

Automotive Quality Data Exchange Format

Measuring Instruments Save Data
in the AQDEF Format



DAIMLER



GETRAG



BOSCH

GM Powertrain



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If the document or text passages are changed independently, the changes must be marked explicitly in order to avoid confusion!

Preface

Online data recording is becoming more and more important. A major advantage is the accurate and reliable recording of data within a minimum of time. This creates the foundation for fast and concise evaluations based on data collected online, and enables validated decision taking.

These possibilities help create more transparency and improve the analysis of internal and external procedures and processes. Thus, online data transfer helps to improve process quality and efficiency as well as to increase customer satisfaction.

More and more diversified online applications are realized and implemented for internal as well as external networks, because of the great results possible. This opens up further possibilities like for example, the use of database systems with the known advantages. However, along with the growing possibilities, also the number of possibilities and variations for a multitude of solutions and the degree of complexity increases.

The existing procedure results in a large number of different company and plant specific individual solutions, which basically have a similar structure, like for example the SPC control of a production process or the acceptance of a facility. For this reason, the measurement device manufacturers have to invest plenty of time and effort for customer specific adaptations, as well as during the specification and control phase at the customers and with regard to investment cost for implementation or license fees.

With the objective to find a satisfactory solution for all parties involved, a number of users of the software function „Data Interface“ from the automotive production and supplier industry joined forces to create a standardized and coordinated specification. The objective was to include a group of users in this work group as big as possible, in order to get a representative cross-section through the scope and interpretation of the key fields and their application. The result is a standardized catalog of the data fields important to every user. This scope is also the basis for a new, unified and comprehensive certification, which needs to be carried out only once for all the users.

In order to display the existing varied structures and procedures of the individual companies, the possibility exists to enable the necessary K fields or disable those not required over the total range of fields.

It was also emphasized that not only one module of qs-STAT[®] should be used, but depending on the situation, the necessary modules could be used directly, like for example the acceptance of a measurement device with the module Measurement System Capability, then the process capability analysis or the evaluation of a number of improvements with the module Sample Analysis, and the favoured SPC control charting with *procella*[®].

Target of the unification of the data interface is to improve the safety of the data transfer and to optimize the effort and cost for all involved parties.

We kindly ask you to play an active part in the continuous improvement process by sending suggestions to the committee for future development.

The committee

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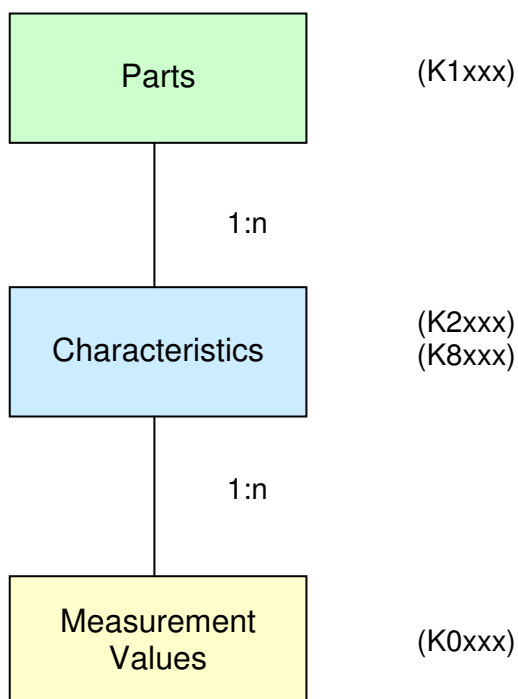
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1 Introduction

The quality data exchange format is distinguished by:

- simple, transparent structure (pure ASCII, variable)
- flexible
- space saving
- easily copied and compacted
(all information may be saved in one file)
- easily transferred
- language independent because of allocation of an explicit key (Kxxxx) to a field

The basic data model has the following structure:



Kxxxx: Key for the characteristics definition of an element

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The characteristics of the individual elements of the data model are described through the use of so-called key fields with the basic key structure as shown below:

| | | | |
|-------|-----|-------|---|
| K0001 | ... | K0999 | Description of value formats / measurement values |
| K1000 | ... | K1999 | Parts data |
| K2000 | ... | K2999 | Characteristics data |
| K5000 | ... | K5999 | Structure information |
| K8000 | ... | K8999 | QCC |

The list of supported keys is included in the K field list below (see paragraph 2). The respective fields are allocated to categories. Each category corresponds to a typical case study (see paragraph 3). This gives every gage manufacturer the possibility to choose the category for certification of his interface. He should make his choice according to the specifications of his customer.

In addition, a status 1 or 2 is allocated to every field. This means:

1. Field must exist
2. Field must exist, however the user has the option to deactivate it.

Note:

If fields do not have to be supported because of their allocation to category B, C, D, E, ..., this requirement will not apply.

The column „Misc.“ is used to record whether the field is a controlling field or a catalog field. In case of a catalog field, the corresponding catalog is specified under „Remarks“. Fields marked with „Q“ are for the evaluation of quality control charts for location and variation. Creating and filling in the information recorded in the fields is a time-consuming task. This is why you have the possibility to fill the fields marked „Q“ completely according to the Q-DAS[®] ASCII Transfer format or to allocate limited content to them. If you choose the limited content you must specify the quality control chart type for location or variation. For the control or warning limits it is sufficient if the numerical values are recorded into the corresponding fields.

A complete description of the technical structure as well as sample data sets are available for download under www.q-das.de/en/service/certification/certification/automotive-quality-data-exchange-format-aqdef/.

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2 K Field List

| Key | Field Type | max. Length | Field Name | Required for Certification after: | | | | | Status | Misc. | Remarks |
|---|------------|-------------|--------------------------------------|-----------------------------------|------------|------------|------------|------------|--------|-------|--|
| | | | | Category A | Category B | Category C | Category D | Category E | | | |
| MEASUREMENT VALUES / ADDITIONAL DATA | | | | | | | | | | | |
| K0001 | F | 22 | Measured value | X | X | X | | | 1 | | |
| K0002 | I5 | 5 | Attribute | X | X | X | X | | 1 | x | i.e. 0 = valid, 255 = empty data field etc. |
| K0004 | D | - | Date/Time | X | X | X | X | | 1 | | |
| K0005 | S | - | Event | X | X | X | X | | 2 | K | Catalog see K2060 |
| K0006 | A | 14 | Batch number | X | X | X | X | | 2 | | |
| K0007 | I10 | 10 | Cavity number | X | X | X | X | | 2 | K | if using I10 instead of I5, adaptation of field length in DB |
| K0008 | I10 | 10 | Operator name | X | X | X | X | | 2 | K | if using I10 instead of I5, adaptation of field length in DB |
| K0009 | A | 255 | Text | X | X | X | X | | 2 | | |
| K0010 | I10 | 10 | Machine number | X | X | X | X | | 2 | K | or K1081 if contents unchanged (see also K0007) |
| K0011 | S | - | Process parameter | X | X | X | X | | 2 | K | catalog see K2061 |
| K0012 | I10 | 10 | Gage number | X | X | X | X | | 2 | K | if using I10 instead of I5, adaptation of field length in DB |
| K0014 | A | 40 | Part ID | X | X | X | X | | 2 | | |
| K0015 | I5 | 5 | Reason for test | X | X | X | X | | 2 | o | |
| K0020 | I5 | 5 | Subgroup size | X | | | X | | 1 | | with attribute tests only |
| K0021 | I5 | 5 | Number of errors | X | | | X | | 1 | | with attribute tests only |
| K0053 | A | 20 | Order | X | X | X | X | | 2 | | or K1053 if contents unchanged |
| CONTROL DATA | | | | | | | | | | | |
| K0100 | I5 | 5 | Total no. of characteristics in file | X | X | X | X | X | 2 | x | |
| PARTS DATA | | | | | | | | | | | |
| K1001 | A | 30 | Part number | X | X | X | X | X | 1 | | |
| K1002 | A | 80 | Part description | X | X | X | X | X | 1 | | |
| K1003 | A | 20 | Part abbreviation | X | X | X | X | X | 2 | | |
| K1004 | A | 20 | Part Amendment status | X | X | X | X | X | 1 | | |
| K1005 | A | 40 | Product | X | X | X | X | X | 2 | | |
| K1007 | A | 20 | Part number – abbreviation | X | X | X | X | X | 2 | | New in Version 2.0 |
| K1008 | A | 20 | Part type | X | X | X | X | X | 2 | | New in Version 3.0 |
| K1009 | A | 20 | Part code | X | X | X | X | X | 2 | | New in Version 3.0 |
| K1011 | A | 20 | Variant | X | X | X | X | X | 2 | | New in Version 3.0 |
| K1022 | A | 80 | Manufacturer name | X | X | X | X | X | 2 | | |
| K1041 | A | 30 | Drawing number | X | X | X | X | X | 2 | | |
| K1042 | A | 20 | Drawing Amendment | X | X | X | X | X | 2 | | |
| K1053 | A | 40 | Contract | X | X | X | X | X | 2 | | or K0053 |
| K1072 | A | 40 | Supplier Description | X | X | X | X | X | 2 | | New in Version 2.0 |

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| Key | Field Type | max. Length | Field Name | Category A | Category B | Category C | Category D | Category E | Status | Misc. | Remarks |
|----------------------|------------|-------------|-----------------------------|------------|------------|------------|------------|------------|--------|-------|---|
| K1081 | A | 24 | Machine Number | X | X | X | X | X | 2 | | or K0010/K2301 |
| K1082 | A | 40 | Machine Description | X | X | X | X | X | 2 | | or K0010/K2302 |
| K1083 | I | 10 | Machine Number | X | X | X | X | X | 2 | | Catalog field New in Version 2.0 |
| K1085 | A | 40 | Machine Location | X | X | X | X | X | 2 | | or K0010 |
| K1086 | A | 40 | Work Cycle / Operation | X | X | X | X | X | 2 | | or K2311 |
| K1087 | A | 40 | Work Cycle Description | X | X | X | X | X | 2 | | or K2312 |
| K1100 | A | 40 | Plant Sector | X | X | X | X | X | 2 | | |
| K1101 | A | 40 | Department | X | X | X | X | X | 2 | | |
| K1102 | A | 40 | Workshop | X | X | X | X | X | 2 | | New in Version 2.0 |
| K1103 | A | 40 | Cost centre | X | X | X | X | X | 2 | | |
| K1110 | A | 20 | Order number | X | X | X | X | X | 2 | | New in Version 2.0 |
| K1201 | A | 24 | Test Facility Number | X | X | X | X | X | 2 | | or K2401 |
| K1202 | A | 40 | Test Facility Description | X | X | X | X | X | 2 | | or K2402 |
| K1203 | A | 80 | Reason for Test | X | X | X | X | X | 2 | | |
| K1206 | A | 40 | Test Location | X | X | X | X | X | 2 | | or K1201 |
| K1209 | A | 20 | Inspection type | X | X | X | X | X | 2 | | see K0015 |
| K1230 | A | 40 | Gage room | X | X | X | X | X | 2 | | New in Version 3.0 |
| K1231 | A | 20 | Measuring program number | X | X | X | X | X | 2 | | |
| K1232 | A | 20 | Measuring program version | X | X | X | X | X | 2 | | |
| K1303 | A | 40 | plant | X | X | X | X | X | 2 | | see K1100 |
| K1343 | A | 20 | Test Plan Development Date | X | X | X | X | X | 2 | | |
| K1344 | A | 40 | Test Plan Developer | X | X | X | X | X | 2 | | |
| K1802 | A | 255 | user field content 1 | X | X | X | X | X | 2 | | no selection field! |
| K1900 | A | 255 | Remark | X | X | X | X | X | 1 | | |
| CHARACTERISTICS DATA | | | | | | | | | | | |
| K2001 | A | 20 | Characteristic Number | X | X | X | X | X | 1 | | |
| K2002 | A | 80 | Characteristic Description | X | X | X | X | X | 1 | | |
| K2003 | A | 20 | Characteristic Abbreviation | X | X | X | X | X | 2 | | |
| K2004 | I5 | 5 | Characteristic Type | X | X | X | X | X | 1 | x o | i.e. variable, attribute, ELS etc. |
| K2005 | I5 | 5 | Characteristics Class | X | X | X | X | X | 1 | x o | classes: 0, 1, 2, 3, 4 |
| K2006 | I5 | 5 | Control Item | X | X | X | X | X | 1 | o | |
| K2007 | I5 | 5 | Control Type | X | X | X | X | X | 2 | o | |
| K2008 | I5 | 5 | Group type | X | X | | X | X | 1 | o | see also K5xxx (multi-variate characteristics) |
| K2009 | I5 | 5 | Measured quantity | X | X | X | X | X | 1 | x o | criterion for characteristic type (i.e. length, shape, location etc.) |
| K2015 | I3 | 3 | Tool wear type (Trend) | X | X | X | X | X | 2 | x o | no trend, upwards, downwards |
| K2016 | I | 3 | 100% Measurement | X | X | X | X | X | 2 | x o | 0 = no, 1 = yes New in Version 2.0 |
| K2022 | I5 | 5 | Decimal Places | X | X | X | X | X | 1 | | |
| K2043 | A | 40 | Measuring Device Name | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2060 | I5 | 5 | Events Catalog | X | X | X | X | X | 2 | | required with the use of K0005 |
| K2061 | I5 | 5 | Process Parameter Catalog | X | X | X | X | X | 2 | | required with the use of K0011 |

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| Key | Field Type | max. Length | Field Name | Category A | Category B | Category C | Category D | Category E | Status | Misc. | Remarks |
|-------|------------|-------------|----------------------------------|------------|------------|------------|------------|------------|--------|-------|------------------------------|
| K2092 | A | 50 | Characteristic text | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2093 | A | 80 | Processing status | X | X | X | X | X | 2 | | |
| K2100 | F | 22 | Target value | X | X | X | X | X | 2 | | |
| K2101 | F | 22 | Nominal Value | X | X | X | X | X | 1 | | |
| K2110 | F | 22 | Lower Specification Limit | X | X | X | X | X | 1 | | |
| K2111 | F | 22 | Upper Specification Limit | X | X | X | X | X | 1 | | |
| K2112 | F | 22 | Lower Allowance | X | X | X | X | X | 1 | | |
| K2113 | F | 22 | Upper Allowance | X | X | X | X | X | 1 | | |
| K2114 | F | 22 | Lower Scrap Limit | X | X | X | X | X | 2 | | |
| K2115 | F | 22 | Upper Scrap Limit | X | X | X | X | X | 2 | | |
| K2120 | I3 | 3 | Lower Boundary Type | X | X | X | X | X | 1 | X O | natural limit or limit value |
| K2121 | I3 | 3 | Upper Boundary Type | X | X | X | X | X | 1 | X O | natural limit or limit value |
| K2130 | F | 22 | Lower Plausibility Limit | X | X | X | X | X | 2 | | |
| K2131 | F | 22 | Upper Plausibility Limit | X | X | X | X | X | 2 | | |
| K2142 | A | 20 | Unit | X | X | X | X | X | 1 | | Text |
| K2202 | I3 | 3 | Evaluation Type | X | X | X | X | X | 1 | X | i.e. type 1, type 2 etc. |
| K2205 | I5 | 5 | Number of Parts | X | X | X | X | X | 1 | | |
| K2211 | A | 40 | Master Number | X | X | X | X | X | 1 | | |
| K2212 | A | 40 | Master Description | X | X | X | X | X | 1 | | |
| K2213 | F | 22 | Standard actual value | X | X | X | X | X | 1 | | |
| K2220 | I5 | 5 | Number of Operators | X | X | X | X | X | 1 | | |
| K2221 | I5 | 5 | No. of Trials | X | X | X | X | X | 1 | | |
| K2222 | I5 | 5 | Number of reference measurements | X | X | X | X | X | 1 | | |
| K2281 | A | 40 | Calibration Part Number middle | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2301 | A | 20 | Machine number | X | X | X | X | X | 2 | | or K1081/K0010 |
| K2302 | A | 40 | Machine Description | X | X | X | X | X | 2 | | or K1082/K0010 |
| K2303 | A | 40 | Department/Cost center | X | X | X | X | X | 2 | | or K1103 |
| K2311 | A | 20 | Production Type (Operation) | X | X | X | X | X | 2 | | or K1086 |
| K2312 | A | 40 | Production Type Description | X | X | X | X | X | 2 | | or K1086 |
| K2320 | A | 20 | Contract Number | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2401 | A | 40 | Gage Number | X | X | X | X | X | 2 | | or K1201/K0012 |
| K2402 | A | 40 | Gage Description | X | X | X | X | X | 2 | | or K1202/K0012 |
| K2403 | A | 20 | Gage Group | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2404 | F | 22 | Gage Resolution | X | X | X | X | X | 1 | | |
| K2406 | A | 40 | Gage Manufacturer | X | X | X | X | X | 2 | | |
| K2407 | A | 20 | SPC device number | X | X | X | X | X | 2 | | |
| K2408 | A | 40 | SPC device manufacturer | X | X | X | X | X | 2 | | |
| K2409 | A | 20 | SPC device type | X | X | X | X | X | 2 | | |
| K2410 | A | 40 | Test Location | X | X | X | X | X | 2 | | |
| K2411 | A | 40 | Test Begin | X | X | X | X | X | 2 | | |
| K2415 | A | 20 | Gage serial number | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2440 | A | 40 | Assembly Component | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2505 | A | 20 | View description | X | X | X | X | X | 2 | | New in Version 2.0 |

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| Key | Field Type | max. Length | Field Name | Category A | Category B | Category C | Category D | Category E | Status | Misc. | Remarks |
|-------------------------|------------|-------------|---|------------|------------|------------|------------|------------|--------|-------|---|
| K2506 | I | 3 | Sheet number | X | X | X | X | X | 2 | | New in Version 2.0 |
| K2630 | F | 22 | Calibration uncertainty | X | X | X | X | X | 1 | | |
| K2900 | A | 255 | Remark | X | X | X | X | X | 1 | | |
| STRUCTURE INFORMATIONEN | | | | | | | | | | | |
| K5001 | A | 30 | Group number (Text) | X | X | | X | X | 2 | | |
| K5002 | A | 80 | Group description | X | X | | X | X | 2 | | |
| K5101 | I5 | 5 | Part as part of a group | X | X | | X | X | 2 | x | |
| K5102 | I5 | 5 | Characteristic as part of a group | X | X | X | X | X | 2 | x | |
| K5103 | I5 | 5 | Group as part of a group | X | X | | X | X | 2 | x | |
| K5111 | I5 | 5 | Parts group | X | X | X | X | X | 2 | x | |
| K5112 | I5 | 5 | Characteristics group | X | X | X | X | X | 2 | x | |
| K5113 | I5 | 5 | Group element | X | X | X | X | X | 2 | x | |
| QUALITY CONTROL CHARTS | | | | | | | | | | | |
| K8010 | S | - | Chart type (location) + additional attributes | X | X | X | X | X | 2 | R | |
| K8011 | F | 22 | Central position (location) | X | X | X | X | X | 2 | R | |
| K8012 | F | 22 | lower Control Limit (location) | X | X | X | X | X | 2 | R | |
| K8013 | F | 22 | upper Control Limit (location) | X | X | X | X | X | 2 | R | |
| K8014 | F | 22 | lower Warning Limit (location) | X | X | X | X | X | 2 | R | |
| K8015 | F | 22 | upper Warning Limit (location) | X | X | X | X | X | 2 | R | |
| K8110 | S | - | Chart Type (variation) + additional attributes | X | X | X | X | X | 2 | R | |
| K8111 | F | 22 | Central Position (variation) | X | X | X | X | X | 2 | R | |
| K8112 | F | 22 | lower Control lim. (variati- on) | X | X | X | X | X | 2 | R | |
| K8113 | F | 22 | upper Control Limit (varia- tion) | X | X | X | X | X | 2 | R | |
| K8114 | F | 22 | lower Warning Limit (varia- tion) | X | X | X | X | X | 2 | R | |
| K8115 | F | 22 | upper Warning Limit (varia- tion) | X | X | X | X | X | 2 | R | |
| K8500 | I5 | 5 | Subgroup size | X | X | X | X | X | 1 | | |
| K8501 | I3 | 3 | Subgroup type | X | X | X | X | X | 1 | x o | fixed, moving |
| K8502 | A | 40 | Subgroup frequency | X | X | X | X | X | 2 | | |
| K8503 | I3 | 3 | Subgroup type (attribute) | X | | | X | X | 2 | o | with attribute tests only |
| K8504 | I5 | 5 | Subgroup frequency | X | X | X | X | X | 2 | | |
| K8505 | I5 | 5 | Number of parts (attr.) | X | | | X | X | 2 | | attribute tests only – target speci- fication, actual size K0020 |
| K8520 | F | 22 | required Cp value | X | X | X | X | X | 2 | | |
| K8521 | F | 22 | required Cpk value | X | X | X | X | X | 2 | | |
| K8522 | F | 22 | fixed Cp value | X | X | X | X | X | 2 | | |
| K8523 | F | 22 | fixed Cpk value | X | X | X | X | X | 2 | | |

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Support of the fields below is required only with post process measuring equipment:

| | | | | | | | | | | | |
|-------|----|----|-------------------------|---|---|---|---|---|---|--|--|
| K8600 | I3 | 3 | Correction strategy | X | X | X | X | X | 2 | | |
| K8610 | F | 22 | Lower correction limit | X | X | X | X | X | 2 | | |
| K8611 | F | 22 | Upper correction limit | X | X | X | X | X | 2 | | |
| K8612 | I3 | 3 | Buffer size | X | X | X | X | X | 2 | | |
| K8613 | F | 22 | Correction target value | X | X | X | X | X | 2 | | |

Field type

| | |
|-----|-----------------------|
| A | alpha-numeric |
| D | date/time format |
| F | floating point number |
| I3 | integer (1 bit) |
| I5 | integer (2 byte) |
| I10 | integer (4 byte) |
| S | special coding |

Miscellaneous

| | |
|---|---|
| x | control fields |
| o | Defined field contents (see documentation "Q-DAS ASCII-Transfer Format") |
| K | catalog reference |
| R | Special situation Quality control chart: For the fields marked „Q“ it is sufficient to record in each case the chart type as well as the upper and lower control and warning limits for the location as well as for the variation. |

Category

| | |
|------------------|--|
| Category A | Variable and attribute characteristics |
| Full certificate | including positional tolerances |
| Category B | Variable characteristics including optional tolerances |
| Category C | Variable characteristics |
| Category D | Attribute characteristics |
| Category E | Header data |

Status

| | |
|---|---|
| 1 | Mandatory field for calculated or recorded value |
| 2 | mandatory field must exist, with possibility to deactivate |
| | If any field is not required because of its allocation to a certain category, this field must not be supported. |

The individual fields, the field contents, their significance, and validity scope are detailed in the „Q-DAS® ASCII Transferformat“ www.q-das.de/en/service/certification/certification/automotive-quality-data-exchange-format-aqdef/ user manual.

A categorized list of the required K fields (AQDEF – K field list) is there also available.

3 Applications

The support of the different applications for machine and process qualification as well as inspection process capability requires the consideration of specific field contents and field relations. The background to the applications may be found in the corresponding guidelines of the companies participating in the work group.

Depending on the application, it must be possible to set default target directories and naming conventions for the created ASCII files.

The following applications must be taken into account for the quality data exchange format ("Q-DAS® ASCII Transfer Format" manual under www.q-das.de/en/service/certification/certification/automotive-quality-data-exchange-format-aqdef/):

3.1 Machine and Process Qualification

Depending on category, the following requirements must be met:

- variable characteristics
- unilateral / bilateral limited characteristics
- fixed / moving subgroup size
- positional tolerances
- Best Fit Move
- Quality Control Chart
- attribute characteristics
- Error Log Sheet
- pre-run study (1-part/5-parts)
- cold start test
- tool change

3.2 Gage Capability / Inspection Process Capability

Depending on category, the following studies must be supported:

- Typ 1 Studie
- Typ 2 Studie
- Typ 3 Studie
- Linearität
- Stabilität
- Attributive Studie
- Ford Typ 4 Studie
- Ford Typ 5 Studie
- GM Typ 1A Studie
- GM Typ 2 Studie
- GM Typ 3 Studie

3.3 Categories

Depending on the respective application, sometimes it is neither sensible nor possible for the interface to support all data fields. For this reason the categories below were created:

| | |
|--------------------------------|---|
| Category A Full certificate | Variable and attribute characteristics including positional tolerances |
| Category B | Variable characteristics including positional tolerances |
| Category C | Variable characteristics |
| Category D | Attribute characteristics |
| Category E | Header data |
| Category Q | see chapter 4.9 |
| Category X | A special certificate will be issued if the interface cannot be allocated to any of the above categories. In this case the specific application of the interface will be determined individually. |

3.4 Write File Modes

The following write modes must be supported:

- *.DFQ (one file per job, time unit, study or similar)
- *.DFQ (one file per measurement)
- *.DFD/*.DFX (one file per job, time unit, study or similar)
- *.DFD/*.DFX (one file per measurement)
- *.DFD/*.DFX (count up mode)

4 Certification of the Quality Data Exchange Format

All suppliers of computer supported measurement and inspection systems (hereafter called “Suppliers”) must understand the described data format and support it in the specified scope. Every supplier of such facilities must be able to show a certification of the data format according to the specifications of the customer. It is the responsibility of every supplier to contact Q-DAS[®] directly for this certification. The supplier decides which category will be applied for his certification.

Q-DAS[®] makes available additional information material to all parties interested in the AQDEF data format certification. This includes, besides a general description, the current price list with a list of services included in every certification package.

4.1 Consultation Service

If further consultation service should be required, Q-DAS[®] offers special workshops on this topic. The AQDEF data format will be discussed in detail and possible customer specific problems and requirements will be discussed.

4.2 Certification Documents

After receipt of an order, Q-DAS[®] will send out the certification documents. You will receive a demo version for your own tests as well as a list for recording the K fields supported by the export interface. The demo version includes test examples as well as sample form sheets for test purposes. All modalities are detailed once more in a frame contract to be concluded between Q-DAS[®] as certification authority and the supplier.

4.3 Realization of the Export Interface

The software technical realization of the export interface will be carried out by the supplier. The following points must be taken into consideration:

- All the required data fields (K fields) must be supported by the export interface. For additional data recording. The measuring software must be expanded by the corresponding data recording screen masks. This applies especially to additional data, like for example machine or cavity numbers which may vary from measurement to measurement.
- For later selection and evaluation of the recorded data it is important to use standardized field records and reduce free text to a minimum. For this reason, some K fields use references to records in a catalog file exclusively. This is why the Q-DAS catalog file must be integrated into the measurement software and linked to the input fields there.
- In order to avoid as many formal errors as possible in the data format from the beginning, the minimum that must be verified is the compliance with the field types and the maximum field length.
- On top of that, plausibility tests must be carried out during data input and incorrect entries must be intercepted.

4.4 Create Example Data Sets

The certification of the export interface is based mainly on the verification of sample files for conformity with the specifications of the AQDEF format. Because, depending on the individual application, different data fields and data field relations are relevant, several fields must be created and made available depending on the scope of the certification.

- one file per application scenario (see chapter3), or alternatively, a file with characteristics of all the supported characteristics types (K2004)
- one file per supported group type (K2008), or alternatively, a file with characteristics from different group types
- one file with several characteristics per evaluation type (K2202) in Gage Capability
- application examples for different measurement value attributes (K0002) (behavior in case of incomplete measuring cycles (attribute 255))
- examples of measurements with several events (K0005) and process parameters (K0011)
- examples of the required write file modes (Chapter 3.5)

4.5 Return of the Certification Documents

After realization of the export interface, the gage supplier makes available the sample data sets to Q-DAS[®] and returns the certification documents to Q-DAS[®]:

- sample files per application
- list of supported data fields
- printouts of data input screen masks; documentation of the export interface
- exact description of the interface with version number
- counter-signed frame contract
- information regarding the required AQDEF certification category

4.6 Behavior Verification of the Writing Systems

Q-DAS[®] will verify the following aspects, based on the screen shots provided or on the installed system:

- possibility to record additional data (i.e. varying from measurement to measurement)
- integration and selection possibility of catalog records (Q-DAS[®] catalog file)
- identification of faulty data input records (i.e. incorrect field type or field length)
- identification of plausibility problems (i.e. $USL < LSL$)

4.7 Verification of Contents and Syntax of the Sample Data

The sample files are then verified for contents (verification of integrity and field relations) as well as for the syntax (diction verification) for the different applications and file write modes:

- K field sequence
- end-of-line identification
- conformity with field types and field length
- additional data and characteristics separators
- additional data sequence
- date / time format
- syntax of events and process parameters
- integrity of the mandatory fields according to the required AQDEF certification category
- plausibility and logic of field sequences or field relations
- printouts with all the supported fields

Not verified is the individual field contents for possible third-party requirements that are not part of the Q-DAS[®] specifications of the AQDEF format.

If deviations from the AQDEF format specification are found during the verification, then the gage supplier will receive feedback including trouble shooting suggestions. After error correction, Q-DAS[®] will use new sample data to verify the compliance with the specifications.

4.8 Issuing the AQDEF Certificate

After all the requirements are met, Q-DAS[®] issues an AQDEF certificate (see appendix) which confirms the conformity of the interface with the requirements described here. The AQDEF certificate shows:

- the category (see appendix)
- the name of the company
- the exact description of the interface
- the version of the AQDEF specification
- the confirmation by Q-DAS[®]

The issued certificates will be published on the Q-DAS[®] website (www.g-das.de/en/service/certification/certification/companies/). The certificate is valid without time limit for the specific version of the verified interface. In case of a release change or any other changes which can affect the export interface, a renewed proof of conformity must be provided through a repeat certification.

4.9 Issuing a Certificate in Coordination with Q-DAS[®] Products

If measuring devices have a simple RS232 or USB interface, it is possible to transfer the quality information directly to the Q-DAS[®] products (qs-STAT[®], solara[®] or procella[®]). Q-DAS[®] can supply the required interfaces through the interface packages (IN-0, IN-1, IN-2, IN-3, IN-4 or ...). It is possible to allocate these interfaces clearly to a gage with a certain version number. If the gage manufacturer requires an AQDEF certificate, it is possible for Q-DAS[®] to issue the certificate for the „Gage in Coordination with Q-DAS[®] Products“.

If measuring devices write quality information into a file which can be opened directly by Q-DAS[®] products (qs-STAT[®], solara[®] or procella[®]), Q-DAS[®] can issue an AQDEF certificate for the „Gage in Coordination with Q-DAS[®] Products“.

In both cases, all the required fields are supported by the Q-DAS[®] products themselves according to the requirements of this document. In this case, a certificate with category Q will be issued.

The manufacturer has to document the required settings using suitable case examples and make them available together with the device, in order to allow the end user to carry out a functional test independently. The appendix of the issued certificate must include the information where these case examples may be found.

4.10 Sample Certificate

