HOERBIGER GmbH
BU EET – Engine Technology
General requirements for prototype parts

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Contact address

HOERBIGER Wien GmbH
Seestadtstrasse 25
1220 Vienna, AUSTRIA
www.hoerbiger.com

Issues of the document

Editor	Changes Description	Issue
Jan Just	Document creation	16-11-2022
Jan Just	Rewording in section 2.1.	22-12-2022
Jan Just	Rewording in section 2.1., point 5	16-03-2023
Jan Just	Rewording in Table 2 & 3	16-05-2023

Purpose

This document defines the general requirements for prototype components intended to be delivered to HOERBIGER BU EET-Engine Technology. It describes the scope of measuring, packaging, cleanliness, sampling requirements and documents necessary to be submitted together with the components.

Deviations from the specifications described in this document are only permitted after consultation with HOERBIGER GmbH!

Scope

The general requirements specified in this document are valid for all components which refer to this document on the ordered drawing, purchase order and/or in any other written form of communication.

1 Delivery conditions

1.1 Cleanliness

The components are cleaned according to the supplier's standard cleaning processes in coordination and/or agreement with HOERBIGER.
In general, the following applies: Free of any residues, degreased, free of detachable burrs as well as no visually recognizable particles permissible. This is valid for all components after any surface and material treatments.

When using compressed air as the final cleaning agent, the following must be observed: Compressed air quality according to ISO 8573-1:2010 (Particles:Humidity:Oil) →(1:4:1).

1.2 Packaging

1.2.1 General

The component packaging must be coordinated together with HOERBIGER. The supplier guarantees the use of packaging materials which ensure sufficient protection of the delivery item against external quality-reducing influences. The packaging must be sufficient to protect the components and must not contaminate the goods. When selecting the appropriate packaging material, both the ecological and economic aspects shall be considered.

Components that tend to corrode must be packaged by the supplier with appropriate protection.The corrosion protection element must be agreed together with HOERBIGER. Before packaging the components, all components must be cleaned (see chapter 5). The supplier is responsible for the procurement of the packaging materials. Each packaging unit - whether bulk, primary or secondary packaging - must be marked as follows:

- HOERBIGER material number
- Number of pieces in the packaging unit
- HOERBIGER Order number
- Date of manufacturing

The delivery bill must either be included with the shipping documents or be visible on the outside of the packaging and clearly identifiable without any dirt or damage.

When delivered in Euro pallets, the empty containers must comply with the standards set by the EuropeanPallet Association (registered association) and the defined exchange criteria are met → see https://www.epal-pallets.org/eu-de/

Only Euro pallets with a max. load of 1000 kg are permitted - low pallets usage are desirable instead of high pallets.
→ other exchange pallets or lattice boxes are to be avoided if possible.

1.2.2 Primary packaging

Primary packaging is the packaging that is in direct contact with the packaged goods. This protects the contained product and ensures its quality.

Unless expressly requested by HOERBIGER, the goods must be delivered sorted by type. This means that only identical parts are permitted in one packaging unit.

If the delivery includes initial samples (PPAP), these must be marked separately and packed individually.

1.2.2.1 Primary packaging for components with critical surfaces

The following applies to components with critical surfaces:

The components with critical surfaces must be packaged individually so that damage during transport and storage is excluded. This can be implemented with blisters/matrices and/or individual plastic bags with appropriate mechanical protection. Only plastic is permissible as a material for these blisters/matrices, not cardboard! The appropriate size should be matched to the parts. The blisters/matrices must be cleaned accordingly so that the already cleaned goods are not contaminated. The packaging unit must be sealed dust-free. This can be achieved, for example, by using suitable pressure seal bags.

The individual matrices/packaging unit must not exceed the following dimensions:
W 300 mm x L500 mm x H 200 mm.

1.2.2.2 Primary packaging for components with non-critical surfaces

The following applies to components with non-critical surfaces:

The components with non-critical surfaces must be packed in such a way that damage during transport and storage is excluded. The appropriate size of the primary packaging should be matched to the parts. The packaging unit does not have to be sealed. Cardboard, bubble wrap or similar can be used as packing aids.

1.2.2.3 Primary packaging for bulk components

If the delivery item is delivered in bulk, it should be packed in tear-proof bags, so that in case of possible damage to the secondary packaging/surrounding packaging, no loss of goods will result. The parts must not be delivered loose in cardboard packaging material.

The batch size of a bulk packaging unit is agreed together with HOERBIGER before the order isplaced.

1.2.3 Secondary / Tertiary packaging

The following is permissible for this purpose:
Several packaging units with different material numbers may be packed in one tertiary packaging.However, these must be clearly separated and marked.

As filling material to prevent damage to the packaged goods, only filling or cushioning systems made of paper products or air cushions - bubble wraps are permitted.

➔ no loose filling material allowed, such as styrofoam, packaging chips, wood wool, flakes, shredded paper

➔ Foam padding systems should also be avoided

Priority should be given here to paper products, such as PadPak/ paper upholstery.

2 Measurement guidelines and documentation

2.1 Measurement guidelines and sampling requirements

The measurement guidelines as well as sampling requirements for prototype components are summarized in the section below. The requirements differ based on the current development stage of each component. The development stage is defined in the request for quotation (RFQ) as well as in the purchase order (PO).

Unless otherwise specified following guidelines apply.

		Sample stage			
No.	**Type of measure**	**CP**	**A**	**B**	**C**
1	100% dim report acc. to drawing + part marking to identify	3pcs	3pcs	3pcs	To C-Sample stage PPAP sampling alignement to be done.
2*	tolerances with bandwidth <=0.05 (length, diameter, form, orientation & position etc.)	13pcs	13pcs		
3*	angles <=+/-0.5° tolerance band width	13pcs	13pcs		
4	roughness <= Rz10 / Ra0.8	13pcs	13pcs		
5*	cpk study for SC and IC characteristics (starting from B)	-	-	50pcs**	
6	hardness if applicable (surface hardness & hardness depth if applicable NHD + OFH)	3pcs	3pcs	6pcs	
7	welding	Section cut or test/dummy welding for min1pcs			

* for these values, measurement parameters to be shown.

** for order volumes less than 50pcs, 100% to be measured

Table 1

2.2 Special characteristics handling

No.	Type of measure/calculation	Qty
1	100% measurement of special characteristics	min 50pcs per each batch
2	additional measurements of special characteristics	3 pcs out of each 50pcs of remaining quantity (considering No.1) per each batch
3	process capability (cpk) calculation according to *Table 3* *if applicable (starting from B-sample as stated in Table 1)*	min 50pcs
4	measurement stability calculation for special characteristics	-

Table 2

Critical Characteristic / CC	**CC**
Critical Characteristics / CC: The capability must be confirmed generally. The confirmation can be carried out by: - 100 % check - statistical process control (SPC) with a long term capability (cp. VDA Band 4 "4.4 Langzeitfähigkeit")1 with Cpk or Ppk ≥ 1,67. For the initial sample report a preliminary process capability (cp. VDA Band 4 "4.3 Vorläufige Prozessfähigkeit")1 with Cpk or Ppk ≥ 2,00 at min. 125 parts must be proofed. - Confirmation of capability by adherence of process parameters that belongs to the production of this characteristic if the correlation between the parameter and the result is given. - Deviating from the confirmation of capability, specific characteristics (e.g. end-of-life- vehicle directive, flammability) can be confirmed in agreement with HOERBIGER by suitable method (e.g. PPAP and yearly requalification) Generally, special characteristics must be reviewed by FMEA, work and inspection instructions and Control Plan and must be marked accordingly. Inspection equipment used for special characteristics must be listed in the list of inspection equipment and the Control Plan. Confirmation of measurement capability must be done.	Marked characteristic in the drawing. + List of all characteristics near title block **CC**
Significant Characteristic / SC	**SC**
Significant Characteristics / SC: The capability must be confirmed generally. The confirmation can be carried out by: - 100 % check - statistical process control (SPC) with a long term capability (cp. VDA Band 4 "4.4 Langzeitfähigkeit")[1] with C_{pk} or P_{pk} ≥ 1,33. For the initial sample report a machine capability (cp.VDA Band 4 "4.2 Kurzzeitfähigkeit")[1] with C_{mk} ≥ 1,67 at min. 50 parts must be proofed. - Confirmation of capability by adherence of process parameters that belongs to the production of this characteristic if the correlation between the parameter and the result is given. - Deviating from the confirmation of capability, specific characteristics (e.g. end-of-life- vehicle directive, flammability) can be confirmed in agreement with HOERBIGER by suitable method (e.g. PPAP and yearly requalification) Generally, special characteristics must be reviewed by FMEA, work and inspection instructions and Control Plan and must be marked accordingly. Inspection equipment used for special characteristics must be listed in the list of inspection equipment and the Control Plan. Confirmation of measurement capability must be done.	Marked characteristic in the drawing. + List of all characteristics near title block **SC**
Inspection Characteristic / IC	**IC**
Inspection Characteristics / IC: A risk assessment during the process development period must be carried out and must be documented. The analysis of risk assessment and the fixing of the needed inspection method must be agreed by HOERBIGER. This agreement must be documented. Generally, special characteristics must be reviewed by FMEA, work and inspection instructions and Control Plan and must be marked accordingly. Inspection equipment used for special characteristics must be listed in the list of inspection equipment and the Control Plan. Confirmation of measurement capability must be done.	Marked characteristic in the drawing. + List of all characteristics near title block **IC**

)[1] VDA Band 4 Wirtschaftliche Prozessgestaltung und -lenkung

Table 3

2.3 Documentation requirements

No.	Document type
1	Cpk calculation report *if applicable (starting from B-sample as stated in Table 1)*
2	3x parts measure 100% dim report acc. to drawing
3	measurement stability calculation report
4	manufacturing feasibility statement (i.e. see Annex)
5*	measurement settings for dedicated parameters
6	material certificate 3.1 for raw material (or 2.2 for polymer parts)
7	Sampling form: VDA Band 2 - sonstige Muster

Table 4

*refer to Table 1 and No. 2,3 and 5 measurements

3 Annex

3.1 Feasibility statement

Below preferred feasibility statement format is attached. The electronic version will be provided on demand or is available on https://www.hoerbiger.com/en/contact/purchasing/downloads.html in Engine section.

Herstellbarkeits-Erklärung für Lieferanten / *Feasibility-commitment for supplier*

HOERBIGER

Lieferant *Supplier*		**Datum** *Date*	
Projekt-Nummer *Project-number*		**Teile-Bezeichnung** *Name of the part*	
Anfrage-Nummer *Number of the RFQ*	**vom** *of*	**Teile-Nummer Hoerbiger** *Part-number Hoerbiger*	
Angebot-Nummer *Number of the offer*	**vom** *of*	**Teile-Nummer Lieferant** *Part-number supplier*	

Bewertungskriterien / Rating criteria

		ja / ***yes***	**nein** / ***no***
1	Sind die Kundenforderungen ausreichend beschrieben, so dass diese Herstellbarkeitsbewertung durchgeführt werden kann? *Are the customer requirements sufficiently specified such that the feasibility analysis can be carried out?*		
2	Sind Sie über die Funktionsanforderungen und besonderen Merkmale des Produkts ausreichend informiert, so dass diese Herstellbarkeitsbewertung durchgeführt werden kann? *Are you sufficently informed about the functional requirements and key quality characteristics such that the feasibility analysis can be carried out?*		
3	Sind die Spezifikationen (Zeichnung, Lastenheft etc.) wie beschrieben erfüllbar und kann das Produkt gemäß der definierten Toleranzen hergestellt werden? *Can the requirements (drawings, customer specifications, etc.) be satisfied and can the products be manufactured within the specified tolerances?*		
4	Können die gesetzlichen Anforderungen (z.B. Recyclingfähigkeit, ROHS; REACH) gewährleistet werden? *Can all requirements by law fulfilled (Directive of the European Parlament and the Council on end-of-life vehicles. E.g. ROHS, REACH, recyclability)?*		
5	Ist der Produktionsablauf effizient gestaltet? *Is the production process economically efficient?*		
6	Erlaubt die Konzeption eine effiziente Materiallogistikk und Handhabung? *Does the production design allow efficient logistics, transport and handling?*		
7	Ist für das Produkt ein stabiler Prozess (Prozessfähigkeit) gewährleistet? *Is a continous quality established in the production process of this product (in terms of process capability / cpk values)?*		
8	Ist eine angemessene Projektkapazität vorhanden? *Are there sufficient resources available for the project?*		
9	Ist der Zeitplan so bemessen, dass die Kundenforderungen zu erfüllen sind? *Does the timining allow all customer requirements to be satisfied?*		
10	Sind die definierten Ziele bzgl. Lieferterminen, Kosten, Investitionen und Qualtiät erreichbar? *Are the defined targets regarding delivery time, costs, investment and quality reachable?*		

Schlussfolgerung / Entscheidung / Conclusion / Decision

Herstellbar ***Producible***	**Produkt kann gemäß Spezifikation ohne Änderungen hergestellt werden** ***Product can be produced due to the specifiation without modification***	
	Änderungen sind gemäß beigefügtem Anhang erforderlich / ***Modifications are necessary due to attachement*** *(Herstellbarkeitsprüfung wiederholen / Resit of feasibility analysis)*	
Nicht herstellbar ***Non producible***	**Designänderungen sind notwendig** / ***Design modification is necessary*** *(Herstellbarkeitsprüfung wiederholen / Resit of feasibility analysis)*	

Vertrieb ***Sales***	Name	*Unterschrift / Signature*
Produktion / Fertigungsplanung ***Production / production planning***	Name	*Unterschrift / Signature*
Qualität ***Quality department***	Name	*Unterschrift / Signature*
	Name	*Unterschrift / Signature*

Herstellbarkeits-Erklärung ist nur mit <u>allen</u> Unterschriften der drei o.g. Fachabteilungen gültig.
The feasibility commitment is only valid with <u>all</u> signatures of the departments.

Herstellbarkeits-Erklärung für Lieferanten / *Feasibility-commitment for supplier*

HOERBIGER

Lieferant *Supplier*		**Datum** *Date*	
Projekt-Nummer *Project-number*		**Teile-Bezeichnung** *Name of the part*	
Anfrage-Nummer *Number of the RFQ*	**vom** *of*	**Teile-Nummer Hoerbiger** *Part-number Hoerbiger*	
Angebot-Nummer *Number of the offer*	**vom** *of*	**Teile-Nummer Lieferant** *Part-number supplier*	

Anhang / ***Attachement***

	Änderung / **Anpassung** *Modification / adjustment*		