

# FFV Ordnance AB

## TEKNISK BESTÄMMELSE TECHNICAL SPECIFICATION

1 (9)

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### Blank for Plunger

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### ÄNDRINGSFÖRTECKNING *RECORD OF CHANGES*

A-nr <i>Rev No</i>	ÄB-nr Rev Requisition No ÄO-nr Rev Order No	Berörda paragrafer + kort beskrivning <i>Relevant paragraph + brief description</i>
5	39080913	<p><b>Para 1:</b> 6 417 888 was F1321-443880 SS-EN ISO 10002-1 was ISO 112110 SS-EN ISO 6507-1:2006 was SS 112516 ISO 2859-1:1999 was ISO 2859</p> <p><b>Para 6.5.3:</b> SS-EN ISO 10002-1 was SIS 112110</p> <p><b>Para 6.5.4:</b> SS-EN ISO 6507-1:2006 was SS 112516</p>

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**1 APPLICABLE DOCUMENTATION**

In addition to this technical specification, the following apply:

Drawing, blank	6 417 888
Standard for tensile testing	SS-EN ISO 10002-1
Standard for indentation testing	SS-EN ISO 6507-1:2006
Standard for selection of samples	ISO 2859-1:1999

**2 PRODUCT DESCRIPTION**

The plunger, produced through cutting of the blank, is exposed during firing to high dynamic stresses and hot gases under pressure that must not be allowed to cause deformation and burn-through of the plunger.

High demands are therefore placed on the homogeneity and tensile strength of the blank to guarantee satisfactory function and safety.

**3 PRODUCT SPECIFICATION**

**3.1 MATERIAL**

**3.1.1**

The raw material must be an aluminum alloy of type Al-Zn6 Mg Cu such as AA 7075 or the equivalent.

**3.1.2 Composition**

The material must have the following composition in percentage by weight:

	Al	Cu	Cr	Fe	Mg	Mn	Si	Ti	Zn	Ti+ Zr	Others	
											each	total
Nom	89.8	1.6	0.20		2.6				5.8			
Min		1.2	0.18		2.1				5.1			
Max		2.0	0.40	0.70	2.9	0.30	0.50	0.20	6.1	0.25	0.05	0.15

**3.1.3**

The material must be free from tail piece failure, oxide veining, inclusions, cracks or other similar defects that can adversely affect the strength and function of the completed component.

Inspect in accordance with Section 6.5.1.

**3.1.4**

The structure of the raw material must be fine-grained and any roughness in surface must not be deeper than that it can be removed during cutting; inspect in accordance with Section 6.5.2

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**3.1.5**

**Tensile strength**

The material must after solution heat treatment and thermal aging fulfill the following requirements:

Yield strength	Rp 0.2	Min 500 N/mm <sup>2</sup>
Tensile strength	Rm	Min 560 N/mm <sup>2</sup>
Elongation	A <sub>5</sub>	Min 7%
Hardness	HV	160 – 195

Due to the difficulty in taking suitable sample from the blanks, the tensile testing must be conducted on samples taken from the raw material (rod) used in for blank production. Inspect in accordance with Sections 6.5.3 and 6.5.4.

**3.2 SURFACE QUALITY**

**3.2.1**

The blank must be free from cracks, fractures, blisters, wrinkles, corrosion or the like.

AQL: 1% Any defects that may occur must not be larger than that they are assessed to be eliminated during treatment.

**3.2.2**


The blank must be well cleaned through mordanting and be free from dents, burrs, flash and impurities.

AQL 4%.

**3.3 Dimensions**

The dimensions of the blank must be according to the drawing.

The AQL values below apply for the following dimensions.

DIMENSION	AQL
Ext. length 10	0.4%
Ext. diam. 59.8	0.4%
Radius	0.4%
Run-out 	0.4%
Other dimensions	2.5%

The number of defects applies provided the non-conformity is not of abnormal magnitude. Standard value < 20% of the tolerance range.

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## 4 PRODUCTION

### 4.1 METHODS and EQUIPMENT

#### 4.1.1

The blank must be manufactured using hot-pressing.

#### 4.1.2

The blank must be heat-treated by solution heat treatment and thermal aging performed in such a manner that all blanks receive a similar treatment.

#### 4.1.3

During heat treatment the oven temperature and batch time must be monitored using a continuous printer. The recorded curves must be comparable with a specific heat treatment batch within a delivery lot. The curves must be recorded in the production log.

#### 4.1.4

Heat treatment must be controlled so that all blanks are guaranteed to have undergone the required solution heat treatment and thermal aging. That is, no complete or partial batch can be allowed to miss any phase of the treatment. After thermal aging, the prescribed tensile strength and hardness testing must be conducted on every batch prior to starting the next operation. If the batch is not approved during this inspection, it must be removed and corrected in a suitable manner.

### 4.2 Planning and monitoring

A production log must be kept and provide information about the circumstances that can affect the product's quality and homogeneity. The log must also contain information about included batches and significant changes to the manufacturing process. The production log must be archived for at least 20 years and must be made available upon request.

## 5 SHIPMENT

### 5.1 Packaging of Goods Unit

The blanks must be divided into delivery lots of approximately 5,000 blanks. The blanks must be packaged in layers on half pallets, four pallet collars high with the same number of blanks on each pallet. Every layer must be separated by an interlayer. The packaging must be such that the blank is not damaged during transport, handling or storage.

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**5.2 Labeling of Transport Packaging**

Each packaging unit shall be labeled with the FFV article number, designation, quantity and lot designation.

**6 Inspection**

**6.1 Vendor Inspection**

**6.1.1**

During production the vendor must perform regular inspections to the extent required to verify that the prescribed requirements are met.

**6.1.2**

The vendor must perform delivery inspections to the extent deemed necessary in addition to in-process inspection to be able to verify the quality level of the delivery lot.

**6.1.3**

Any non-compliance shall be subject to the applicable non-compliance procedure agreed between the purchaser and vendor.

**6.2 Purchaser inspection**

**6.2.1**

The purchaser shall perform receiving inspection on every delivery lot to the extent considered necessary.

**6.2.2**

The purchaser is entitled to attend and monitor the vendor's production and inspections.

**6.3 Inspection lot**

Every delivery lot is an inspection lot.

**6.4 CERTIFICATION**

The vendor provides the purchaser with an inspection certificate for every delivery lot, enclosed in the delivery or immediately after delivery.

The certificate must include information about the technical data package, delivery lot number, quantity, FFV article number, designation and certificate number. In addition to the above, the following must be specified in the certificate:

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**6.4.1**

All results from material strength testing.

**6.4.2**

All results from hardness testing.

**6.4.3**

All results from structural examination.

**6.4.4**

Blank composition with statement of batch analysis.

**6.4.5**

That the raw material for blank production is inspected for cracks, inclusions, tail piece defects or similar defects.

**6.4.6**

Reporting in accordance with Sections 6.4.4 and 6.4.5 can also be performed by providing a subcontractor certificate, attached to the certificate.

Otherwise, the subcontractor certificate must be available to the purchaser and information about subcontractors used must be provided on the certificate.

**6.5 Test Methods****6.5.1**

Every ingot or blank of the raw material for blank production must be inspected for internal hidden defects by means of ultrasound or other equivalent method. Every end during pressing of the raw material must be examined for tail piece defect using macro etching. Defects must be eliminated through cutting.

**6.5.2**

Structural testing must be conducted on the blank using macro etching of the longitudinal section. The minimum number of samples must be ten per delivery lot.

**6.5.3**

Tensile testing must be conducted on samples taken from the raw material (rod) for blank production. The samples must be heat-treated together with the blanks and there must be a minimum of ten per blank delivery lot and evenly distributed over all solution heat treatment batches. Tensile testing must be conducted in accordance with SS-EN 10002-1.

**6.5.4**

Hardness testing must be conducted on the blanks. Testing is conducted with a load of 196 N and otherwise in accordance with SS-EN ISO 6507-1:2006. The minimum

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number of samples is 25 per delivery lot distributed over all solution heat treatment batches.

## 6.6 Test lot

To provide the purchaser with an idea about how production will be conducted regarding quality, the vendor must submit test lots in agreement with the purchaser.

### 6.6.1

The test lots must be representative of future production and produced using the production processes, tools, measuring device and so on to be used during series production.

### 6.6.2

The test lots must be submitted:

- When the blank is new to the vendor.
- When substantial design modifications have occurred to the blank.
- When substantial modifications have been made in production of the blank, for example, process revisions.
- When the blank manufacturer switches to new manufacturer or manufacturers of the raw material.
- When modifications occur in connection with production of the raw material for the blank, for example during change of ingot, blank or rod manufacture or in alloy composition.

### 6.6.3

The vendor must submit a test lot in good time prior to series production so that any observations can be corrected prior to the first delivery. Before series deliveries start, the test lot must be approved by the purchaser.

### 6.6.4

The blank producer must inform the purchaser, in writing, when such changes in blank production require or can require a new test lot of the blank and obtain the purchaser's observations prior to implementing the changes.

### 6.6.5

Test lots must be labeled during submission as "Test Lot" and accompanied by an inspection certificate in accordance with Section 6.4 of the vendor's own inspection of the lot.

### 6.6.6

Test lots must include approx. 500-1000 blanks.

### 6.6.7

Test lots must undergo processing and high pressure testing prior to approval of the test lot.



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### 7 Additional requirements

No procedures.