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Since 1984 he has been the technical director of the Precious Metals Testing Laboratory of the Vicenza Chamber of Commerce, the first institutional Italian laboratory and a reference point for Vicenza's goldsmithing district.
As he is a teacher and technical expert in quality and certification of the goldsmithing sector, he works as a lead auditor for important certification bodies in the field of the management systems ISO 9000, SA 8000 and the accreditation system for test laboratories. He is a member of the Technical Committee of U.N.I.- the Italian standardisation body, and of C.E.N., which sets the technical standard for the precious metals sector. He collaborates as a technical expert with MAP and with ASSICOR in drawing up legislative and regulatory guidelines. He has taken part in different national research projects for the goldsmithing sector as part of the programme MURST-MICA "Pro.Art."; exploiting products and processes in the precious metals sector; SAIME: devising innovative analytical systems for determining fineness in precious metal alloys.

"Memory will illustrate the technical requirements for application of the Italian national brand, "ITALIA TURRITA" to state the conformity of gold products destined for sale in European markets (Annex B amendment D.P.R. no. 150/2002).
The following will therefore be illustrated: application field and relevant technical requirements, control activities and analysis and guideline methods to sample product batches.

“Technical requirements for the application of the optional assay mark”

Certification of conformity and hallmarks of the product

(DPR 4 August 2015 no.168)

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INTRODUCTION

As defined in art. 34, comma 5 of DPR no. 168, 4 August 2015, the company can request a test of the conformity of its products and the affixing of the conformity mark “Italia Turrita” at the competent Chamber of Commerce, which will be served by an accredited Laboratory (ISO/IEC 17025) or a national accreditation body (Reg. EC no.765/2008) for the certification of purity of precious metals.

TECHNICAL REQUIREMENTS FOR THE APPLICATION OF THE OPTIONAL ASSAY MARK

ANNEX A
(ART. 1, COMMA 1, LETT. B)

ANNEX VII
(ART. 1, COMMA 1, LETT. B)

(*) The cartouche under the profile of the head of Italia turrita contains the initials of the province.

	Circumference in mm
1st size	1.0 – (exclusively with laser technology)
1st size	1,6
2st size	3,2
3st size	6,0

DEFINITIONS AND TECHNICAL REQUIREMENTS

1. Definitions

For the sole purposes of applying the hallmark as per art. 34, as well as the definitions in art. 1, the following definitions are used:

1.1 Item in precious metal

An item in precious metal is any piece of jewellery, gold or silver, or watches or any other item made, either wholly or in part, by precious metals or the alloys of same. “In part” means that an item in precious metal may, for technical or

decorative reasons (i), contain non metal parts or (ii) common metal parts An item in precious metal that contains parts in common metal for decorative purposes, is listed as a “multi-metal item”.

1.2 Coating/plating

Coating or plating is understood as one or more layers of:
(i) precious metal (or precious metal alloy);
(ii) common metal (or common metal alloy);
(iii) non-metal substance;
applied to the whole or part of an item in precious metal, using, for example, chemical, electrochemical, mechanical or physical processes.

1.3 Common metals

Common metals are understood as being all metals, with the exception of platinum. gold, palladium and silver.

1.4 Multimetal items

A “multimetal” item is an item consisting of:

1) a precious metal with legal hallmark
a) and a thickness no lower than 500 micrometres
b) a surface sufficiently extended to permit the application of a hallmark with a mark 0.5 mm in height.

and

2) non-precious metals that are:
a) visible
b) distinguishable by colour (e.g. not covered or treated to give them the appearance of precious metal)
c) not used for technical reasons (i.e. not used for the mechanical functions for which precious metals cannot be used, both in terms of resistance and strength.)
d) marked “METAL” (or equivalent) in line with the requirements of the present Annex.

2. TECHNICAL REQUIREMENTS

2.1 The optional assay mark cannot be applied to:

a) objects made with alloys with a purity of less than 850 thousandths for platinum, 375 thousandths for gold, 500 thousandths for palladium, and 800 thousandths for silver;
b) any item intended for medical, dentistry, veterinarian, scientific or technical use;
c) coins that are legal tender;
d) parts or incomplete semi-finished pieces (e.g., metal parts or surface layers);
e) raw materials such as bars, sheets, wires and tubes;
f) items in common metal coated with precious metal;

2.2 Tolerances

Negative tolerances are not permitted with regard to the legal purity stated on the item.

2.3 Use of welds

Without prejudice to that stated in art. 8, welds can be used only for the purpose of jointing and, as a rule, must have the

same purity as the item.

The following exceptions are permitted:

2.3.1 Wire:

In wire filled with welding, where a lesser purity weld is used, the wire must overall be of the permitted purity.

2.3.2 Precious metal:

If using a lesser purity weld, the item must overall be of the permitted purity, with the following exceptions:

GOLD

• Gold alloy items with a purity of 916 thousandths or above can have gold welds with a minimum purity of 750 thousandths;
• in case of filigree items and watch cases with a purity of 750 thousandths, the welding must contain no less than 740 thousandths of gold. In case of filigree items and watch cases with a purity of 750 thousandths, the welding must contain no less than 585 thousandths of gold.

SILVER

• in case of silver items with a purity of 925 thousandths, the welding must have a purity of no less than 650 thousandths;
• in case of silver items with a purity of 800 or 830 thousandths, the welding must have a purity of no less than 550 thousandths;

PLATINUM

• to join parts of items in platinum, it is necessary to use welds with a total minimum precious metal content of 800 thousandths.

PALLADIUM

• to join parts of items in palladium, it is necessary to use welds with a total minimum precious metal content of 700 thousandths.

2.3.3 Mixed precious metal

Welds can be as those permitted for the lowest purity of precious metal.

2.3.4 Precious metal with common metal

Any suitable welds can be used, including in common metal.

2.3.5 Other joining methods

Adhesives can be used in place of welds.

2.4 Use of common metal parts and non-metal substances

It is permitted to use parts in common metal and non-metal parts on precious metal items for technical or decorative reasons, under the following conditions:

a) the parts in common metal or the non-metal parts need to be clearly distinguishable from the precious metal;
b) they must not be covered or treated to give them the appearance of precious metal;
c) they must not be used for the purpose of reinforcing, adding to weight or filling;
d) they must be engraved with the word “METAL” or the name of the common metal used.

Exceptions and details:
a) Common metal parts are permitted for decorative purposes as long as the precious metal parts have a legal purity and a thickness of no less than 500 micrometres, plus a sufficiently extensive surface to allow the placing of a mark, 0.5 mm in height.
The parts in non-precious metal must always be visible. They must be clearly distinguishable in terms of colour and not used for technical purposes.
b) It is permitted to use common metal parts for the mechanical functions for which precious metals cannot be used, both in terms of resistance and strength.
c) Where it is not possible to stamp or include the word “METAL”, the common metal part shall be clearly distinguishable from the colour of the precious metal, with the exception of watch movements.
d) Non-visible, non-metal substances are permitted in the following cases:
- filling a base with non-metal material is permitted to guarantee better stability
(e.g., candlesticks, vases and similar in silver);
- filling handles with mastic (or similar material) is permitted
(e.g. cutlery, salad cutlery, carving knives and forks, manicure sets, grooming sets, and similar items).

2.5 COATINGS

The following coatings are permitted:
a) metal coatings, according to the following table

ON	PERMITTED
platinum	rhodium, ruthenium, platinum
gold	rhodium, ruthenium, platinum, gold
palladium	rhodium, ruthenium, platinum, gold, palladium
silver	rhodium, ruthenium, platinum, gold, palladium, silver

metal coatings must have the following minimum purities:

- Gold: 375‰
- Silver: 800‰
- Platinum: 850‰
- Palladium: 500‰

If the alloy and coating are the same precious metal, the purity of the coating cannot be lower than that of the alloy.

b) Lengthy chemical or heat treatments (e.g. silver sulphide, physical vapour deposition [PVD], chemical vapour deposition [CVD])

The surface colour of precious metal items via chemical transformation of the alloy or its parts may be permitted if the purity is not altered by the process.

c) Non-metal coatings (e.g., enamel, niello)

3. Laboratory checks - General

3.1 The laboratory appointed must examine whether or not the precious metal items presented for marking with the hallmark, as per article 34, meet the conditions as stated in this Annex.

3.2 In the case the laboratory finds an item to be complete in terms of all of its metal parts, and that it conforms to that stated in this Annex, it must, at request, mark the item with the hallmark, as stated in article 34. Before placing the hallmark, as per article 34, the laboratory must ensure that the item bears the identification mark and indication of purity.

3.3 The examination of the items in precious metals presented for hallmarking, as per article 34, consists of the following two stages:
a) assessment of batch uniformity;
b) identification of alloy purity.

4. Test and examination methods

4.1 To assess the uniformity of a batch, the laboratory can use the following methods:

a) benchmark test;
b) X-ray spectroscopy test

4.2 To identify the purity of metal items, the laboratory must use the ISO/EN/UNI official testing methods.

5. Sampling

The number of items to sample from a batch and the number of samples from each item for examination and testing needs to be sufficient to establish the uniformity of the batch and to make sure that all parts and all items checked have the required legal purity. The Ministry for Economic Development can, with its own directive, indicate guidelines.

6. Hallmarking

6.1 Each time this is possible, the hallmark, as per article 34, must be placed in the immediate vicinity to the identification mark and indication of purity.

6.2 Items consisting of two or more alloys of the same precious metal

In case an item consists of different alloys of the same precious metal, the purity indication must be the one corresponding to the lower level of purity on the item.

7. Referral

For anything not expressly envisaged in this Annex, the Decree and Regulations will apply.

SAMPLING GUIDELINES

1. Screening

1.1 Visual inspection to ensure that items have an identification mark and indication of purity.
1.2 Visual inspection to find each excessive or sub-purity weld.
1.3 Visual inspection to find common metal parts or unauthorised fillers.
1.4 Exam, with chemical method or other, to identify the presence of plating or other coating, and to identify the nature of same.
1.5 Isolation of all dubious items to subject to special tests.

1.6 There are three different screening levels, decided on the basis of the quality level of the conformity of items found during the year in progress. Information must be stored for two years. The screening level is decided using the following formula:

$$QL = \left[1 - \frac{\Sigma(\text{rejected items})}{\Sigma(\text{presented items})\ v} \right] \times 100\%$$

Rejected items = Items that do not conform to the material and technical requirements envisaged.
Note: these requirements include, for example, purity, authorised coatings, weld composition, functional parts and all other technical requirements.

Σ rejected items = the total sum of rejected items.
Note: if one item in a batch is rejected, all of the items from the same batch are rejected.

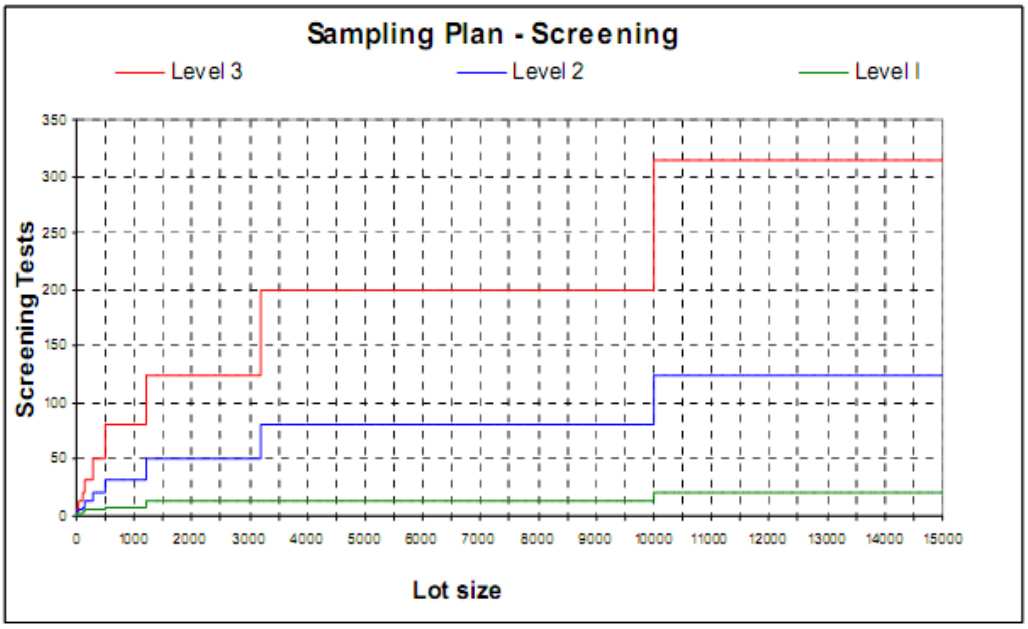
ACCEPTED ITEMS AS % OF PRESENTED ITEMS

Level 3	0 – 94,9%	minimum reliability level	higher screening
Level 2	95 – 98,9%	normal reliability level	
Level 1	+ 99%	maximum reliability level	lower screening

(*) Author's note

The reliability level can also be defined through objective evidence provided by the company: ISO 9001 certification, Additional certification ex art.19, process control plans, etc.

1.7 SCREENING MUST BE MADE ACCORDING TO THE FOLLOWING PLAN:



2. SAMPLING

2.1 It is possible to use the following sampling methods:

- slitting
- scraping
- drilling

2.2 Slitting is the preferred method in terms of accuracy, but often it is not possible. In these cases, the sample can be taken by scraping. Specific circumstances may allow the sample to be taken through drilling.
2.3 In specific cases, when an item can be damaged unreasonable by sampling, it is possible to assay a sample of the material used to make it. In these cases, the laboratory must take all precautions needed to ensure that the sample comes from the same batch of material used to make the item (e.g., the same roll of wire, same sheet, bar, etc.).
2.4 If the surface of the item has been enriched (e.g., by pickling), or coated with a permitted metal (e.g. electrodeposition), or the surface layer must be removed before the sample can be taken. This is possible via scraping, filing or cleaning.
2.5 Samples must be taken in convenient places that represent the parts sampled. Welds can be included in the sample, except in those cases where, as per Decree or Regulation, they can be of a lower purity than that of the item. Other types of surface impurity, such as polishing residues, must be removed before the sample can be taken. Lacquers must also be removed with the use of suitable solvents.
2.6 Samples of items that have been polished or are contaminated by grease can require degreasing with suitable solvents (e.g., trichloroethylene) before sampling.
2.7 The number of items selected for sampling, and the amount of samples from more than one item to be collected before the assay process will depend on each case. In some cases, for example, it may be more appropriate to select one or more items randomly and assay them separately; in other cases, it may be better to take samples from a larger number of items, bringing them together later and assaying them together. Experience concerning the variation of purity within a batch and the degree of damage of an item following sampling should be decisive factors. Generally, there is a recommended number of items to be selected considering the size of the batch and the screening level. The following table shows the recommended number of items to select according to batch size.

BATCH CONSISTING OF ONE OR MORE PARTS OF THE SAME MATERIAL

SIZE OF BATCH	SCREENING*			ASSAY recommended
	Level 1	Level 2	Level 3	
1	1	1	1	1
2 to 8	2	2	2	1
9 to 15	2	2	3	1
16 to 25	2	3	5	1
26 to 50	2	5	8	1
51 to 90	3	5	13	1
91 to 150	5	8	20	1
151 to 280	5	13	32	1
281 to 500	1	20	50	2
501 to 1.200	8	32	80	2
1201 to 3.200	13	50	125	3
3201 to 10.000	13	80	200	4
10.001 to 35.000	20	125	315	5

* using the benchmark and XRF methods
Note: In case the sampling process can damage the item, non-destructive tests are permitted.

In case an item selected for sampling consists of several parts, each part must, where possible, be sampled.
2.9 Samples from separate parts of the same item can be mixed if it seems they are made of the same material. If it seems that they are made of different materials, the samples from these parts must, where possible, be assayed separately. For items made with electroforming, the purity marking must not be above the lowest purity level found in testing.
2.10 If there is any suspicion that items contain unauthorised filler, it is possible to use splitting, drilling, or immersion in suitable reactant. If there is a suspicion that an item contains iron or steel, it can be examined using a magnet.

CONCLUSIONS

The implementation of laser technology in the precious metal production sector is doubtless another important technological innovation.
The possibility to mark products at the end of the production process – today increasingly lighter and smaller – represents a definite advantage for the operator.
For qualified Italian laboratories (Assay Office) too, laser marking speeds up the product conformity certification process, aligning procedures with those of European partners.

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