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SUPERSEDES	

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TECHNICAL SPECIFICATIONS

FOR SOLID-RUBBER TYRE FIXED WITH ADHESIVE TO DISCS (RIM) WITHOUT SHOULDERS

INDEX: 84/0848711-03-HT-40147 kA

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	NAME	SIGN	DATE	

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The present technical specifications pertain to the solid rubber tyres adhesively fixed to metal on rims, discs without shoulders. Tyres made as per the present technical specifications, are designed for the purpose of road wheels idler wheels, track support rollers for the special purpose vehicles supplied within the country as well as for export including to the countries with trophical climates.

Solid rubber tyres are the continious rubber ring which is by vulcanized onto metallic rims (Rim type) or to discs (disc type).

1. TECHNICAL REQUIREMENTS

1.1 Solid rubber tyres should meet the requirements of the present technical specifications, made as per the production process and drawings approved in the specified order.

1.2 Changes in the drawings of tyre, rims, discs and production process are entered in the specified order.

1.3 Dimension and function of tyres (for road wheel, idler wheel and track support rollers), drawing number of tyre, rim, disc and conventional index of article, for which the tyres are designed, load on tyre, quantity of tyres on vehicle, vehicle velocity and other parameters are prescribed on appendix according to form I of this present technical specifications.

1.4 Characterstics (properties)

1.4.1 Physical and Mechanical properties of rubber tyce should be in compliance with norms, specified in table 1.

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Table 1.

Description indices	Norms
1. Nominal stress during 100% elongation in MPa (Kgf/Cm^2), Not less than	5.9(60)
2. Nominal strength during tension in MPa (Kgf/C[illegible]), not less than	9.8(100)
3. Relative [illegible]ngation during breaking in %, No[illegible]ss than	140
4. Relati[illegible]idual deformation after brea[illegible]%, Not less than	10
5. Ten[illegible]ngth in KN/m(Kgf/Cm), No[illegible]	24.5(25)
6. Ha[illegible]in the limits	74-84
7. Tem[illegible] of brittleness in ^{o}C, not [illegible]oo%	-60
8. Nominal [illegible]ength during tension, after heating, in MPa (Kgf/Cm^2), Not less than	100
9. Relative elongation during breaking after heating in % Not less than	105

1.4.2 Peeling strength of rubber from metal should be in compliance with norms, specified in table 2.

Table 2.

Rim and disk metal	Peeling strength in KN/m (Kgf/Cm) Not less than
1. Steel	3.9(4.0)
2. Light alloys	3.6(3.7)

Note: During the test for peeling and shearing, the fracture is allowed along the metal surface with alloy particle transfering in to peeling rubber for the tyre on disks, made out of alumimum alloy.

1.4.3 Dispersed poor fusions at metal Rubber boundry are allowed to total area of 4.0 Cm^2, in that case the maximum

area of one incomplete fusion should not exceed 1.0 Cm^2. If the area of each incomplete fusion is within the limits from 0.25 Cm^2 to 1.0 Cm^2, then the distance between them should not be less than 15 Cm. If the area of each incomplete fusion is within the limits from 0.1 to 0.25 Cm^2, then the distance between them should not be less than 5 Cm. The smaller incomplete fusions of non-group arrangement is allowed.

1.4.4. The indeces of apperance of tyre which do not effect on service properties are established according to installation directions instruction on external appearance grading (appendix.6).

1.4.5 Tyers in longitudinal and corss sections of rubber mass should be solid without cavities, cracks, bubbles and foreign matters visible with nacked eye.

1.5 Mettalic rims and disks supplied to the tyre manufacturing plant should conform to drawings agreed in the specified order.

1.6 Each batch of rims and disks delivered to manufacturing plant is accompanied by technical papers which includes;

- Name of the manufacturing plant of rims and disks.
- Drawing number
- Metal grade as per GOST or technical specification and also number of casting for disks from light-alloy.
- Quantity of rims and disks in batches.
- Stamp of technical inspection department
- Stamp of customer representative. (in case of acceptance by customer representative)
- Date of dispatch.

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1.7 Presence of corrasion, Passivating agents, Acid, Alkaline, Salts, Oil and etching slurry on the surface of rims, disks delivered to tyre manufacturing plant is not allowed. Easily removable layers of corrosion when preparing for rubberizing which occured during transportation is allowed on the metal surface upon the agreement with tyre manufacturing plant. Special anticorrosive coating (oxidation) is allowed on disks made out of alloys BM 65-I and MA12.

1.8 Rubberizing of the disks and rims is allowed, after removing the solid rubber from metal. After removing the rubber, disks, rims, according to geometric dimensions should ensure the production of tyres meeting the requirements of technical specifications.

Before repeating rubberizing, removing of the solid rubber from steel rims and disks is carried out by treating them upto the temparatures not more than 450°C, for aluminum disks and other light alloys - by machining.

Method of removing the solid rubber from disks and rims should agreed between the manufacturing plant of rims and manufacturing plant of tyres.

1.9 Markings.

1.9.1 Side surface of each tyre should have the following.

- Index of the manufacturing plant
- Tyres designation Plant
- Year and month of manufacture and number.
- Example: A75XI3003

Where 'A' - Index of Manufacturing plant
75 - Year of manufacture
XI - Month of manufacture
3003 - plant of the tyres

- Stamp of technical inspection department "Accept TID"
- Batch number

- Stamp of the manufacturing plant.

1.9.2 Tyres designation and inden of the manufacturing plant are madd by the impression of mould engraving year and month of manufacture and numbor are printed by mottalic tag; TID and customer representative stamp and batch number are firmly marked with water proof paint. Number marked uncorrectly is allowed to remove (roughing) and apply again by burning it to depth not more than 2 mm. Applying the number of the worker gang and shift with coloured vulcanize rubber on side surface of the solid rubber is allowed.

1.9.3 Mettalic rims and disks delivered to the tyre manufacturing plant, should have the stamp of the technical inspection department of rims and disks manufacturing plant and stamp of the customer representative (in case of Acceptance by customer representative).

1.10 Packing

1.10.1 Tye are not packed.

2. ACCEPTANCE RULES

2.1 Tyres are delivered in batches. Quantity of tyre in batches should not exceed 250 pcs. Marking of the complete sets of batches should not be carried out later than 3 months after manufacturing the tyres. Complete sets of batch should be made of tyres which conform to drawing and those which passed the inspection in compliance with norms as shown in table 3.

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Table.3.

Indices	Qty. of tyre checked from batches, in %
External appearence	100.0
External diameter	1.0
Internal diameter (for tyre rims)	100.0
Hardness on solid rubber surfaces	10.0
Edges for incomplete fusions	100.0

2.2 The completed batch is subjected to testing in compliance with items 1.4.1, 1.4.2, 1.4.3 and 1.4.5 - one tyre from the batch of 100 pcs. and two tyres from the batch more than 100 pcs. and as per indices 8 and 9, specified in item 1.4.1 - One tyre from the batch of one of the sizes once a month. Selection of tyre for testing is carried out by technical inspection department in agreement with customer representative. For these tests there may be selected the tyres which have been rejected due to defects on external appearence.

2.3 In case of obtaining satisfactory results of tests, the TID puts the batch number and stamp of "Acceptable, TID" on each tyre.

2.4 If unsatisfactory results of tests as per items 1.4.1, 1.4.2, 1.4.3 and 1.4.5 of this present technical specifications are obtained tests for these indices are repeated again by doubling the quantity of tyre from that same batches. If unsatisfactory results are obtained while retesting the batch is subjected to resorting. According to the reasons caused deviations from the technical specification requirements, the batch should be sorted as per shifts, groups or fusions. One tyre from tyres of each shift, group or fusions excluding the shift, group or fusion from which the test is

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carried out, is subjected to testing, test results are considered final.

2.5 Rejected tyres by the technical inspection department should be marked with "Rejected" stamp and separated from the accepted.

2.6 Tyre batch presented to technical inspection department is checked in compliance with technical specifications and submitted to the customer along with following technical papers.

- Information about the presented batches as per form No.2
- Test certificates as per form No.3
- Factory inventory number as per form No.5
- Acceptance reports given as per form No.4

2.7 Acceptance of tyre by the customer representative is carried out in presence of representative from technical inspection department of the tyre manufacturing plant. During acceptance for external inspection, checking for incomplete fusion at edges and hardness of the surface of solid rubber not less than 10% of tyre should be submitted from batches.

2.8 Stamp should be put on each tyre from the accepted batch by the customer representative. Tyres regected by the customer representative should be marked with clear n visible stamp, "Rejected" and plant number on them should be visible and they are separated from the other tyres.

2.9 When checked at random the tyres which do not meet the technical specifications are subjected to resorting by TID according to their deviations. After resorting the tyre batch, it is submitted to customer representative with mark on notification about the required second presentation. In Case the customer representative is repeated by rejected, the question about acceptance of these batches is decided in

collaboration with the representative of manufacturer and customer.

3. METHODS OF TESTS

3.1 All testings are to carried out not lessthen 12 hours after vulcanization.

3.2 External diameter of the tyres is measured at centre line of the tyre tread by a vernier caliper with an accuracy of 1 mm. Inner diameter of rim tyres to be devided into groups, are measured with indication at two opposite points at centre part of the rim. One of measurements is to be carried out under the Factory No. Demensions of the local deformations (bulges) along the internal diameter of rim should be determined with template in compliance with drawing.

3.3 Checking at the edge of the solid rubber rims and disks for incomplete fusions is carried out from both sides of tyres on squeezing machine in some points or around according to the machine design. Minimum number of points (Places) subjected to checking is specified in table. 4.

Table 4.

Diameter of tyres in mm	Number of checking points (Places)
upto 200	4
Above 200 upto 400 inclusively	6
Above 400 upto 600	8
Above 600 upto 800	12
Above 800	16

Permissable value of incomplete fusions on edges, is specified by appendix as per form No.1 for each type and dimension of tyre. Depth of the incomplete fusions on edges is measured from the edge of solid rubber. Rubber layer on the face of the rims and disk is to be cut. The applied force should be enough for separating solid rubber from the surface

of metal in case the joint (fusion) is absent. Necessary force for each dimension of tyre is tobe set experimentally by the tyre manufacturing plant and together with customer representative. The applied force should not cause the damage of solid rubber and its fixing to metal when joint (fusion) is present.

3.4 Precence of inner defects of rubber is determined when preparing (shear solid rubber) tyres to physical and mechanical testing.

3.5 Analysis of Physical-Mechanical properties are to be carried out elongation of 100%, nominal strength during tension, relative elongation during break and relative residual deparmation after break according to GOST 270-75;

- Tensile strength - according to GOST 262-79;
- Hardness - according to GOST 263-75 tested at 5 or 6 points. Take the arithmatic mean from the test results measurements from all dimensions;
- Temparature of brittleness - as per GOST 7912-74,
- Nominal strength during tension after heating and relative elongation during break after heating by 100°C to a period of 24 hours - as per GOST 9.024-74.

3.6 Peeling resistance of rubber from metal tested by peeling of rubber strips from disks (rim) and the measurement of force obtained.

3.6.1 Solid rubber is sheared on arc equal to 1/5 length, leaving uniform layer of rubbers to thickness 8 to 10 mm, from tyres selected for testing. Two longitudinal cuts are made upto metal to a distance of 25±1 mm one from other along middle part of rubber layer left on disk (rim). Rubber strips formed outside the longitudinal cuts are designed for peeling andshearing. The remaining rubber strips is under-

cut on boundry or rubber-Metal to a section of lenth, 80-100 mm. Tyre is mounted and fixed on free rotated chuck, the undercut portion of is fixed in the clamp of breaking machine. Graph paper is fixed on drum of recorded device.

3.6.2 The drive of the breaking machine is switched on and rubber strip is peeled to a section of length 50-80mm with speed of 100± 20 mm/min.

Note: In case of the peeling of rubber strip there may be failure of adhesion (along the edge of rubber-metal) and as well as cohesion (failure along rubber). While conducting the test the "Load Time" curve is fixed by recording device of shearing machine. In case of cohesion failure of rubber strip the testing is repeated by trimming to same strip on edge of rubber-metal.

3.6.3 Index of peeling resistance of rubber from Metal is calculated by means dividing the average points of force into the width of strip peeled. In case of adhesion failure the mean force is determined by conducting planimetry of the corresponding area under curve of "Load-Time" and dividing it into the length of corresponding base. Measuring accuracy of area is - ± 1.5% and measuring accuracy of base length is - ± 0.5 mm.

Note: In this case the obtained value of mean force refered to the width unit of peeling rubber strip of tyres, characterized the peeling resistance of rubber from metal. While determining the area, in case of adhesion failure, there should be excluded the initial section on curves "loading-Time" which characterize the rise in loading time and canning deformation of rubber strip without breaks at

joint edges or solid rubber and the end section, which may cause further deformation of rubber strip and subsequent breaks of rubbers.

In case of cohesion failure, the maximum force irrespective of curve forms is registered on curve 'Load-Time'. The final result is taken the mean value from the two maximum forces, obtained at cohesion failure occured during first and repeated tests which are refered to width unit of peeling rubber strip of tyres.

In this case it should be taken into account that peeling resistance of rubber from metal is more than the value determined in accordance with this item.

Mean force, refered to width of tyre specimen should not be less than specified peeling resistance of rubber from metal shown in table 2.

3.6.4 In test certificate of solid tyres in item "Peeling resistance in KN/m (Kfg/Cm)" enter the appropriate record is entered. In case of adhesion failure mode note as "F/B" (Failure along the edge of rubber-metal) in certificate. In case of cohesion failure make note as "F/R" (Failure along rubber) in certificate.

3.7 Checking for the presence of incomplete fusions of rubber to metal is carried out by inspecting after cutting the solid rubber along the edge of rubber-metal by 4/5 of rim surface (disk).

4. TRANSPORTING & STORING

4.1 The tyres are transported at ambient temporature from $-55^{\circ}C$ to $+55^{\circ}C$ by any type of transport.

4.2 Every batch of tyre dispatched to the customer should be accompanied with technical papers in compliance

with item 2.6 of this technical specifications, except for notification about the submittance of tyre batch.

4.3 Storing conditions of tyres in warehouse is to be at dry place with temparature from -30 to +30°C at a distance not less than 1.5 m. from heating devices in piles to a height not more than 1.5 m. Tyres should be protected from direct entry of sun-light.

4.4 During transportation and storing the tyres should not be effected by oil, benzine, acid, alkaline, coatings and other failures of rubber material.

4.5 Tyre surface of rims and disks intended for storing in warehouse are to be coated with Paraffin-Rubrax lubricant with composition of;

Parafin	-	2 parts by weight
Rubax	-	2 parts by weight
Benzine	-	5 parts by wieght

5. OPERATING INSTRUCTIONS

5.1 Tyres should be operated at ambient temparature from +55 to -55°C at conditions specified in present technical specifications and used as per form I.

5.2 Tyres should not be damaged during assembling and mounting on track wheel sproket wheel and supporting wheel units.

5.3 Tyre installing place and Tyre numbers to article are entered in certificate, the rearrangement and replacement of tyres during operations are indicated in certificate.

5.4 If ~~any~~ one of the tyres is failed during operations it is necessary to change with new one.

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6. SUPPLIER'S GUARANTEE

6.1 Solid tyres should be accepted by the technical inspection department of manufacturing plant.

6.2 Tyre manufacturing plant guarantees that tyres meet the requirements of present technical specifications when handing over to customer.

6.3 Tyre manufacturing plant guarantees for the serviceability of tyre with the limits, specified in appendix as per form-I to this present technical specifications, provided that the requirements of technical specifications and appendixes to them are observed.

6.4 Manufacturing plant guarantees run of a tyre with the limits of operating period and storage given in appendix to this present technical specifications, when maintaining using, operating conditions, transporting and storing specified in this technical specifications and appendix to them are observed.

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Appendix 1 to technical specifications

Form No.1

Secrecy is defined while filling

Approved	Approved.	Approved.
Commander of troops units (defined while filling)	Chief of industry's department	Chief of industrial corporation

Application

This technical specifications _____

on solid tyres of dimension _____

1. Tyre load index of vehicles _____

2. Maximum speed of the vehicle, Km/Hr

3. Operating characterstic of tyre:

Tyre dimension	Purpose	Quantity of tyre on Vehicle	Maximum Statical load in Kgf	Drawing number: Tyres	Disk(rim

4. Guaranteed kilometers travelled _____

5. Guarantee period for operations and storage _____ years

6. Additional requirements and conditions _____

_____

_____

Integral parts of this appendix is drawing No: _____

to _____ sheets (Not secret)

Approval:

Assistant director of the institute

Chief engineer of the manufacturing Plant.

Chief engineer of the manufacturing Plant.

Customer representative of the manufacturing plant

Customer representative of the plant consumer

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Appendix 2 to technical specifications

Form No.2

Description of the manufacturing Plant.

Notification No: _____

about tyre batches presented.

Presented for acceptance to customer representative of solid tyre batch No: _____ in Qty of _____ pcs. dispatched in _____ month _____ year of dimension _____ made in full should agree with technological regulations No: _____ and Technical specifications.

Enclosures to batches:

1. Reports giving about acceptance
2. Test certificato
3. Record of serial number of tyres

Production manager (chief engineer)
TID inspection.

"_____" _____ 19__ year _____ Hrs. _____ min.

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Appendix 3 to
Technical specifications

Form No.3

Description of Manufacturing Plant.

C E R T I F I C A T E
Test for Solid Tyre

Test for solid tyres from batches No:_____

Plant No:_____ manufactured in the year of _____

1. Overall dimensions
   a) External diameter _____
   b) Tyre tread _____

2. Physical - Mechanical properties of tyres:
   a) Nominal stress during 100% eloggations, in mega.Pa (Kgf/Cm^2) _____
   b) Nominal strength during tension in mega, Pa, (Kgf/Cm^2) _____
   b) Relation elongation during shear in %_____
   c) Relative residual deformationafter shear in %_____
   d) Tensile strength in KN/m(Kgf/Cm) _____
   e) Hardness _____
   f) Temparature of brittleness in ^{o}C _____
   g) Nominal strength during tension after heating in mega·Pa. (Kgf/Cm^2) _____
   h) Relative elongation during shear after heating in %_____

3. Peeling resistance in KN/m (Kgf/Cm) _____

4. Characterstic of solid rubber and the quality of fixing should be as per item 1.0.3, 1.4.4 and 1.4.5 of technical specifications _____

Inspector of the factory main laboratory,

Inspector of the Physical - Mechanical Testing Section.

Conclusion by TID

TID inspector.

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Appendix 4 to the Technical specifications

Form No.4.

Description of the Manufacturing Plant.

ACCEPTANCE CERTIFICATE
of Solid tyres batches.

This certificate certifies that batch No._____ of solid tyre having dimension _____manufactured in full compliance with Technical Specifications _____ drawing No_____ and with technological regulation no:_____

Quantity	Manufacturing data	Test data	Remarks

Production Manager (chief engineer)

TID inspector

Conclusion by customer representative

Solid tyre batch No:_____checked by means of sampling recognized in compliance with technical specifications and it is considered to have been accepted in quanity of _____ _____Pcs.

Customer representative.

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Appendix 5 to the Technical specifications

Form No. 5

Description of the Manufacturing Plant

LIST

Serial number of solid tyre of batch No: __________

Item No.	Serial No.	Item No.	Serial No.	Item No.	Serial No.
1.	....	101	....	201	....
2.	....	102	....	202	....
3.	....	103	....	203	....

Total: Pcs.

Foreman TID

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Appendix 6

SOLID TYRES
Fixing by pasting on disks (Rims) without shoulders.

INSTRUCTIONS
Instructions on sorting by visual inspection.

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Vulcanized tyres are subjected to inspection after cutting, pressing off and dressing ot butt ends of disks (Rims) from rubber burrs.

Tyre is subjected to 100% inspection.

Simultaneously not more than 5 different defects are allowed on one tyre.

Quantity of outer defects and their dressing depths are determined visually and if required - by measuring the size of defects.

On tyres, having passed visual inspection and confirming with technical requirements of tehhnical specifications, Put "Accepted by TID" stamp.

The tyres which do not meet the specified requirements should be marked with clearly visible stamp "Rejected".

1. During inspection of tyre the following should be guided:

	Description of tyre defects	Value of defects, admissible on solid tyre without dressing - not more than
1.1	Cracks on solid rubber surfaces.	depth 1 mm length for tyre of diameter upto 500 mm ____ it is 15 mm above 500 mm ____ is 25 mm
1.2	Cavities, Wrinkles, traces of blisters and removal of foreign inclusions rubber spanginess mechanical damages and other defects on solid surfaces	depth 3 mm Area of each defects for tyre diameter upto 500 mm ..... 50_{mm^2} above 500mm ..... $100mm^2$
1.3	Impression of end rubber bands	depth 1 mm length 100mm

2. The following are permitted on solid tyres:

2.1 Step due to shift of the half forms the value of which should not be more than 2 mm.

2.2 Trimmed surface defects on solid rubber to a depth not more than 3 mm. Trimmed area is not specified.

2.3. Ellipticity along internal diameter of rims of tyres of non rim type (in compliance with drawing)

2.4 Dents on disk faces on both sides of tyres to a length

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not more than 50mm, depth not more than 2 mm to a distance from edge of dents to weld seam not more than 25 mm, to a quantity on one disk not more than at 3 places.

3. The following are not allowed on solid tyres.

3.1 Separation of solid rubber into layers.

3.2 Inclusion of foreign matters in solid rubber.

3.3 Undermoulding of solid rubber.

3.4 Uncut rubber pressing out.

3.5 Deformations and demages on disks(Rims) which prevent from mounting of tyres.

4. When the tyres defects are detected and they are not specified in this present instruction, their acceptance should be solved in agreement with tyre manufacturing plant, user plant of tyre and the customer representative on these plants.