

Description General specification for cast iron castings
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1 SCOPE

1.1. DEFINITION

This specification defines the requirements for the quality of of supplies and the conditions for controlling and testing grey cast-iron castings, which are the only part in the conditions for use .

2 OBJECT AND FIELD OF APPLICATION

2.1. TYPOLOGY

Gray iron castings, types 200, 250, 300 and 350, contemplated in the UNI EN 1561 standard, 600-3 type spheroidal graphite cast iron foreseen in the UNI EN 1563 standard, 250 type vermicular cast iron foreseen in the ASTM A 842-85 standard, special Savio cast irons SR 30, the special 350 BMWPE cast irons poured into sand or loam moulds or shell-moulding, and lamellar graphite cast iron in a pearlitic matrix (for brake hubs), are the object of this specification.

2.2. DESIGNATION

According to Savio's drawings, the type of cast iron used for pouring is given in the "Material" box on the drawing with one of the designations given in Table 1.

Table 1 Features of the typed cast irons

DESIGNATION	old designation	Description	Notes
EN GJL 200 UNI EN 1561	Cast iron 200 UNI ISO 185	Gray iron for casting, essentially iron and carbon based; this element is like graphite plates of shape "I" described in UNI EN ISO 945. Classification of gray iron for casting is based on the material's mechanical properties (tension).	
EN-GJL-250 UNI EN 1561	Cast iron 250 UNI ISO 185		a*)
EN-GJL-300 UNI EN 1561	Cast iron 300 UNI ISO 185		
EN-GJL-350 UNI EN 1561	Cast iron 350 UNI ISO 185		a*)
EN GJL 600-3 UNI EN 1563	Cast iron 600-3 UNI ISO 1083	Spheroidal graphite iron, essentially iron and carbon based; the latter element is mainly spheroidal graphite nodules of shape "VI" indicated in UNI EN ISO 945. Classification of spheroidal graphite iron is based on the material's mechanical properties (tension and elongation).	
VERMICULAR CAST IRON COMP. ASTM 842-85	Cast iron 250 ASTM A 842-85	Vermicular graphite iron. The carbon is mainly at the thick graphite plate state with rounded tips ($\cong 80\%$) of shape "III" and of spheroidal graphite nodules ($\cong 20\%$) of shape "VI" indicated in UNI EN ISO 945. Classification of vermicular cast iron for castings is based on the material's mechanical properties (tension).	Cast iron used mostly for making grooved rolls. Hardness foreseen on castings: 140÷170 HBS $2.5/187.5$ 4032_7004_00
SR30 4032_7001_06	Cast iron SR 30	Gray iron for castings, of a defined chemical composition. Classification of gray iron for casting is based on the material's mechanical properties (tension).	To be used for cams with contour to be tempered. Specifications according to the Savio table code 4032-7001-06
350BMWPE GL-MnCuNi a*) ↑	Cast iron 350 special BMWPE	Lamellar graphite cast iron in a pearlitic matrix, of a defined chemical composition. Classification of gray iron for casting is based on the material's mechanical properties (tension).	Cast iron used mostly for making brake drums. Hardness foreseen on castings: 220÷270 HBS $2.5/187.5$. Specifications according to the Savio table code 4032-7001-06
Lamellar graphite cast iron (TO BE PREFERRED FOR BRAKES)		Lamellar graphite cast iron in a pearlitic matrix, of a defined chemical composition. Classification is based on the material's hardness.	Cast iron to be preferred to make brake hubs. Prescribed hardness, in the specified area, HBW 200-245. Characteristics as for 4032_7001_10
a*) non typed cast irons with very rare uses			

3 REFERENCE DOCUMENTS

See Table 2

Table 2 Reference documents	
Typology	Description
Procedure APPR 2	Qualification of suppliers and vendor list
Procedure PR 7.51	Control of materials in acceptance
Procedure PR 8.50	Handling non conformities
Work instruction PROD 02	Packing and handling materials inside the factory and coming from outside
Work instruction LABO 26	Preparing the chemical reactives
Standards referred to	Standard
Rockwell hardness test	UNI EN ISO 6508-1:2006
Brinell hardness test	UNI EN ISO 6506-1:2006
Gray iron castings: classification	UNI EN 1561:2011
Spheroidal graphite iron:classification	UNI EN 1563:2012
Specifications for compact iron castings with graphite (vermicular)	ASTM A 842-85:2004
Tension test	UNI EN ISO 6892-1 :2009
Designation of the graphite microstructure	UNI EN ISO 945:2009
Dimensional tolerances systems for castings in general	UNI ISO 8062:2009
Tables	4032-7004-00 4032_7001_06 4032-7001-08 4032_7001_10

4 PRODUCTION PROCESS

4.1. PRODUCTION PROCESS

The cast iron production process is left for the supplier to decide unless specified otherwise in the drawing and/or order.

4.2. FORMING PROCESS

The forming process is left for the supplier to decide unless specified otherwise in the drawing and/or order.

5 CHARACTERISTICS

5.1. TYPOLOGY

The types of cast iron are classified according to the unit tensile strength at break; this characteristic and other properties are given in Table 3.

Table 3 Classification and typing

Quality typed	Load tensile strength at break *	HBS hardness 2.5/187.5 and R _m (Likely mechanical properties of castings, examples)									
		Light castings		Medium castings		Heavy castings		Very heavy castings			
	R _m	Wall thickness in mm									
	(N/mm ²)	3÷5	5÷10	R _m min.	10÷20	R _m min.	20÷40	R _m min.	40÷80	R _m min.	
EN GJL 200 UNI EN 1561	200 (0 + 100)	≤ 280	260 ±170	205	230 ±150	180	210±135	160	190±120	145	
EN GJL 250 UNI EN 1561	250 (0 + 100)		280 ±200	250	250 ±180	225	235±150	205	220±145	185	
EN GJL 300 UNI EN 1561	300 (0 + 100)		**	**	280 ±200	270	255±180	245	240±165	225	
EN GJL 350 UNI EN 1561	350 (0 + 100)		**	**	**	**	280±200	290	260±185	270	
EN GJL 600-3 UNI EN 1563	600				190 ±270						
CAST IRON GRAPHITE VERMICULAR ASTM 842-85	250		≤ 179								
SR30 4032_7001_06	300		274 ±314		255 ±274		≤ 255				
CAST IRON 350 special BMWPE (Ref. Savio 4032_7001_08)	400		270 ±220								
LAMELLAR GRAPHITE CAST IRON FOR BRAKE HUBS	/		HBW 200-245								

* Mechanical properties measured on samples taken from other castings.
 ** The supplier has to take certain measures when using these types of cast iron for these thicknesses.

5.2. CHEMICAL PROPERTIES

The chemical properties of the cast irons in this specification are not, as a rule, considered binding by the regulatory requirements in force. However, Savio may, at the sampling stage, request certification of the chemical properties of the iron utilised for the castings. Such properties will be the subject of reference for all future supply checks.

5.3. ACCEPTANCE CHECKS

The castings must be presented at the Savio acceptance check, deburred and clean. The castings, standards, risers and all other such elements must be removed. When necessary, at the discretion of Savio Quality Control and in relation to the complexity of the casting, counter drawings are made of the castings on which the following are given, with reference to the indications given on the Instruction Sheet of Enclosure 1 :

- indications as to the positions of the gates, sprues, circulating scraps, etc. (which must be eliminated);
 - the type of deburring and other characteristics that interest the foundry man and which are connected to the subsequent working method of the casting (parting lines, locking points of blanks on the equipment, etc).
- Castings must be free from all oxidation as well as from loam and/or sand residuals.

5.4. STRUCTURE ABNORMALITIES ●

White zones and mottlings (primary cementite) are not allowed on any part of the casting.

5.4.1 GRAPHITE DISTRIBUTION ●

The presence of parts with dendritic structure, as for the reference images for graphite distribution type D and type E of norm UNI EN ISO 945-1: 2009 are not allowed.

5.5. DEFECTS ●

When inspected, as too during mechanical machining, castings must have no defects such as cracks, inclusions, blowholes or shrinkage cavities that could lead to problems during machining or prejudice use.

5.5.1 IRREGULARITIES ●

Any projecting parts, irregularities and/or other defects can be repaired by the supplier after agreement with Savio by means of a request for derogation (see Enclosure 2).

5.5.2 STRAIGHTENING

For the most serious defects, castings can be straightened after agreement with Savio by means of a request for derogation (see Enclosure 2).

5.6. ROUGHNESS

Casting roughness, in relation to the production process, must be kept within the values of Table 4.

Table 4 Roughness of casts	
Production process	Ra (μm)
Castings in sand	25
Shell mouldings	6.3
Shell mouldings	12.5

5.7. CASTING CODE

Dimensions permitting, the castings must be marked with the drawing code number. This marking must be in low-relief on a surface that is not going to be machined. The supplier may affix trade-marks and other markings after receiving Savio authorisation.

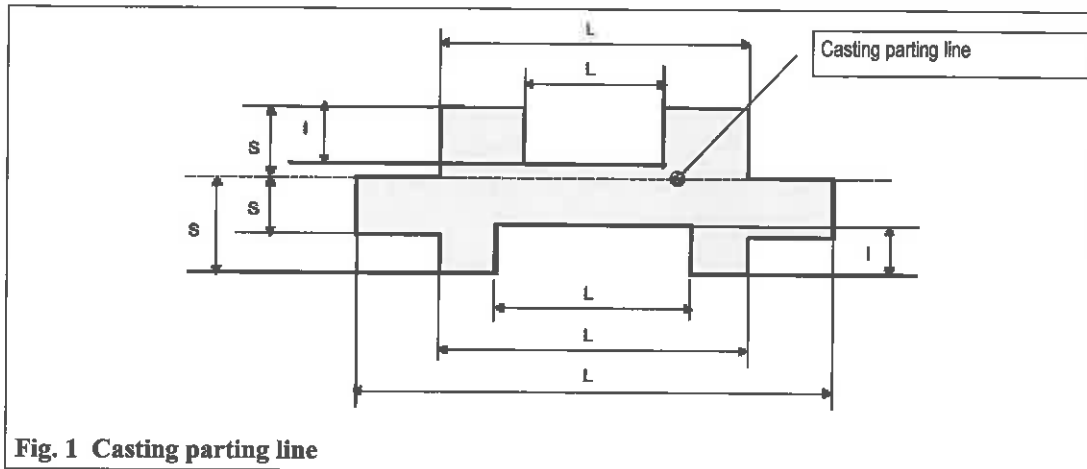
5.8. MACHINING ALLOWANCES, DRAFTS, RIBS AND WALL THICKNESSES

5.8.1 MACHINING ALLOWANCE VALUES

The machining allowance values in Table 5 are greater than the nominal values of each surface that, as per the casting drawings, will undergo mechanical machining; they vary also in relation to the position of the surface to be machined at the time of casting, and that is: upper (S), lateral (L) and lower (I) - see Fig. 1

Table 5 Machining allowance values								
Dimension greater than the surface to machine	Position of the surface at casting*	Maximum dimension of the raw casting						
		≤ 100	$> 100 \leq 160$	$> 150 \leq 250$	$> 250 \leq 400$	$> 400 \leq 630$	$> 630 \leq 1000$	$> 1000 \leq 1600$
		Machining allowance						
≤ 25	S	2.5	3	3.5	3.5	4	4.5	5
	L e I	2	2.5	3	3	3.5	4	4.5
$> 25 \leq 40$	S	2.5	3	3.5	3.5	4	4.5	5
	L e I	2	2.5	3	3	3.5	4	4.5
$> 40 \leq 63$	S	3	3.5	4	4	4.5	5	5.5
	L e I	2.5	3	3.5	3.5	4	4.5	5
$> 63 \leq 100$	S	3	3.5	4	4.5	5	5.5	6
	L e I	2.5	3	3.5	4	4.5	5	6.5
$> 100 \leq 160$	S		3.5	4	4.5	5.5	6	6.5
	L e I		3	3.5	4	4.5	5	5.5
$> 160 \leq 250$	S			4.5	5	5.5	6.5	7
	L e I			4	4.5	5	5.5	6
$> 250 \leq 400$	S				5.5	6	7	7.5
	L e I				5	5.5	6	6.5
$> 400 \leq 630$	S					6.5	7.5	8
	L e I					6	6.5	7
$> 630 \leq 1000$	S						8.5	9
	L e I						7.5	8

Reference UNI 7068 for precision degree: Precise
 * : S = Upper ; L = Lateral ; I = Lower (see Fig. 1)



When the measurement in the drawing is a diameter, that is, involving two raw surfaces to be machined, it is intended as a nominal dimension of the casting, that which is obtained by adding, as in the case with external surfaces, or subtracting, as in the case with internal surfaces, double the machining allowance established in Table 5 from the dimension of the machined casting (nominal dimension of the drawing, see Fig. 2).

The deviation values of the internal and external measurements established by dimensional tolerances (see Table 8) must refer to the casting's nominal measurements (see Fig. 2).

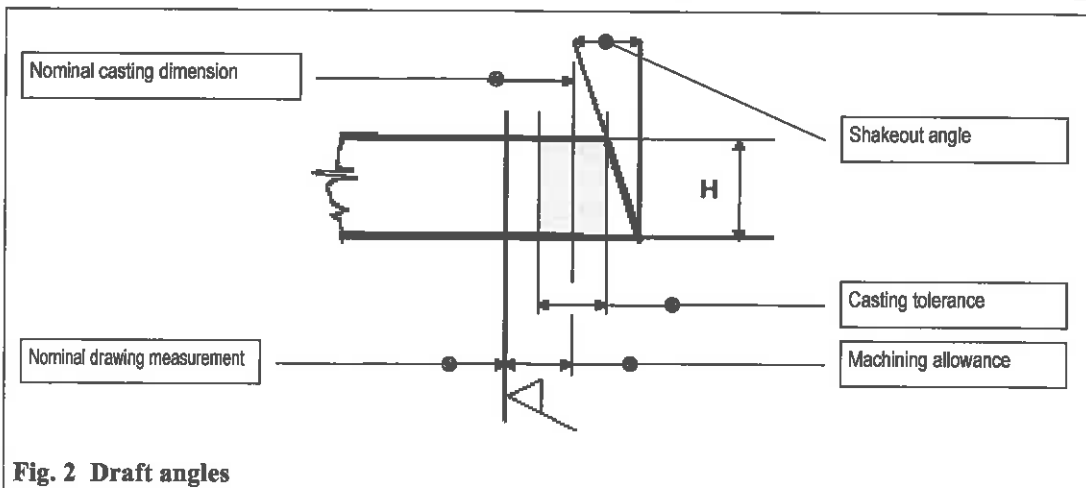
In all cases, machining allowances must be greater than the deviations allowed on both the internal and external measurements.

5.8.2 DRAFT ANGLES

The values of the draft angles to attribute to the casting surfaces positioned in the direction of the draft, are given in Table 6 in relation to wall height.

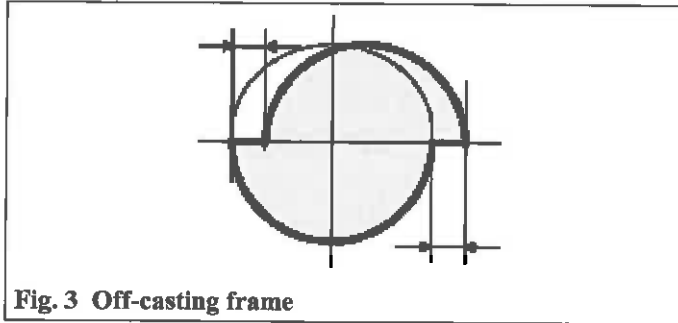
Draft material is always intended as added to the machining allowance (see point 5.8.1 and Fig. 2).

Wall height	H mm			
	≤ 50	> 50 ≤ 80	> 80 ≤ 120	> 120
Max. Draft angle	3°	2°	1° 30'	1°



5.8.3 OFF-CASTING FRAME

The permitted off-casting frame (mis-match; casting shifted - see Fig. 3) in any one direction of the parting plane must be within the tolerance range specified in point 5.9.


Fig. 3 Off-casting frame

5.8.4 TOLERANCES

Tolerances (limit deviations) relative to wall thickness and ribs are given in Table 7.

Table 7 Limit deviations							
Nominal dimension	Maximum casting dimension						
	≤ 100	> 100 ≤ 160	> 160 ≤ 250	> 250 ≤ 400	> 400 ≤ 630	> 630 ≤ 1000	> 1000 ≤ 1600
	Limit deviations						
≤ 6	± 0.5	± 0.5	± 0.5	± 1	± 1	± 1	
> 6 ≤ 10	± 0.5	± 1	± 1	± 1	± 1.5	± 1.5	
> 10 ≤ 16	± 1	± 1	± 1	± 1.5	± 1.5	± 1.5	± 2
> 16 ≤ 25	± 1	± 1	± 1.5	± 1.5	± 1.5	± 2	± 2
> 25 ≤ 40	± 1.5	± 1.5	± 1.5	± 2	± 2	± 2.5	± 2.5

Reference UNI 7068 for precision degree: Precise

5.9. DIMENSIONAL TOLERANCES

All casting dimensions, unless specified otherwise in the drawings, must be kept within the tolerance ranges given in Table 8. The requirements substitute the dimensional tolerances relevant to the raw casting surfaces given in the "Material" box on the drawing.

5.9.1 LIMIT DEVIATIONS

The tolerances (limit deviations) applicable to raw castings are given in Table 8.

Table 8 Limit deviations applied							
Nominal dimension	Maximum casting dimension						
	≤ 100	> 100 ≤ 160	> 160 ≤ 250	> 250 ≤ 400	> 400 ≤ 630	> 630 ≤ 1000	> 1000 ≤ 1600
	Limit deviations						
≤ 25	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	1/-0.5
> 25 ≤ 40	± 0.5	± 0.5	± 0.5	± 0.5	± 0.5	1/-0.5	1/-0.5
> 40 ≤ 63	1/-0.5	1/-0.5	1/-0.5	1/-0.5	1/-0.5	± 1	± 1
> 63 ≤ 100	1/-0.5	± 1	± 1	± 1	± 1	1.5/-1	2/-1
> 100 ≤ 160		± 1	± 1	± 1	1.5/-1	2/-1	2/-1.5
> 160 ≤ 250			2/-1	2/-1	2/-1	2/-1.5	2.5/-1.5
> 250 ≤ 400				2.5/-1.5	2.5/-1.5	2.5/-2	3/-2
> 400 ≤ 630					2.5/-2	3/-2	3.5/-2.5
> 630 ≤ 1000						4/-2.5	4/-3
> 1000 ≤ 1600							+5/-3.5

Reference UNI 7068 for precision degree: Precise

The limit deviation values in Table 8 refer to the external surfaces of the castings; in the case of attribution to the internal surfaces, the deviation signs have to be reversed (i.e.: for a casting with a maximum dimension of 500 mm with a nominal dimension of 150 mm externally, deviations +1.5 and -1 will be applied; for an internal dimension with the same casting characteristics, deviations -1.5 and +1 will be applied).

5.9.2 LIMIT DEVIATIONS

Tolerances (limit deviations of Table 8) attributed to the surfaces which will subsequently be machine tooled, are applied to the casting's nominal dimension (nominal dimension in the drawing + machining allowance; see point 5.8 and Fig. 2).

5.9.3 TOLERANCES

Tolerances (limit deviations of Table 8) attributed to the piece's raw surface are applied to the drawing's nominal dimensions.

5.9.4 EDGES

The edges of all surfaces that have a machining allowance must be rounded; the radius must not exceed 2/4rds of the machining allowance thickness. The surfaces of the castings on the division plane are excluded from this requirement.

6 CHECKS

Checks upon receipt of the castings must verify the requirements described in point 5 and in particular the following points.

6.1. VISUAL INSPECTION OF CASTINGS

The aspect of the castings must be inspected thoroughly without using any special tools.

The castings must be taken to Savio with the sprues removed and must be deburred, clean and free from oxidations as well as from sand and/or loam residuals (burnt on sand), blow holes/cracks, shrinkage cavities and short runs.

6.2. SURFACE HARDNESS CHECK

According to UNI EN ISO 6506-1 Table 2 standards, or equivalent, for the HB characteristic.

Whenever deemed necessary, the specimens to be checked can be placed on a special phenol resin support providing them with a more solid and secure working base which also makes handling easier.

Checking for white zones or mottlings (primary cementite) in the casting can be done, at the inspector's discretion and as an alternative to the hardness test, by way of a workability test using a file in the thinnest areas of the casting. These areas, known from experience, must be representative for the drastic nature of cooling the casting; the surfaces subject to the hardness test must, if possible, be those from which shavings were removed.

6.3. CHECKING THE METALLOGRAPHIC STRUCTURES AND THE CHEMICAL PROPERTIES

6.3.1 METALLOGRAPHIC STRUCTURE

The metallographic structures' materials, whether they have been subject to heat treatment or not, are examined under a microscope (with a preferential enlargement of 100 X) after the surface has been polished and etched with suitable reactives (see LABO 26 Table 2).

This examination makes a comparison with type figures extrapolated from standards (for the dimension of the grain and the graphite's structural form), with photographic images of the Metallographic Atlas, with specialized literature and/or documentation resulting from Savio's experience/research.

6.3.2 CHEMICAL PROPERTIES

The amount of material taken from different parts of the casting must be sufficient for a spectrum analysis of the cast iron's chemical properties.

The results will be compared with the limits agreed and/or requested during sampling of the castings.

6.4. SURFACE ROUGHNESS

A roughness meter is used to test surface roughness in accordance with ISO 468:1991 Table 2 and/or visual-tactile comparative systems (Rugotest).

6.5. DIMENSIONAL CHECKS

6.5.1 DIMENSIONS

Only two of the following dimensions must be taken into consideration for the dimensional check: external dimensions, internal dimensions, thickness.

6.5.2 SAMPLES

Whenever sampling is being done, the main axes and machining allowances of a sample must be indicated; for significant castings, the requirements must be indicated in the dedicated supply specifications.

6.5.3 DIMENSIONAL LIMITS

Dimensional tolerances must conform to the requirements in paragraph 5.9; blisterings in the castings, in the opening direction of the moulds, and any off-casting frames (see Fig. 3) are not to exceed the dimensional limits permitted by the tolerances given in Table 8.

6.5.4 MACHINING ALLOWANCES

Machining allowances and the draft angles must conform to the requirements of Table 5 and Table 6 respectively.

6.5.5 CASTING DEVIATIONS

Castings produced with reference to the same drawing and with the same type of material should not deviate from the reference casting mass (mean mass calculated on 10 sampled pieces in the approved batch) more than:

- ± 5% for machine formed castings;
- ± 7% hand formed castings.

6.6. NONDESTRUCTIVE TESTS

Depending on the complexity of the casting and/or on the characteristics to which the part will be subject to when installed, the castings can be subject to no destructive tests such as:

- penetrating liquids;
- magnet-particle test.

The castings subject to the tests must be neither oxidised nor subject to cladding and/or surface protection prior to the test.

6.7. STATIC TEST

Castings that are to be used also as liquid containers and which a visual inspection brings to light a faulty surface (cracks, blow holes, cold laps, shrinkage cavities and/or porosity, inclusions, etc.), can be subject to the static test with kerosene.

6.7.1 TEST DESCRIPTION

The surfaces being tested must be neither oxidised nor subject to cladding and/or surface protection prior to the test.

The test consists in pouring enough kerosene in proximity of the zones deemed faulty or filling those that must certainly be liquid proof due to their morphology (specified in the drawings). After 12 hours the external surfaces wet with kerosene are checked for bleeding and/or dripping.

6.8. DESTRUCTIVE TESTS

The castings can be subject to a tensile test when the dimensions are such that samples can be taken; if specified in the control programme and order, separate specimens of the castings made with the same cast iron must be supplied as well as the castings themselves and will be used to take the samples for the tensile test.

7 QUALIFICATION

The suppliers have to undergo a Savio qualification test (see APPR 2 Table 2); the work cycles that will be adopted and approved, based on the results obtained with the trial order, must be frozen and repeated for all subsequent supplies.

8 CHECKS TO BE MADE BY THE SUPPLIER

The supplier must carry out the above mentioned checks with the modalities indicated and in relation to the complexity and importance of the casting.

8.1. SIGNIFICANT CASTINGS

Significant castings must be supplied with a dedicated supply specification which defines, for example:

- Material.
- Status.
- Process.
- Treatments.
- Chemical and mechanical properties.
- Indication of the reference, check and identification areas.
- Checks to be made by the supplier.
- Packing and shipping.
- Documentation.

8.2. INSIGNIFICANT CASTINGS

Castings that do not have a dedicated supply specification (insignificant castings) must, unless specified otherwise in the drawings, be subject to the following checks:

- Visual inspection (see point 6.1) on 100% of the batch.
- Hardness check (see point 6.2) on 2% of the batch.
- Dimensional check (see point 6.5) on 2% of the batch, but in all cases, on no less than 1 piece per mould form.

9 ACCEPTANCE CONTROLS (SAVIO)

Acceptance controls are carried out as foreseen by the control programmes for cast irons, that is, in accordance with the PR 7.51 Table 2

10 DOCUMENTATION

The supplier shall produce the following documentation:

- a) For castings supplied with a dedicated supply specification, the documentation foreseen by said specification;
- b) For castings not supplied with a dedicated supply specification, the supplier has to produce the documentation according to the tests as under point 8.2

This documentation must be handed over with the pieces or, depending on the agreements reached with the Savio acceptance control manager, kept in a retraceable manner on the supplier's premises and made available for any audits required.

11 DEROGATIONS

All deviations (significant) from this ruling, order, drawings or reference documents, must be promptly communicated to the purchaser (Savio Acceptance Control) by fax, utilising the relative form: "REQUEST FOR DEROGATION", form RX/121 (see Enclosure 2) or equivalent document. The following must be indicated on the form:

- a) type of derogation and extent;
- b) solution proposed;
- c) modification proposed to avoid the defect being repeated.

The supplier must agree with Savio Quality Control on the solution adopted before proceeding to solve the defect, according to PR 8.50 Table 2.

The derogation is valid only for ongoing work and cannot be extended to future work.

12 MODIFICATION

Any modified to the product, as well as the introduction of significant modified to the production cycle must be reported in writing to the Savio and may be introduced only after approval. In any case, the modified take effect only after the update of the design and / or specifications by the Technical Department, or should have been made a written derogation

13 PACKING AND SHIPPING

The pieces shall be packed and handled as prescribed by the work cycles relative to the product code. If no method is specified, the general requirements given in the Work Instruction PROD 02 must be referred to. The pieces are to be identified by a visible tag, giving:

- a) Company name;
- b) Savio product code;
- c) Description
- e) Quantity.

There must be no traces of rust, dents and/or deformations on any of the material arriving at Savio's premises. The supplier should preferably use Savio containers (see Work Instruction PROD 02 Table 2).




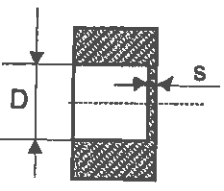



14 ENCLOSURES

- Standard referred to standard and former standards: Table 9
- Symbology for deburring cast iron and aluminium castings : Enclosure 1
- Request for derogation : Enclosure 2

Table 9	Table 10 Standard referred to standard and former standards				
Standards referred to	Standard	Adopted standards			
Rockwell hardness test	UNI EN ISO 6508-1:2006	UNI EN ISO 6508-1 :2002	EN ISO 6508-1 :1999	EN ISO 6508-1 :09.1999	
Brinell hardness test	UNI EN ISO 6506-1:2006	UNI EN ISO 6506-1:2001	EN ISO 6506-1 :09.1999	UNI EN 10003-1:1996	UNI 560
Gray iron castings: classification	UNI EN 1561:2011	UNI EN 1561:1998	UNI ISO 185:1991		
Spheroidal graphite iron:classification	UNI EN 1563:2012	UNI EN 1563:2004	UNI EN 1563:1998	UNI ISO 1083:1991	
Specifications for compact iron castings with graphite (vermicular)	ASTM A 842-85:2004	ASTM A 842-85			
Surface roughness	-	UNI ISO 468:1998	UNI ISO 468:1991		
Tension test	UNI EN ISO 6892-1:2009	UNI EN 10002-1:2004	UNI EN 10002-1:1992		
Design. of the graphite microstructure	UNI EN ISO 945:2009	UNI EN ISO 945:1995	UNI 3775:1973		
Gray iron castings, not alloyed: tolerances and machining allowances for sand or loam castings	-	UNI 7068:1983			
Dimensional tolerances systems for castings in general.	UNI EN ISO 8062:2009	UNI ISO 8062:1989	ISO 8062 :1984		

Enclosure 1 Symbology for deburring cast iron and aluminium castings

	SYMBOLGY FOR DEBURRING CAST IRON AND ALUMINIUM CASTINGS	N° PG 0034 Rev. 01 Page 1/1
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SYMBOL	DESCRIPTION	OPERATION							
XXXXXX	Cast iron scraps	Deburr only if the projection is > 1 mm							
OOOOOO	Washes	Deburr only if the projection is > 1 mm							
////////	Punching	Projecting parts of no more than 0.25 mm are allowed on punched areas.							
—	Section to be deburred	Deburr with a belt, grinding wheel or disk: 80 ÷ 100 grain for die-cast pieces; 60 grain for cast iron and aluminium castings.							
	Parting line not always shown in the drawing but visible in the casting	Deburr, even if not indicated by the F.I., if burrs are bigger than 0.30 mm for die-cast pieces and bigger than 0.40 mm for cast iron and aluminium castings.							
	Area with bumps (only for die-casts)	Deburr with a 10 grain abrasive cloth							
	Preparation holes for tapping for plastic deformation (die cast aluminium pieces only)		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Thread diameter D</th> <th style="width: 50%;">Burr thickness S Max.</th> </tr> </thead> <tbody> <tr> <td>Up to M6</td> <td>0.15</td> </tr> <tr> <td>from M8 to M12</td> <td>0.30</td> </tr> </tbody> </table>	Thread diameter D	Burr thickness S Max.	Up to M6	0.15	from M8 to M12	0.30
Thread diameter D	Burr thickness S Max.								
Up to M6	0.15								
from M8 to M12	0.30								
		If thicker than the permitted maximum thickness, punch							
	Ejectors (for die-cast pieces only)	The ejectors' mould forms should reenter max. 0.3 mm. Eliminate all burrs bigger than 0.30 mm.							
	Reference point for machining	Remove all burrs from the parting line or from the extractor without altering the dimensions							
	Point for locking in the tool	Remove all burrs from the parting line or from the extractor without altering the dimensions							

REFERENCE DOCUMENTATION

Supply specification for die-cast pieces, code 4011_1005_00

Supply specification for iron castings, code 4011_1003_00

Drawn up by	Date	Approved by	Date



SUPPLY SPECIFICATION

4011-1003-00

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Enclosure 2 Request for derogation



REQUEST FOR DEROGATION

N°.

TO BE COMPLETED BY THE SUPPLIER

Supplier	Code of the part
Order No.	Quantity involved
Description of the defect	DIAGRAM OR ILLUSTRATIVE DRAWING
Causes of the defect	
Solution proposed	
Corrective action to avoid the defect being repeated	
Supplier's signature	Date
Enclosures: YES <input type="checkbox"/> NO <input type="checkbox"/>	

TO BE COMPLETED BY SAVIO

Solution to put into practice	
Enclosures: YES <input type="checkbox"/> NO <input type="checkbox"/>	
Quality signature	Project Head signature
Date	
COPY FOR	

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