

I Purpose

This specification set out the requirements related to the sorting of chips by producers of chips that will subsequently undergo PAMCHR process.

II Operator(s) and fulfilment authorities

All EcoTitanium suppliers that produce chips.
EcoTitanium's MQP (Methods, Quality, Process) department.

III Definitions and abbreviations

CHIPS PRODUCERS: companies that produce chips as part of their manufacturing processes.

CHIPS COLLECTORS: companies whose job is to collect chips that will subsequently be melted down.

CHIPS PROCESSORS: companies in charge of preparing chips in order to be melted down as part of PAMCHR process.

PAMCHR: Plasma Arc Melting Cold-Hearth Refining

COLLECTION CONTAINER: a container that is provided by the chips collector and used to transport chips from the chips producer to the chips processor.

CHIPS BATCH: This refers to:

- 1 client
- 1 contract
- 1 production site
- 1 machining unit/cell
- 1 producer
- 1 type of waste metals
- 1 removal date, on which a transport provider collects the batch from a collection point.

A single chips batch can be made up of multiple containers.

TITANIUM ALLOYS (this list is an example, and is not exhaustive): TA6V (Grade 5 standard and high O), TA6V ELI, Ti 1023, Ti 5553.

IV Quality requirements

The chips producer is responsible for sorting chips at source in order to prevent any mixing. Any changes to the various stages involved in the process previously approved and put in place by the chips producer, or changes to the technical resources used (e.g. treatment before machining, machining process, cutting tools used, number of passes, thickness of machined sections) must be communicated to EcoTitanium.

The chips producer must, for any stage in the chips-production process, be able to provide documented proof that attests to the requirements set out in this specification being adhered to.

1. Anomalies/non-compliance

If the chips producer identifies an anomaly during or at the conclusion of the chips-production process (e.g. contamination, mixing), it must inform EcoTitanium as soon as possible.

When collection takes place, any discrepancy with regard to identification and/or quantity must be dealt with by the collector and the producer.

The chips producer will be charged for any additional processing costs incurred by the chips processor that can be attributed to an anomaly related to non-compliance with the requirements set out in this specification.

EcoTitanium's representatives and the chips producer must work together to resolve any anomaly as quickly as possible.

2. Risks identified and action plan

Risk identified	Action plan
Contamination and/or mixing of chips during the chips-production process or as containers are filled	Producer certification and audit of producer's practices with training covering the dangers of contamination
Lack of traceability	Traceability-monitoring procedure should be implemented
Incorrect container being collected	Training covering the dangers that may arise when containers are collected Audit of batch identification in collection area

The producer must have an appropriate quality-control system for ensuring that products are of a reliable quality. EcoTitanium is entitled to conduct audits of the producer as regularly as EcoTitanium deems appropriate.

V Product Requirements

1. Chips sorting

The following requirements must be adhered to during the sorting process. EcoTitanium reserves the right to reject a batch in its entirety, or a portion of a batch, if the chips processor cannot sort it or if it poses safety or environmental problems.

- Chips must be sorted according to:
 - variety/grade
 - machining process (milling, turning, etc.)
 - quality (first pass and subsequent passes)
 - type of cutting tools used to produce it (tungsten carbide, ceramic, high-speed steels)
- Chips that may affect the safety/security of the chips collector's employees and the chips processor's employees are forbidden:
 - Radioactive chips or chips that may contain radioactive waste: radioactivity tests must be noted in the documents accompanying chips batches (radioactivity threshold for raw materials = 0.36 µSv/h).
 - Chips contaminated by CMR substances or PCBs (the chips producer must provide material safety data sheets (MSDSs) for relevant substances, such as cutting oil).
- No foreign matter (wood, plastic, paper, cardboard, adhesives etc.) is allowed in the chips.
- No parts or pieces of cutting tools must be mixed with the chips.
- No chips produced using ceramic cutting tools is allowed.
- No chip that has been burnt or exposed to fire (any material that is burnt or has been processed using machinery that has been exposed to fire and has not yet been cleaned) is allowed.
- Grindings and saw cut material are forbidden.

- No solid chips of dimensions greater than 20mm x 20mm x 20mm is allowed.
- Chips derived from a first machining pass and that is therefore directly derived from forged or heat-treated material must be noted and separated from other chips.
- Chips batches derived from coated materials must be noted.
- If residual materials of known origin are present, the chips batches must be noted and the nature of the residual materials communicated by the relevant MSDS being sent.
- The producer must inform EcoTitanium of any possible non-compliance in a batch, which will require written approval from EcoTitanium before being sent on.

N.b. In the case of batches of chips of a particular type:

- The producer informs EcoTitanium that these batches are available.
- EcoTitanium determines which specific items the relevant batches will be assigned to.
- EcoTitanium updates the collection plan.
- The collector carries out the collection of the specified items.

Examples of the types of chips to which this special strategy applies:

- Chips derived from coated materials.
- Chips that contains residual materials of known origin.
- Chips that is non-compliant with regard to the intended item.

2. Chemical composition

The chemical composition of the titanium-alloy chips must meet the following criteria:

Grade	Fe, max	O, max	C, max	N, max	H, max	Al	V	Other, individual max	Other, total max
TA6V (Grade 5 standard)	0.40	0.23	0.08	0.05	0.015	5.50–6.75	3.50–4.50	0.1	0.4
TA6V (Grade 5, high O)	0.25	0.25	0.03	0.03	0.015	6.30–6.70	4.00–4.40	0.1	0.4
TA6V ELI (Grade 23)	0.25	0.16	0.08	0.03	0.015	5.50–6.30	3.50–4.50	0.1	0.3
Ti 1023	1.80–2.20	0.16	0.050	0.050	0.015	2.60–3.40	9.00–11.00	0.1	0.3

Grade	Fe, max	O, max	C, max	N, max	H, max	Al	V	Mo	Cr	Zr, max	Other, individual max	Other, total max
Ti 5553	0.30–0.50	0.21	0.100	0.050	0.015	4.40–5.70	4.00–5.50	4.00–5.50	2.50–3.50	0.300	0.1	0.3

(The values given in the table above refer to % weight. The remainder is exclusively composed of titanium.)

VI **Monitoring**

Machinery used to produce chips must be cleaned when the variety or grade changes.

Containers used by the producer to collect the chips produced by the machining equipment must be used with only one variety/grade of titanium. In case of any changes in this regard, there must be a

cleaning process in place for the collecting containers (Appendix 3: Container management for chips producers).

The chips producer should verify that all key information for the collection of the material has been recorded. The chips producer and collector must work alongside one another to ensure that the information that appears in the collector's transport order matches that which appears on the monitoring form for the container.

VII Transport conditions

The collection containers that should be used will be made available by the chips collector, in keeping with the process used by the chips producer (except where the producer already owns containers that have been approved by EcoTitanium).

These containers must be used solely to collect and transport titanium alloys. Gas Tungsten Arc Welding welds are prohibited from being placed in these containers, as are nitride, oxide and ceramic coatings. MIG, MAG etc. welding is allowed (Appendix 1: List of prohibited materials that may come into contact with chips when it is produced).

Before the container is filled, the chips producer must ensure that the container used has been adapted to allow EcoTitanium chips to be collected and that this container is in good condition. The producer must also check that the container is dry and clean i.e. free from foreign matter (a container-inspection procedure must be put in place).

Once the container is filled, the chips producer must cover it for storage in order to prevent water or any other contaminant from entering the container until it is collected by the chips collector.

The chips batch will be identified using a batch number that is unique to it. A single batch can be made up of multiple containers. Each chips container will be identified using the batch number.

VIII Dispatch documents

The following documents must accompany the material that is being dispatched:

- Dispatch form that includes full details of the batch (grade, amount, date of availability, site of availability, list of batches for which there is a discrepancy as regards intended nature, etc.).
- All required documents, as specified in the contract.

Documents detailing the following information must accompany each batch:

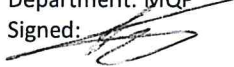

- The name of the client and the associated contract
- The order number
- The collection number
- The type of waste metals
- The name of the grade
- The number of containers
- The batch number
- The name and address of the producer
- The specific production site (workshop and machine, if possible)
- Category of waste transported or collected (waste-material terminology in Appendix II, Article R.541-8 of France's Environmental Code)
- The total weight (declaration signed by both the collector and the provider)
- The net weight (declaration signed by both the collector and the provider)

IX Transport

Specifications — Sorting chips for chips
producers
Document reference: IQ19-v0

The lorries used to transport the chips shall be covered to prevent any contamination (humidity, exogenous contamination, etc.).

The chips shall be transported in such a way as to protect and secure the lorry's contents, in order to prevent any malicious act until the chips processor takes receipt of it.

Written by	Approved by	Distributed by	Version
Name: J Escaffre Department: MQP Signed: 	Name: R Allier Department: Management Signed: 		Created on: 14/10/2015 Updated on:

List of changes:

Version	Date	Purpose of changes
0	14/10/2015	Document created



Specifications — Sorting chips for chips
producers

Document reference: IQ19-v0

APPENDIX 1

List of materials prohibited during chips processing

- 100% of items in each chips batch must be metallic materials (no wood, plastic, cardboard, etc.)
- Radioactive materials (radioactivity threshold = $0.36 \mu\text{Sv/h}$)
- CMR substances (see INRS outil 66)
- Any refractory material
- Any metallic elements with a high fusion point ($T_{\text{Melting}} > \text{titanium } T_{\text{Melting}}$)
- Metallic elements with a melting temperature lower than or equal to that of titanium



Specifications — Sorting chips for chips producers
 Document reference: IQ19-v0

APPENDIX 2
Responsibilities table

Responsibilities table			
	SUPERVISION	FULLFILMENT AUTHORITY	ACTIVITY
Phase	<div style="background-color: #4CAF50; color: white; padding: 10px; text-align: center; width: 100%;">EcoTitanium</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;">producer</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;">collector</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">processor</div>	<pre> graph TD A{{Sorting waste metals (solids or chips)}} --> B{{Packing into collection container}} B --> C{{Loading collection container}} C --> D{{Transporting collection container}} D --> E{{Transporting to processor and monitoring delivery}} E --> F{{Processing scrap (solids and chips)}} F --> G{{Transporting to EcoTitanium and monitoring delivery}} </pre> <div style="border: 1px solid black; background-color: #FFCDD2; padding: 5px; margin-top: 10px; text-align: center;"> The producer and the collector's responsibilities end when the processor finishes processing the chips (when invoiced) </div>



Specifications — Sorting chips for chips producers
Document reference: IQ19-v0

APPENDIX 3
Container management for chips producers

