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Steel Forgings Technical Conditions of Delivery		DIN 7521			
Schmiedestücke aus Stahl; Technische Lieferbedingungen					
1. Scope					
This Standard contains technical conditions of delivery for steel drop forgings of all sizes and steel open-die forgings up to medium heavy sizes and covers the general requirements which may be applied to drop forgings. Requirements going beyond these must be specially agreed.					
2. Definitions, manufacturing methods					
Drop forgings are workpieces produced by hot forming by impact or pressure with multi-part tools (dies) which normally completely enclose the material.					
They are still regarded as drop forgings even if their surface is partly or completely subjected to subsequent cold forming treatment in order to improve surface quality or dimensional accuracy.					
Open-die forgings are workpieces produced by hot forming, by impact or pressure with tools which either do not enclose the material at all or only to a small extent.					
Bars, half-finished products or ingots produced by rolling or extrusion are not forgings.					
3. Material					
The material and its designation shall, as far as possible, be taken from the relevant material standards (e. g. DIN standards, Euro standards).					
If heat treatment is required for the forgings, this shall be quoted using the terminology in DIN 17014.					
4. Tolerances					
4.1. Variations on dimension and shape					
In relation to these, DIN 7526 and DIN 7527 apply unless otherwise agreed.					
Variations in dimensions and shape of open-die forgings which are not covered by this Standard, require special agreement.					
4.2. Quantity variations					
In the case of drop forgings, quantity variations resulting from rejects which are only ascertainable after cooling or after heat treatment and descaling of forgings, are permissible within the tolerances stipulated in the table, in view of the disproportionately large processing effort and cost for re-forging.					
Open-die forgings should as far as possible be supplied to the full quantity ordered.					
5. Documents accompanying order					
5.1. Material, condition of delivery					
The grade of steel - and where applicable the quality group and the required properties after forging or after heat treatment - must be quoted in an unambiguous manner.					
The normal finish for forgings does not include any surface treatment. Requirements going beyond this (for example descaling) must be specially agreed.					
5.2. Drawing documents					
The forging drawing is normally the decisive document for manufacture and delivery of forgings to customer's requirements. According to DIN 7523 Part 1, this is either prepared by the manu-					
Order quantities, number of pieces	Variations of numbers of pieces in % of order quantities for forgings weighing				
	up to 0,1 kg	over 0,1 to 1 kg	over 1 kg	up to 0,1 kg	over 0,1 kg
	Overdelivery			Underdelivery	
	%	%	%	%	%
up to 20	-	25	15	-	12
over 20 to 50	-	20	12	-	7
over 50 to 100	-	17	10	-	6
over 100 to 500	20	14	8	10	5
over 500 to 1 000	14	12	7	7	4
over 1 000 to 2 500	10	9	6	5	3
over 2 500 to 6 300	8	7	5	4	3
over 6 300 to 10 000	6	5	4	3	2
over 10 000	5	4	3	3	2

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facturer and approved by the customer before the forging tools are made or prepared by the customer. In this case, supply of a drawing of the finished component also is desirable.

5.3. Ordering of drop-forged standard parts

The designation of the standard must be precisely quoted. Where not quoted in the standard, the information necessary for execution of the order (e. g. information on material, surface) must be quoted with the order. If standard forgings are not required with any subsequent machining which may be necessary but simply as unfinished forgings, this must be specially agreed.

5.4. Die prints

In special cases, at the request of the customer, die prints in plaster or other suitable non-shrinking moulding materials, may be produced by the manufacturer after completing the dies and sent to the customer for inspection. The customer then sends the manufacturer a test report. The binding document for series manufacture of the drop forgings is the approved forging drawing.

The die impressions must be formed in the dies with a shrinkage allowance of 0.5 % to 2 % to allow for shrinking of the material on cooling.

The shrinkage allowance used must be quoted and taken into account in assessing the dimensions of the plaster prints.

5.5. Indication and marking

Drop forgings shall carry the identification symbol of the supplier.

The marked area and the marking shall be quoted in the drawing sent to the customer for approval or be on the plaster print and they shall as far as possible take into account the wishes of the customer. The size of the lettering shall depend on the size of the forging and the technical possibilities. The lettering shall be according to DIN 1451. The height of the letterings shall be not less than 4 mm. The marking may, at the choice of the manufacturer, be forged in a raised or sunk form or be stamped in cold or hot. If the customer will accept only a particular type of finish, the manufacturer's attention must be specially drawn to this.

Letterings formed in the die are subject to rapid wear; hence the marking should be as short and simple as possible.

Unless there have been special agreements to the contrary, illegible lettering on the forging shall not constitute a reason for complaint.

6. Requirements

Forgings must comply with the standards quoted in Sections 4 and 5 in respect of material properties and dimensions, unless otherwise agreed.

6.1. Surface

Unless otherwise agreed, forgings are supplied with rough forged or rough rolled surface. The provisions of DIN 7526 apply here. Grinding of the surface is permitted, provided the usability of the forging is not thereby impaired. Removal of defects by welding is permitted only with the agreement of the customer.

6.2. Design

In the case of drop forgings, the rules concerning design, drafts, machining allowances, fillets and edge radii given in DIN 7522, DIN 7523 and DIN 7526 should be observed.

6.3. Complaints

Defects in the forging may only be objected to if they impair to an appreciable extent appropriate processing and use of the forging.

The customer must give the supplier an opportunity of convincing himself that the complaint is justified and where possible shall do this by submitting the forgings objected to.

7. Tools

7.1. Tools specific to the customer

Tools specific to the customer are manufactured or obtained by the manufacturer of the forgings acting on behalf of the customer. The manufacturer is responsible for maintenance and replacement and for appropriate storage of the tools. This storage obligation ceases if the customer places no further order for the corresponding forgings within 3 years of the latest order.

After this period has elapsed, the customer must be informed in writing and given the opportunity to reply within 6 weeks. The manufacturer may use tools, for which the customer has borne the costs or a proportion of the costs under the normal commercial conditions of delivery and payment, only for deliveries to the customer, irrespective of his ownership.

7.2. Tools not specific to the customer

In the case of tools not specific to the customer, the manufacturer of the forgings shall manufacture or obtain the tools at his own risk and his own cost. The manufacturer can make use of the tools without restriction; he can if he wishes modify them or scrap them. The costs of such tools, including maintenance and replacement expenditure are determined according to the normal methods of cost accounting and are included in the manufacturing costs of the forgings. This handling is the normal one for manufacture of components for general use - e. g. standard parts.

8. Testing

The type and extent of the testings depend on the requirements placed on the forgings in subsequent processing and future use.

8.1. Normal testings

These include dimensional testing according to drawings and material properties as well as for surface defects and surface cracks insofar as these can be detected by visual observation.

8.2. Additional testings

The nature and extent of additional testings and the test methods to be used, such as 100 % hardness testing (e. g. Brinell or Rockwell hardness), magnetic crack testing, testing for defects by ultrasonic methods etc. must be specially agreed and precisely quoted in the forging drawing, or at the time of ordering and on confirmation of order.

The position of test bars has to be stated according to DIN 7523 Part 1.

8.3. Acceptance

This applies to deliveries with test certificates and acceptance at the manufacturer's premises by agents of the customer. The nature and extent must be specially agreed and quoted in the order and the confirmation of order.

9. Proof of the quality supplied

9.1. Forgings subject to the normal extent of testing according to Section 8.1 are supplied without certificate.

9.2. In the case of special agreement for example for a wider extent of testing according to Section 8.2 and in the case of acceptance according to Section 8.3, a statement of compliance with the order, works report, works certificate, test certificate or certificate of acceptance according to DIN 50049 may be requested as proof of the testings carried out.

Explanations

The standard DIN 7521 published in August 1944 for steel forgings, technical conditions of delivery, has definitely proved its value. However, since it has been current for a long period it has become necessary to undertake a revision. Some sections which, in the opinion of the Bundeskartellamt (Federal Cartel Office), were in the nature of conditions, have been amended, as a result of negotiations between the Bundeskartellamt on the one hand and the Committee for Forging Practice and the DIN Deutsches Institut für Normung e.V. (DIN German Institute for Standardization e.V.) on the other to produce a wording acceptable to the Bundeskartellamt. The other sections of this Standard have also been newly revised, firstly because there was some overlapping and secondly because certain modifications were necessary.