Acknowledgement of receipt ............................................................................................................................................... 27
1 Objective

This design specification for gauges and GOM Fixtures is intended to facilitate the communication between quality planning engineer, supplier and user of the gauge by setting clear requirements.

The design specification for gauges and GOM Fixtures ordered by KIRCHHOFF Automotive considers requirements regarding materials, accuracy and function. These requirements are based upon generally accepted technical practices and operational needs.

Compliance to these requirements is mandatory for all involved parties. They are determined by the inquiry documents as well as by the present design specification.

This means for the manufacturer that he is only allowed to fulfill the requirements in an alternative way in terms of a more economical production when deviations are agreed in advance with the quality planning engineer and the alternatives have been expressly approved.

Deviations from this design specification, which are required by KIRCHHOFF Automotive and that may arise from urgent operational demands, must be officially ordered by quality planning. The validity of all other regulations is not affected.

The design specification with revision status 005 is completely revised and solely available in English language. It applies to all newly ordered gauges and GOM Fixtures. For all gauges that are already finished or are under construction at the effective date the previous revision status 004 is applied.

In case modified legal requirements come into effect or possible gaps maybe in the regulations of this design specification, the degree admissible by law respectively the corresponding state of the art of the application will be substitution.

Attendorn, 03.02.2017

R. Kowalke
Manager Quality Planning
2 Abbreviations

- BSK = Trim edge
- EM = Extended measurement surface
- APQP = Quality planning
- LL = Clearance
- LH = Left-hand side
- LHD = Left-hand-drive
- RH = Right-hand side
- RHD = Right-hand-drive
- RPS = Reference point system
- ZB, ZSB = Assembly
3 Design of Gauges

3.1 General
As a standard, the gauge has to be built in vehicle position. In exceptional cases, the inquiry documents may specify a gauge body position rotated by integer multiples of 90° from vehicle position. In all other cases vehicle position is mandatory.

All Gauges and GOM fixtures must be designed and produced according to the reference system (normally ASME Y14.5M-2009 or RPS) stated on the part drawing. After completion of the gauge design the CAD-data have to be forwarded to the quality planning engineer for design approval. Data must be provided as Catia 3D-Model, JT or STEP and additionally as 3D-PDF. All checking pin diameters must be specified in a catalogue or a 2D-drawing. Costs incurred for the manufacturing of gauges or fixtures where the design has not officially been approved by the quality planning engineer, are at the expense of the supplier.

It has to be guaranteed, that all measuring points (e.g. surfaces, edges, holes) are measurable and accessible by the measuring machine. This has to be particularly considered with regard to the positions of clamps, displaceable bridges, templates or similar.

3.2 Reference to vehicle coordinate system
Reference to the vehicle coordinate system is made by flanged bushings respectively globes for alignment. The bases which are incorporated into the base plate have to be wear-resistant and, if possible, impact-protected. For this purpose three appropriately secured flanged bushings (Figure 1) with grinded flanges must be used. As an alternative globes are permissible.

The positions of the flanged bushings must be indicated in all three coordinate axis on the base plate (Figure 2)

The base plate has to be parallel to a plane of the vehicle coordinate system.

Additional net references on the gauge/fixture are allowed. However, it should be noted, that for measuring the gauge/fixture at KIRCHHOFF Automotive, the datums defined in the part drawing are used for alignment. The CAD-Data provided by KIRCHHOFF Automotive are always used as the basis for gauge/fixture design and measuring.
4 Baseplates

When designing the gauge/fixture, distortion stiffness and deformation resistance have to be considered. Regarding the baseplates and the gauge/fixture body this design specification can only depict the basic variants. Exact specifications according to the project will be defined by the responsible quality planning engineer. The selection of materials has to be adapted to the intended use of the gauge/fixture. Fundamentally, dimensionally stable and abrasive resistant materials have to be chosen. The gauge’s/fixture’s material must be protected against corrosion.

The standard materials which are used for baseplates are:

- rolled aluminum plate (aluminum block material).
- cast aluminum.

In order to simplify the transport of the gauges/fixtures, the dimensions of the baseplate should allow a space-saving transport on euro-pallets (Figure 3) or lattice boxes (Figure 4). You must pay attention, that the accessibility during the removal of gauges, e.g. from a lattice box, is possible.
5 Gauge/fixture body

5.1 Basics

The gauge/fixture body has to be set up in aluminum (e.g. material AlMg4,5Mn) or plastic – block material with a shore-D hardness of minimum 80 (e.g. Cibatool BM 5112 grey or Cibatool BM 5166 ivory) according to the project requirements.

Neither a component of the gauge/fixture (e.g. clamp, slider, pin) nor the tested part itself may protrude the base plate due to its dimensions. All mounting parts, pins, templates etc., must be stored on the gauge.

All checking pins, bushings, datums and clamps have to be marked in ascending order, that means:

- Datums and clamps: A1, A2, ...
- Locating pins & bushings: Z1, Z2, ...
- Checking pins & bushings: P1, P2, ...
- Checking plate for trim: in terms of color - with assignment to the respective area.
- Checking pins for contour testing: in terms of color - with assignment to the respective area.

Locating pins and zero contact surfaces have to be additional marked with yellow color.

The allocation of the pins to different tolerance areas must be visible, even if the tested part is clamped to the gauge.
If generously tolerated holes or cut-outs have to be checked for existence only, this has to be done by pins fixed in the gauge/fixture body which protrude from the part by minimum 5 mm. That means if the hole or cut-out is missing, the part can’t be checked. These pins have to be tight and exchangeable. In case this is not possible due to reasons of design or handling, an alternative has to be developed together with the quality planning engineer.

5.2 Alignment and clamping

To align a part, in general two locating pins are used. One of them has to be designed as a “tapered pin”, the other one as a “swordlike pin”.

Preferably, these pins should be carried out as removable pins. Depending on customer needs and requirements, these pins can be specified in the inquiry documents as spring-loaded, too.

The swordlike pin has to be assured against rotation. The positional tolerance of the hole for the swordlike pin has to be incorporated into the narrow (not tapered) side of the swordlike pin.

Positions and sizes of datum surfaces are specified in the inquiry documents. In case the size of the datum surfaces is not specified, it should not be smaller than 10 x 10 mm or Ø 12 mm, as long as this is suitable for the part to be checked.

All contact surfaces, bushings and pins must be hardened and grinded to a hardness of min. 400 HV30.

The part has to be fixed with clamps in its position. Unless otherwise specified, for each datum surface a separate clamp (Figure 5) has to be used. For that, preferably horizontal hold-down clamps should be used, otherwise vertical hold-down clamps. In case of ring-shaped contact surfaces (e.g. at hole positions) fork clamps (Figure 6) must be used.
5.3 Datum surfaces

![Figure 7](image1)

![Figure 8](image2)

Datum surfaces must be realized as shown in Figure 7. Depending on the specification they can be designed circular as well. Herewith it is ensured, that the center-point of the datum surface can be measured, if this will be required in measuring plans of the customer. Mounting screws in the center point of the datum-surfaces, like shown in Figure 8, are not acceptable. The datum surfaces must have a hardness of minimum 400 HV30.

5.4 Dial gauges

If dial gauges are needed for measuring one or more criteria, the following requirements must be fulfilled:

- Dial gauge digital with digimatic-interface or wireless
- Clamping shank Ø 8 mm -h6
- Guide bushings
- The adapter ring for the dial gauge must be screwed with a stud
- Certificate of calibration

Regarding the positioning of the dial gauge it has to be considered, that the metering of the measuring result is possible without any limitations.

A possibility for calibration (zero pad) must be in place for all measuring elements, which are in contact to the part. The tolerance for the zero pad is +/- 0,02 mm.

For each measuring position at a gauge the requirements mentioned in the AIAG manual "Measurement System Analysis", fourth edition, June 2010, have to be fulfilled. The results for gauge R&R should not exceed 0,1 if possible, maximum, however, should be 0,3.

Therefore, it is absolutely necessary to pay attention to a stable construction while designing the gauge and to minimize the clearance, e. g. at fits and guides.

Generally, KIRCHHOFF Automotive will cross-check the measurement system capability of a gauge/fixture at the production plant.
6 Test Criteria

6.1 Contour

All contour checks are made with 3 mm clearance. Depending on the size of a part or an assembly, the clearance can be enlarged to 5 mm if specified in the inquiry documents or agreed with the quality planning engineer. If during the design phase a different clearance dimension becomes necessary, the responsible quality planning engineer has to be informed. He will decide to which extent the deviation can be accepted, respectively will work out a suitable technical solution together with the gauge/fixture supplier.

For checking the part contour, a corresponding maximum/minimum bended checking pin has to be prepared. In case checking pins with ball ends are requested, the balls must be fastened with threads. Glued balls are not permissible.

The assignment of checking pins to different tolerance areas is done with colored dots on the checking pin and on the corresponding areas at the gauge. Even if the part rests on the gauge, the assignment must be visible. An example is shown in Figure 9.

![Figure 9](image)

6.2 Trim edges

Trim edges have always to be designed on nominal size. For checking, supplementary measuring surfaces (EM) of minimum 20 mm, 90° degrees to the part, are necessary. The inspection of the trim edge is done with test plates. The minimum resp. maximum tolerance of the trim edge is incorporated to these test plates (Figure 11 to Figure 12).

As an alternative, a cylindrical pin with the minimum resp. maximum tolerance of the trim edge incorporated is permissible, if specified in the inquiry documents.
Design Specification
Gauges / GOM Fixtures

Date  Rev.  Created  Checked  Released
28.11.2013  004  Fleper  Kowalke  Willeke
03.02.2017  005  Fleper  Kowalke  Willeke

Figure 10  Inspection of contour

Figure 11  Inspection of trim edge

Figure 12  Inspection of trim edge
6.3 Hole positions

Checking pins for hole positions have to be produced based on the principle: „minimum hole diameter minus positional tolerance”.

For checking of nuts, stepped pins with two diameters (first: checking of nuts, second: checking of holes) must be used. For the checking of nuts the following principle applies: „core diameter D1 of the nut minus positional tolerance”.

Bolts or screws have to be checked by corresponding sleeves; for the checking diameter of the sleeve the following applies: „Nominal diameter of the screw or maximum dimension of the bolt plus positional tolerance”.

All checking pins for formed holes as well as square and hexagon holes have to be designed not allowing any rotation of the pin.

When designing guide bushing and the related pin, each size of checking pins has to be combined with an individual diameter of the bushing. Thereby a mix-up of the checking pins and their positions is avoided.

All contact surfaces, bushings and pins must be hardened and grinded to a hardness of min. 400 HV30.

Only cords may be used for fixing the checking pins at the base plate of the gauge.

If ordered, so-called “Key-backs“ (Figure 14) must be used. When using Key-backs the deposition of the check pins has to be integrated in the fixation. Key-backs with a wire instead of a cord are recommended. (Figure 15).
A suitable deposition for pins has to be provided. A plastic or aluminum block with holes, preferably nearby the holes to be checked (Figure 13) is mandatory. The deposition places have to be marked according to the corresponding pins. Checking pins and bushings: P1, P2 (see chapter 5.1). Please engrave the marking, don’t use labels.

6.4 Hole diameters

For hole diameters with a tolerance range less than 0.3 mm limit plug gauges with lower limit / maximum limit dimensions have to be provided. Minimum and maximum dimensions as well as KA no. (without suffix) have to be engraved clearly into the limit plug gauges. For elongated holes, tolerances have to be considered separately for length and width. In case of several (elongated) holes with the same dimensions and tolerances on the part to be checked, only one limit plug gauge has to be provided.
7  Tolerances

7.1  Datums
Contact surfaces and hole positions called out as DATUM have to be produced with a tolerance range of ± 0,05 mm.

7.2  Other surfaces and positions
- Hole positions have to be produced within a tolerance range of ± 0,05 mm.
- Pin diameters have to be produced within ± 0,02 mm.
- Areas with clearance have to be produced within a tolerance range of ± 0,10 mm.
- Extended measurement surfaces (EM) have to be produced within a tolerance range of ± 0,10 mm.
- Contour-templates have to be produced within a tolerance range of ± 0,10 mm.
- Zero-pads have to be produced within a tolerance range of ± 0,02 mm.

7.3  Surface finish
- Datum surfaces: Rz 10
- Grid reference surfaces: Rz 10
- Gauge body: Rz 25
- Generally: Rz 40

7.4  Fits
- Locating pin / Bushing: g6 / H7
- Checking pin / Bushing: g6 / H7
- Length of parallel: min. 10 mm
8 Weight

For all gauges and fixtures transport handles must be attached to the gauge. If the weight of the gauge exceeds 15 kg, four threaded holes M12 must be added to enable screwing-in eyebolts for transport. At least four feet (depending on the gauge(fixture size) made of hard plastic or rubber have to be fixed underneath. When attaching the transport handles and threaded holes please pay attention to position, accessibility, center of gravity and risk of injury.

If required the gauge or fixture has to be supplied including a transport cart. This cart will be enquired and ordered separately by the quality planning engineer.

9 Coloring

In order to have a uniform overall picture, the color scheme in the following table has to be used:

<table>
<thead>
<tr>
<th>Area</th>
<th>Color</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary color on gauge body up to approx. 25 mm in front of BSK</td>
<td>RAL 5015 (sky blue, KIRCHHOFF blue, HEX #2271B3 )</td>
<td>surface</td>
</tr>
<tr>
<td>Baseplate</td>
<td>Not painted, dull, not glossy, e. g. sandblasted</td>
<td>no reflections</td>
</tr>
<tr>
<td>areas not to be tested, clearance</td>
<td>black</td>
<td>surface</td>
</tr>
<tr>
<td>datums, locator pins, zero areas</td>
<td>yellow</td>
<td>clamps, bushings, bolts, billets, clamping areas</td>
</tr>
<tr>
<td>nominal area (outline)</td>
<td>Red</td>
<td>countersink or labels</td>
</tr>
</tbody>
</table>
### 10 Gauge marking

#### 10.1 Gauge label

The content of the gauge label has to be filled in according to the data in the order. All fields have to be filled by the gauge supplier. KIRCHHOFF Automotive completes the field “inspection status.” If some information is missing, please contact the responsible quality planning engineer.

The gauge label has the following content:

![Gauge Label Diagram](image)

**Figure 16**

In case of manufacturing a new gauge respectively in case of a gauge modification, the gauge label „INSPECTION GAUGE“ must be prepared anew through the gauge supplier. When the new respectively modified gauge is checked, the inspection status label will be attached by KIRCHHOFF Automotive.

### Area Color Remark

<table>
<thead>
<tr>
<th>Area</th>
<th>Color</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>clearance (3/5mm – general tolerance)</td>
<td>green</td>
<td>countersink or labels</td>
</tr>
<tr>
<td>clearance (3/5mm – matching surfaces)</td>
<td>blue</td>
<td></td>
</tr>
<tr>
<td>hidden surfaces without layout - on demand</td>
<td>white</td>
<td>surface</td>
</tr>
<tr>
<td></td>
<td>grey</td>
<td>surface</td>
</tr>
<tr>
<td>EM – at least 20 mm</td>
<td>red</td>
<td>countersink or labels</td>
</tr>
<tr>
<td>locating pins and datums</td>
<td>yellow</td>
<td></td>
</tr>
</tbody>
</table>
An MS-Excel-template for the gauge label is available at:

www.kirchhoff-automotive.com/deEN/purchasing/downloads/europe

The gauge/fixture labels are placed in a milled pocket in the base plate and covered with a plexiglass pane to protect them against contamination and damage. Afterwards the pane will be fixed at the base plate with torx-screws (Figure 17). The labels must not be glued. Underneath the gauge label another milled pocket is required for a microSD card with all data for the gauge (CAD-data, dimensional report, etc.). See chapter 14. The gauge label and the plexiglass pane protect the microSD card.

**Figure 17**

Furthermore, there must be an appropriate explanation on the gauge/fixture, wherein the used color codes and abbreviations are explained. Beyond that, a producer label is allowed, which does not contain any article-specific information.

### 10.2 Marking of the baseplate

At the narrow side and at the longitudinal side of the baseplate a label with KA-No. (without suffix) and customer name must be attached (Figure 18).

**Figure 18**
10.3 Marking of exchanges parts and loose parts
All exchangeable parts and loose parts must have the gauge number engraved. It is not allowed to use labels.

11 Operational safety
The gauge should be user-friendly and allow a safe handling:

- Sharp edges are not allowed.
- Avoid crushing hazards.
12 Specifics for GOM Measuring Fixtures

12.1 Introduction
The GOM cell is an optical 3D measuring machine for an efficient quality control in the production process.

Whereas mechanical measuring machines capture data in a point-based manner, optical 3D-coordinate measuring systems provide full-field deviations of the 3D actual coordinates and the CAD data.

The cell consists of a housing, a standard robot equipped with the optical sensor and a rotary table. Before executing measuring programs, all robot movements are simulated in the virtual measuring room and checked for safety. Once the programs are created and tested the measurement can be done by the operators.

The new technology requires measuring fixtures with some special features. They are detailed in this chapter. All other features of GOM measuring fixtures have to be realized correspondingly in the same way as specified in the previous chapters.

Figure 19
12.2 Baseplate

The baseplate of the measuring fixture is fixed on the table of the GOM cell. The machine table has a hole pattern as shown in Figure 20. All holes are equipped with threaded sleeves M8.

The measuring fixture is locked into position by four screws (M8) on the machine table. The fixture should be placed in the middle of the measuring plate (see Figure 20). The four holes of the measuring fixture are located in the corners of the base plate and have to be labelled by the gauge supplier as shown in Figure 21, so that the fixture can be put easily in correct position.

The labels have to be protected against dirt and damage like the gauge labels by being placed in a pocket that has been milled slightly lower and covered with a plexiglass pane. The labels must not be glued.
12.3 Basics

The GOM system uses white glued dots to support the orientation of the optical sensor. These dots are applied during the preparation of a measuring program and are not in the responsibility of the supplier of the measuring fixture.

Depending on size and geometry of the part, GOM measuring fixtures must be equipped with additional devices to allow a proper optical measurement.

In case the part to be measured is longer than 1050 mm, the GOM system must use two additional bars (rulers). These rulers belong to the GOM cell, and are not included in the scope of delivery of the measuring fixture. The fixture just has to be equipped with two pairs of threaded holes M6 in a distance of 35 mm to accept the two brackets of each ruler. See Figure 22.

![Figure 22](image)

If rulers are required, they must be installed in different heights. The two rulers must be installed close to the part but with a minimum distance of 25 mm to the part and other features of the measuring jig. A distance of minimum 50 mm must be kept from the edges of the baseplate. The size of a ruler is 949 mm x 45 mm x 20 mm (length x width x height).

In case the setup is not higher than 150 mm, rulers are not required, as the baseplate can be used to apply white dots for the orientation of the optical sensor.

Measuring bigger parts with the GOM cell, it may occur that the optical sensor does not “see” neither the baseplate nor the rulers of the measuring fixture. In this case additional hexagonal columns are required. The outer diameter of these hexagonal columns should be approximately 45 mm. The height should be 50% of the maximum height of the part. See Figure 23 as an example.
12.4 Datum surfaces

GOM measuring fixtures for hot-formed parts must be equipped with convex datum surfaces, if the datums are located on curved surfaces. In case of datums on flat surfaces the drawing requirements regarding position, size and shape of the datums must be followed. Figure 24 shows the preferred solution in case of datums on curved surfaces. Other solutions are possible, too.

In case GOM-fixtures are ordered for cold-formed parts and assemblies, the datum surfaces must be exactly in line with the drawing regarding position, size and shape. A fixing screw in the middle of the datum surface will not be accepted.
12.5 **Clamps**

Only horizontal hold-down clamps equipped with a globe-joint (see Figure 25) should be used.

![Figure 25](image)

12.6 **Color**

Baseplate and body must be painted in dull black. Bushings and clamps are not painted.

12.7 **General requirements**

GOM measuring programs are prepared offline based on the CAD design of the measuring fixture and the part geometry. Therefore, it is very important that all attachments (as clamps, holders, pin trays etc.) are included in the 3D design and are arranged in the correct position. Otherwise, there is a risk of collision when executing the program.

In case the part has to be measured from the underneath, e.g. for mating surfaces or to measure material thinning, the part must be arranged 400-500 mm above the top of the baseplate. This has to be agreed with the responsible quality planning engineer.
13 Ordering process of gauges

- Start of the project
- The quality planning engineer prepares the gauge concept.
- The gauge concept is reviewed and approved by the production plant.
- The quality planning engineer creates the purchase requisition in SAP.
- Purchasing receives gauge concept and purchase requisition from the quality planning engineer.
- Purchasing sends out inquiries.
- Purchasing obtains appropriate offers based on the gauge concept provided.
- Comparison of the offers considering the budget. Sourcing decision is taken by purchasing and quality planning.
- The SAP-Order is issued by purchasing. Without SAP-order the supplier is responsible for all costs arisen.
- The supplier provides the gauge design to the quality planning engineer.
- The gauge design is checked and approved by the production plant. The quality planning engineer issues the design approval to the supplier. For the approval process at KIRCHHOFF a time period of 10 days has to be considered.
- Delivery of the gauge according to the order. Normally the delivery address is: KIRCHHOFF Automotive Deutschland GmbH, Am Eckenbach 30, 57439 Attendorn, Germany. Send copy of delivery note to the quality planning engineer.
- Preliminary check of the gauge based on gauge concept and design.
- Forwarding of the gauge to the tool maker or the manufacturing plant.
- After execution of a measurement system analysis with positive result the gauge is registered in the inspection equipment monitoring system.
14 Scope of delivery

The delivery must include the following documents on a microSD card, which is stored in a milled pocket under the gauge label. Attention: The microSD card has to be marked with the KA-No.

- Provided CAD-data from KIRCHHOFF Automotive (all transmitted variants in the original format)
- Gauge and Part design (identical to the gauge status), in Catia and/or Step
- Measurement report including comparison of target and actual values. Alignment done with bushings in baseplate and measuring of component datums. Alignment done with component datums and measurement of hole positions, surfaces and trim edges (EM). Report numerically and graphically in PDF-format. The base of the measurement is the component-data set from KIRCHHOFF Automotive. A measurement against gauge design data is not acceptable.
- All other provided tools and documents in original format.
- If required: gauge and part drawings (identical to the gauge status) in Catia and/or Step.
- If required: Operating instructions in German and/or English in MS-Word and Acrobat PDF format.
- Calibration certificates for dial gauges.

An extra copy of the delivery note has to be send to the quality planning engineer by e-mail.
15 Acknowledgement of receipt

KIRCHHOFF Polska Sp.z o.o.
attn. Paulina Krępa
Wojska Polskiego 3
PL-39-300 Mielec
paulina.krepa@kirchhoff-automotive.com

We confirm the receipt of the Design Specification for Gauges of KIRCHHOFF Automotive, revision status 005. It is taken as a basis for each newly ordered gauge by KIRCHHOFF Automotive from now on. This specification replaces all previous agreements and requirements.

Please return the signed acknowledgement within 14 days after receipt of the design specification by e-Mail to KIRCHHOFF Automotive.