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MASTER C.

The present technical specifications deal with the delivery of ring-shaped blanks made of steel of grades 45 x Hands x HN which are designed for manufacture of turret rings.

1. RANGE OF SIZES

1.1 Dimensions and mass of the rings should be within the range of values corresponding to the range of sizes of the mill of the supplying factory, given in table -1.

TABLE-1

| Sizes | | mm | | | | Mass, Kg | | | |
|------------|----------|-------------|------|------|------|----------|-----|-----|--|
| Outer In | ner a | Wi | dth | heig | ht | n | ax | min | |
| Max. Min. | Max. | ilin. | Max. | Min. | max. | Min. | | • | |
| 2600 840 2 | 310 | 7 00 | 180 | 80 | 180 | 100 | 970 | 280 | |

1.2 Shape, dimensions of rings and their allowed tolerances in each specific case should be agreed on between the supplying factory and the consuming factory. Theoretical mass specified in the specification chart or in the drawing is the basis on which the delivery of rings is made.

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TECHNICAL REQUIREMENTS

2.1 harks, chemical composition of steel and the allowed tolerances of ladle sample should comply with table 2:

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|------------------|------------|--------------------|--------------------|-----------------------|-------------|--------------|--------------------|----------------|
| Gra- de | | | | Content of elements % | | | | 7 |
| of st- eel | Car bon | Manga nese | Sili con | Phospho rous | Sulph ur | | | |
| | | | | Maximum | 0 | Chro mium | Nick- el | Molib denum |
| 45 X H | to | 0.50 to 0.80 | 0.17 to 0.37 | 0.035 | 0.035 | to | 1.00 to 1.40 | ** |
| 45XHM | to | 0.50 to 0.80 | to | 0.035 | 0.035 | to | 1.00 to 1.40 | to |

Note: 1. Tolerances allowed are:

± 0.01% for carbon

± 0.02% for chromium

- 0.05% for nickel

- 2. The content of residual copper may be maximum 0.4%
- 3. Providing the user's consent, there is allowed some deviation in content of phosphorous, sulphur, maganese, silicon and malybdenum

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- Rings are delivered in heat treated condition (after hardening and tempering). The conditions of heat treatment are worked out by the factory supplying the rings.
- 2.3 Mechanical properties of the heat treated rings should comply with the norms given in Table 3.

| · | <u> </u> | | | TA | 3 L E · 3 |
|--|--|------------------------------------|------------------------------|--------------------------|--|
| of Strength Steel Kgf/mm ² | Yield limit T Kgf/mm ² | Relative elonga- tion 5 % | Relative Contra- ction | Stren- gth KCV / 2 | Hardness all over the sec- tion |
| at least | | | | Kgfylam | Diameter mm |
| 45XH 80.0 | 60.0 | 12.0 | 45.0 | 7.0 | 3.5 to 3.9 |
| 45XHM 80.0 | 50.0 | 12.0 | 45.0 | 7.0 | 3.4 to 3.8 |

2.4 Macro-structure of steel should not posses flabes and tarnishes of any class. Segregation of porosities allows upto 3rd degree, inclusive. Bubbles under tarnishes and other rare-found defects loacated to a depth within the ranges of allowance for machining are not the basis for rejection.

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2.5 Defects (laps, skins, rolled bubbles and dirts etc) are allowed on surface of the rings as well as unevenness on the faces having depth of occurrence of maximum 75% of the actual oneside allowance for machining.

Fins are allowed on inner diameter of the rings.

PROCEDURES ACCEPTANCE RULES AND TEST

- 3.1 Checking the production and quality as well as acceptance of the rings are carried out by QID of the supplying factory in compliance with requirements of the present technical specifications and with the specification-charts or drawings, agreed upon.
- Rings to be accepted are presented in batches
 The batch includes rings of the same melt of steel
 in one or several standard sizes.
- Job In order to check the surface hardness in delivery condition, three rings-upper, middle and lower along height of the charge (stack) from each charge (stack) are tested. Measurement of Grinell hardness is carried out in compliance with Jost 9012-59 at one point on the side surface of the ring by means of ball of diameter 10mm at a load of 300 Kgf. Hardness number (diameter of imprint) is marked near the place of measurement.

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- 3.4 In case the results of hardness measurement of only one ring from the stock come to be unsatisfactory, all the rings of that stock are subjected to check.
- 3.5 The factory supplying the rings is provided with the right of subjecting the batch rejected on the basis of level of surface hardness to duplicate heat treatments and submit it as a new one. However the number of repetitive heat treatments should not exceed two. Number of temperings is not restricted.
- 3.6 Depth of occurrence of defects is determined by run-in-cut test or by grinding at 1 to 3 places with emery.
- 3.7 For checking the quality of articles, one ring of maximum section is selected in the delivery condition (when submitting) having been rolled from head part of the ingot; There cut out are:
- a) Per two specimens for tensile test and for determining the impact strength.
- b) One transversal template for checking the macro structure and hardenability.
- c) One logizudinal templet to check for Tlakes,
- 3.8 Specimens for tensile test was test for impact strength are cut out from two diametrically opposite points of the test rings.

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- 3.9 In case, the melt is rolled in several steps (2-3 or more), checking for flakes is carried out independently after each rolling.
- 3.10 Cutting diagram and sizes of that specimens are set up by the supplying factory.
- 3.11 Tensile test is carried out according to Gost 1497-73 on 5 times longer in length circular specimens. Diameter of specimen is 10mm (Short).
- 3.12 Test for impact strength is carried out according to Gost 9454-78 on specimens of 1st Type.
- hardenability is determined by measuring the hardness at the surface and in the middle of section of the transveral template (before its etching).

 Brinell hardness is measured according to Gost

 9012-59 by means of 10mm ball at a load of 3000 Kgf.
- 3.14 Placrostructure and flakes are determined by deep etching in hot 50% solution of hydro-chloric acid.

Defects of micro-structure are assessed by means of a scale agreed between the supplier and the customer of rings.

3.15 If results of some type of tests (except flakes) are unsatisfactory, the double number of samples are subjected to the same kind of test only.

The supplying factory is provided with the right to subject the batch rejected on the basis

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of level of the mechanical properties to the duplicate heat treatment and submit it for acceptance as a new one. However, total number of duplicate heat treatments should not exceed two. Number of temperings is not restricted.

- 3.16 If the results of the duplicate tests be unsatisfactory even on one specimen, the heading blanks are rejected while the remaining ones are subjected to tests and retests in the same order.
- 3.17 If the unsatisfactory results are obtained due to defects of manufacturing the specimens, the sign "defect of specimen" is noted down in the test-log book and retest is carried out on a specimen taken from the same ring.
- 3.18 If flakes are detected on longitudinal or transversal templates, retest or duplicate heat treatment is not allowed and all the rings of the melt-batch rolled in one step and processed in one mode are rejected

MARKING, DOCUMENTATION AND SHIPMENT

4.1. Each ring is marked with melt number, grade of steel, ordinal number of the ring and the conventional number (with code).

Accepted rings should have the wir rism.

of one half of the double ring, a drilling is done

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on the defective half and the marking 'reject' is written with paint. Such rings are noted as 190%! in the certificate. The defective half is delivered at the price of scrap.

The rings to be shipped are accompanied

with certificate in which specified are: melt number, grade of steel, chemicalanalysis of melt, ordinal number of the rings, code, hardness on the surface and in the cross-section, mechanical properties and the macro-structure

> Drawn up basing on the condition on 01.09.83 It is correct:

> > **Q€**£F