

## Material samples

Inhalt	Seite
1 Scope .....	2
2 References .....	2
3 Terms and definitions .....	2
4 Test batches.....	3
5 Extraction of samples and testing .....	4
5.1 Extraction positions .....	4
5.2 Test specimen and sets of specimen .....	5
6 Additional sample material .....	6

### Changes

2023-03-14 :

The following changed in comparison to RN 1550: 2022-11-10:

- a) Par. 4, table 2: revised in content
- b) editorially revised

Responsible Division: PK	Editor: M. Förste	Approved by: see doc. workflow	Techn. reference: C. Eschert	Page: 1 / 6
-----------------------------	----------------------	-----------------------------------	---------------------------------	----------------

## 1 Scope

This factory standard applies to all raw and pre-machined steel products purchased from REINTJES.

It contains specifications for the taking and preparation of material samples intended for the testing of mechanical material properties. It also specifies the criteria under which samples may be grouped into test lots.

## 2 References

The following documents, cited in part or in whole in this standard, are required for the application.

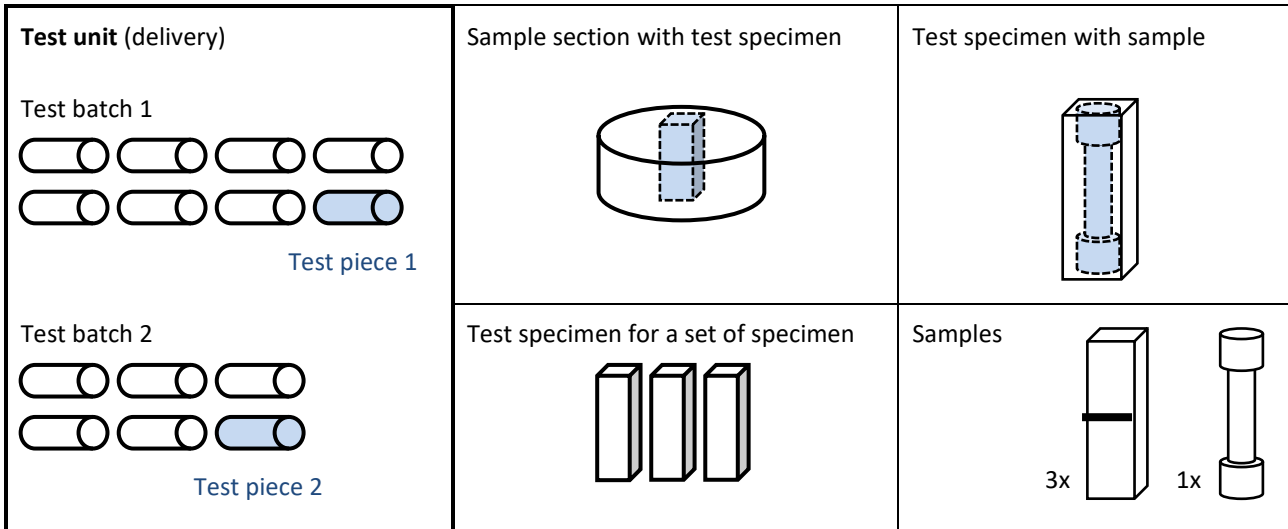
EN ISO 377	Steel and steel products - Location and preparation of samples and test pieces for mechanical testing
EN ISO 3785	Metallic materials - Designation of test specimen axes in relation to product texture
VV-3664	Sawing plan for round bars - Part A, sample production with fixture
VV-3666	Sawing plan for round bars - Part A, sample production without fixture

The content of this factory standard may deviate in parts from the specifications in referred documents. In this case, the internal specifications take precedence over the external specifications.

## 3 Terms and definitions

For the purpose of this document, the following terms shall apply:

<b>Sample</b>	Part of a sample section that has been mechanically treated before the production of the samples
<b>Sample section</b>	Sufficient quantity of material taken from the test piece to produce one or more samples The amount of material shall be sufficient to produce at least two sets of specimen. Note 1: Sometimes the sample section may be the test piece.
<b>Set of specimen</b>	Number of samples to perform the required mechanical tests
<b>Test specimen</b>	Part of the sample section with specific dimensions, which is tested processed in the required condition
<b>Test piece</b>	Product (e.g. bar, punched disc, forging blank) selected for testing
<b>Test unit</b>	Number or mass of products accepted or rejected together on the basis of the tests to be carried out on the samples according to the delivery standard or the order (usually the delivery quantity of a product)
<b>Test batch</b>	Number of forgings with similar dimensions (e.g. perforated discs with diameter differences up to $\pm 20\%$ ) from the same melt and common heat treatment. As a rule, Table 1 applies to the determination of the size of test lots.
<b>Unit weight</b>	Weight of the product to be supplied, excluding cut-offs and back-cuts



#### 4 Test batches

For forgings of shapes 1 to 5 (see Table 2), test batches can be formed for the incoming goods inspection, taking into account the criteria in Table 1, provided that

- the parts have similar dimensions
- originate from one melt and
- have been subjected to a common heat treatment.

**Table 1 Criteria for test batches**

Heat treatment	+QT (quenched and tempered)
Max. unit weight	3000 kg
Max. total weight per test batch	3000 kg
Sets of specimen per test batch	2

Residual quantities ≤ 10 % of the number of pieces can be allocated to one test batch.

Example 1: Test unit with 10 parts, unit weight 100 kg:  
1 test batch, 2 sets of specimen

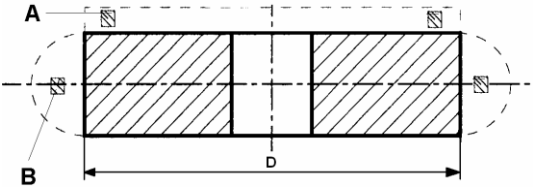
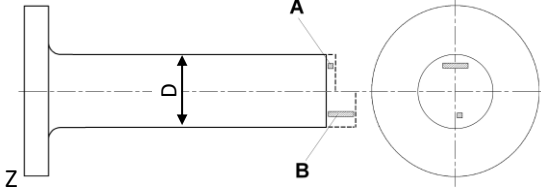
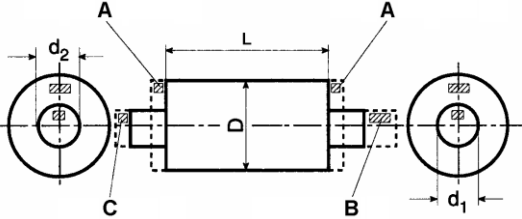
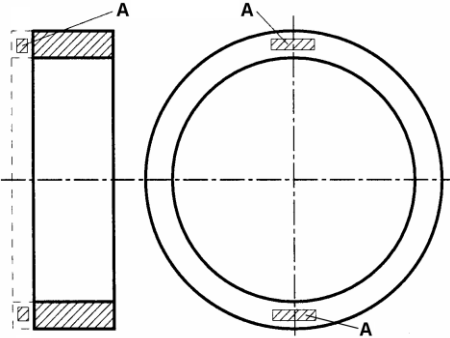
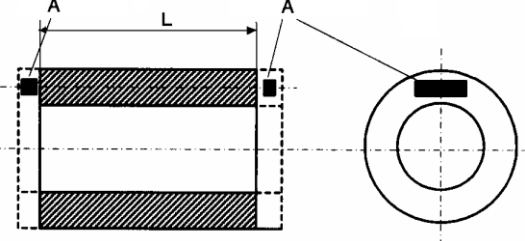

Example 2: Test unit with 10 parts, unit weight 600 kg:  
2 test batches, 4 sets of specimen

For forgings of shape 6 (see Table 2), the supplier can form test batches for each charge and dimension.

## 5 Extraction of samples and testing

### 5.1 Extraction positions

Table 2 Sampling extraction

 <p style="text-align: center;"><b>Form 1: Punched disc</b></p> <p><math>D &lt; 2500</math> mm: Preferably, take sample section for tangential set of specimen A in the tothing area; alternatively, position B is possible</p> <p><math>D \geq 2500</math> mm: 2 opposite sample sections for 2 tangential sets of specimen A</p>	 <p style="text-align: center;"><b>Form 2: Flanged shaft, die shaft</b></p> <p>A = transverse sample, B = longitudinal sample</p> <p><math>D &lt; 350</math> mm: take longitudinal sample B</p> <p><math>D \geq 350</math> mm: alternatively take transverse sample A</p> <p>Die shafts: take sample sections for longitudinal samples from an additionally manufactured die shaft; extraction positions according to Figure 1</p>
 <p style="text-align: center;"><b>Form 3: Pinion shaft</b></p> <p><math>D \leq 160</math> mm: Sample section for longitudinal samples B</p> <p><math>D &gt; 160</math> mm: Sample section for transverse samples A in the tothing area, sample positions B or C are only permissible if test specimens cannot be manufactured in position A</p> <p><math>L \leq 1250</math> mm: 1 Sample section for transverse set of specimen A</p> <p><math>L &gt; 1250</math> mm: 2 opposite sample sections for 2 tangential sets of specimen A</p>	 <p style="text-align: center;"><b>Form 4: Ring, gear bandage</b></p> <p><math>D &lt; 2500</math> mm: Sample section, preferably for tangential sample A or alternatively for longitudinal sample, if necessary from additionally manufactured ring</p> <p><math>D \geq 2500</math> mm: 2 opposite sample sections for 2 tangential samples A</p>
 <p style="text-align: center;"><b>Form 5: Hollow shaft</b></p> <p><math>L \leq 1250</math> mm: 1 Sample section for tangential sample A</p> <p><math>L &gt; 1250</math> mm: 2 opposite sample sections for 2 tangential sets of specimen A</p>	 <p style="text-align: center;"><b>Form 6: Round bar</b></p> <p>Extraction positions according to Figure 1</p>

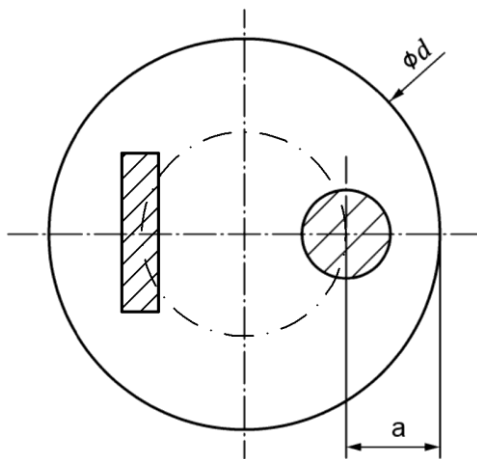


Figure 1

**Extraction points for round material**

Forged round material

- $d \leq 50$                        $a = d/2$
- $d > 50$                          $a = d/5$ , but max. 80

Rolled round material

- $a = d/6$

(see also documents VV-3664 and VV-3666)

Unit weight	Extraction of samples
< 3000 kg	at one end face
≥ 3000 kg	at both end faces

The extraction positions for samples for testing the mechanical properties shall be selected according to Table 2, Form 1 to 6, depending on the product or blank shape.

From 220 mm diameter on, material for transverse samples should preferably be taken if test specimens can be removed from the sample sections.

Regularly the sample sections should not be separated from the forging until after final heat treatment. If this is not possible for manufacturing reasons, the forging and the sample section must be heat treated together.

**5.2 Test specimen and sets of specimen**

At least one set of specimens is required to test the mechanical material properties of a test piece. One tensile test sample or two samples for notch impact test can be made from one test specimen.

Test specimen dimensions:                      30 mm x 30 mm x 130 mm

Test specimens per set of specimen:        3

Test specimens per set of specimen:        1 tensile test, 3 notched bar impact tests

## 6 Additional sample material

For parts whose mechanical material properties have to be tested again at REINTJES after final heat treatment or for acceptance, additional sample material is required.

The following applies here:

- ⇒ The respective extraction positions for samples according to table 2 must be observed.
- ⇒ Sample bars and sets of specimen are prepared according to par. 5.2.
- ⇒ The sample material shall be provided in the form of extensions, additional parts or sample sections.  
Maximum dimensions for ring segments  
 Cross section: 250 mm x 250 mm  
 Outer arc length: 500 mm
- ⇒ The provision of finished test specimen is not permitted, since the original sample position must be recognizable for REINTJES (see also illustration in chapter 3).

**Table 3 Additional number of specimens sets for material testing**

Sample material for		sufficient for (number of sets of specimen)
each punched disc	(Form 1)	according to table 2
flanged shafts, die shafts per test batch	(Form 2)	2
each pinion shaft	(Form 3)	2
rings, gear bandages per test batch	(Form 4)	outer diameter < 400 mm: 3 outer diameter ≥ 400 mm: 2
hollow shafts per test batch	(Form 5)	2
round bars	(Form 6)	0 <sup>1)</sup>

<sup>1)</sup> No additional sample material required unless otherwise stated in the order