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HOT ROLLED STEEL RINGS

SPECIFICATIONS

TY-14-1-1363 - 75

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These specifications pertain to hot rolled steel rings of square and shaped profiles for ~~your~~ purpose.

I. SIZING

1.1. Rings are manufactured by forging with subsequent rolling in tyre rolling mill as per the manufacturer's technology.

1.2. Dimensions of supplied rings are ensured by specialization of the tyre rolling mill. Specifications ~~and~~ are found in the following units (rough dimensions):

a) External dia From 440 to 1295 mm ;
b) Internal dia From 340 to 1100 mm;
c) Height From 70 to 200 mm;
d) Thickness From 50 to 120 mm ;
e) Weight From 55 to 360 Kgs.

Note:- Supply of rings, having thickness not less than 30 mm is allowed.

1.3. Permissible limit deviations from nominal rough dimensions of rings (mm):

a) External dia ± 10 ;
b) Internal dia ± 5 ;
c) Height upto 170 mm ± 5 ;
d) Height 170 mm and more + 5; - 10

e) Width and height of ridges ± 3 ;

f) Width and depth of grooves ± 3 ;

Note:- For rings, having internal dia, less than 355 mm rolled without subsequent sizing on tension press.

Following permissible limit deviations are established:

a) For external dia + 15 mm
- 5 mm

b) For internal + 5 mm
- 10 mm

1.4. Form, dimensions, grade of steel and shape of rings, in each case, are agreed by the manufacturer and the Consumer, as per specifications, approved by Chief Engineers of manufacturing plant and consumer.

2. Technical requirements.

2.1. Rings as delivered should correspond to the requirements of this document and agreed specifications.

2.2. Rings are manufactured from the following grades of Steels:

a) Structrual steel 10,15,20,25,30,35,40, 45,50, 55, 60 as per GOST 1050 - 74;

b) Alloyed and highly alloyed Steels: 40x, 38 XC, 20X2H4A, 30XH3A, 20XГCA , 25 XГCA, 30 XГCA , 20 XГHP as per GOST 4543 - 71, Ш X15CT, Ш X15 as per GOST 801 - 60;

20X3MBФ (ЭИ 415) as per GOST 20072 - 74;

c) Corrosion resistant and high temperature steels: 12X18H10T as per GOST 5632 -72

Chemical composition of steels should correspond to the requirements given in Specified Standards.

Note:-

Upon agreement between the Supplier and the Customer , rings may be manufactured from the steels having reduced limits of content of several elements, instead of those specified in GOSTS.

2.3. Rings are supplied without machining in heat treated state or without heat treatment.

Types and conditions of heat treatment are specified by the manufacturer. On demand of Customer the rings are subjected to heat treatment as per conditions of Customer agreed with the manufacturer.

2.4. In compliance with the requirements of Customer the rings are supplied being tested for mechanical properties (ultimate strength , yield limit, relative elongation, relative reduction, impact strength and hardness) or without testing.

2.5. When testing on tangential test pieces, the mechanical property should correspond to norms, specified in corresponding GOSTS and specifications for longitudinal test pieces, with the following reductions:

For ultimate strength	- by 5 %
For yield limit	- by 5 %
For relative elongation	- by 25 %
For relative reduction	- by 20 %
For impact strength	- by 25 %

For rings having profile thickness (determined as half the difference between external and internal diameter of ring) more than 80 mm , the mechanical properties may be reduced additionally. Value of reduction is agreed by the Manufacturer and the customer.

2.6. As delivered,rings should have hardness, specified in Specifications, agreed by the Supplier and the Customer.

2.7. Surface of rings should be free from cracks, scabs, laps, foreign inclusions and other defects . Individual minor nicks, dents, marks, traces from dressing/defects of and minor scabs are allowed, provided they are within the allowance for machining. Depth of surface defects is inspected by cutting out. Burrs are allowed for rings with internal diameters less than 400 mm , thickness less than 50 mm, height - less than 80 mm or more than 170 mm. For other batches of other dimensions, the burrs are allowed upon agreement with Consumer.

2.8. If defect, which cannot be rectified , is found on one faces of multiple ring, i.e. of the rings, intended for manufacturing or some finished components, those rings may be supplied to customer with corresponding correction by lowering the multiplicity and weight. Metal of rejected part of ring should be painted with paint or drilled and paid by the customer as per value of scrap.

2.9. Macrostructure of supplied rings should have no flakes as well as accumulated slag inclusions, cracks, spillings and other defects. Microstructure is checked

as per the procedure approved at the manufacturing plant. (Appendix No.1).

2.10 Check for macro structure may be replaced by the ultrasonic testing upon consultation with the customer.

2.11. Radii of ring corners rounding off, should be in compliance with dimensions, given in agreed specifications.

2.12 Ovality and curvature on the surface of rings should not exceed the permissible limit deviations for corresponding dimension. When checking the cocking of rings relative to plane, perpendicular/axis to the of rings the value of clearance between the surface of ring and the surface of cross shaped rule, should not exceed 5 mm.

3. TEST PROCEDURES

3.1. Check for quality and acceptance of rings are carried out by QID of manufacturing plant.

Dimensions and surface finish are checked on every ring.

3.2. Rings are presented for acceptance in batches, consisting of rings of the same melting and heat treated under the same conditions.

Number of rings in the presented batch is not limited. When manufacturing rings of blanks of small meltings of electrical steel (or open hearth steel) enough for manufacturing rings less than 50 pieces, then joining of rings of these meltings in one batch is allowed, provided this batch consists of rings of the same steel grade and heat treated under same conditions.

3.3. Area, having depth upto 3 mm , is prepared (dressed, milled or drilled) for hardness check as per GOST 9012 - 59 on the surface of the ring. Check for surface hardness is carried out on 5 % of rings taken from the batch, but not less than on 2 rings of each dimension. Test is carried out with 10 mm ball under load of 3000 Kgs.

3.4. If the results of hardness test are unsatisfactory, routine tests are carried out on two imprints made on the same ring, one of which is made near to that made before, and the second one is made at diametrically opposite place. In case of unsatisfactory results of routine tests, repeated tests are carried out on doubled the quantity of rings.

3.5. If the results of repeated tests for hardness are unsatisfactory, the batch of rings is subjected to repeated heat treatment and then presented to acceptance as new. In that case , 3 % of rings are subjected to hardness tests.

3.6. In case of unsatisfactory results of tests for ring surface hardness, whole batch may be checked for hardness item by item. After that only rings with unsatisfactory results are subjected to repeated heat treatment.

3.7. Maximum 3 repeated heat treatments may be carried out. Quantity of temperings is unlimited.

3.8. Macrostructure of rings is tested on cross templates , taken from one ring of each melting. If the results of tests for macrostructure are not satisfactory, repeated tests are carried out on doubled the quantity of templates, selected from one or two rings (depending on defects).

3.9. In case of the rings manufactured from small meltings, (not more than 50 pcs) macrostructure may be checked by ultrasonic testing as per procedure, agreed with the customer. Two rings from melting are subjected to testing.

3.10 One ring from the presented batch is subjected to check for mechanical properties (for tension and impact strength) . Breackage and impact test pieces are selected from the one third part of ring thickness taken from the medium with consideration of axis distance of test pieces from the surface of rolling ring 20 ± 5 mm unless otherwise no other requirements to test pieces selection are specified in the specifications. If the results of tests (for tensile and for impact strength) are not satisfactory, repeated tests are permissible on doubled quantity of test pieces.

3.11. Tensile tests are carried out as per GOST 1497-73 for tangential round test pieces, having dia of 10 mm and five fold design length;

3.12 Impact strength test is carried out as per GOST 9454 - 60.

3.13 When the rings are subjected to acceptance with preliminarily heat treatment and tests are carried out on heat treated test pieces, then quantity of heat treatments and repeated tests is unlimited.

3.14 Rings are supplied as per theoretically accepted weight, specified in specifications. Theoretically accepted weight is calculated taking the half of positive tolerances into account (for internal dia - negative tolerances) for ring profile.

4. MARKING AND DOCUMENTS

4.1. Trade mark of manufacturing plant, Grade of Steel (with conventional code), conventional code of dimension, melting No. Serial No. of ring are stamped on the face of every ring in hot state.

4.2. Height of digits of marking is established from 6 to 10 mm. Free area before the serial number of the manufacturing plant should be left on every ring for QID stamp. Depth of hot marking is upto 5 mm. Marking of rings in cold state is allowed, for correction of defected hot marking and reduction of marking after repair of ring.

4.3. Each batch of rings is accompanied by a certificate, in which name of Manufacturing Plant, grade of steel, melting No. Designations of rings as per specifications, Weight and quantity of rings as per item No., No. of these specification, order No. as well as chemical composition of steel, conditions of heat treatment of rings and test pieces, test results are specified.

4.4. When claiming for quality of rings, Nos. of claimed rings, Nos. of claimed rings and meltings must be specified.

APPENDIX - 1

PROCEDURE OF CHECKING MACROSTRUCTURE.

1. Full profile template having length of 180 ± 10 mm is cut from thering, selected by QID Inspector , and sent to Central Laboratory of factory for manufacturing macro sections and checking the macrostructure.

2. Macrostructure is checked on transverse macro section only or on longitudinal and transverse macro sections depending on the Consumer's request.

3. Transverse macro section should have thickness of 20 ± 5 mm and enclosed all the transverse section of ring. Section plane should be perpendicular to direction of rolling. Plane of longitudinal macro section should pass through the Centre of ring section. Length of longitudinal macro section is not less than 150 mm .

4. Macro sections should be cut so, that checked sections is situated at distance excluding the cutting effect. Uniform and smooth plane of section without surface cold workings and surface burns is ensured, by machining of the surface , being checked.

5. Deep etching of macro section should be carried out until revealing the structure in 30 to 40 % boiling solution of hydrochloric acid. Approximate duration of etching is from

20 to 45 min.

6. After etching, macro sections should be neutralized washed and dried. If checking of the macro structure or photography are carried out later than in 0.5 hours after etching is over, than surface of section should be coated with colourless lacquer.

7. If required, during strong etching of metal , the check may be repeated on those sections after removal of surface layer upto a depth not less than 3 mm.

8. Macrostructure is determined by comparing its natural view with standard * Tables of Standard macrostructures of bindings " Final dimensions and smooth profile of ring are taken into account in this case.Presence of flakes in any place of section of ring is considered as cause for rejection.

9. If the results of macrocontrol are not satisfactory, repeated test is carried out on two templates . In this case, if defects due to rolling are revealed, then two templates should be cut from other rings selected by QID Inspector for the repeated tests. If the defects caused by melting process, are found in the template, then two templates - each one from two other rings - are selected for repeated tests.

10. If the results of repeated macro control are not satisfactory even for one of macro sections, the given batch of rings is rejected or subjected to re-sorting with the help of the ultrasonic testing. After re-sorting, thebatch is tested on two macro templates, cut from two different rings .

11. Rings , having flakes, are rejected and not subjected to re-sorting.