Technical Specification №97- 51 -2015 for supply of machined wheels for Delhi Metro Rail Corporation

Revision 2

Description	Machined wheels **Ø 860 мм**
Specification	**EN 13262 actual revision, category 2**
Drawing	№ TRP09106AB/RS3 considering the following: *1. Weight of 1 wheel is 316 kg;* *2. Diameter rough boring in hub bore - 201-2 mm, roughness Ra 12,5;;* *3. Distance from the end of the hub bore to the exit oil hole – 100,5 ±2 mm;* *4. Thickness of disk 30±0,2 mm.* ~~ø30.0~~ *5.Profile EN13715-S1002/h28/~~ø32,5~~/ 6,7, if other is not specified in the order*
Wheel Plugs	Not performed if other is not specified in the order
Steel Grade	**ER8**
Steel making process	electrosteel-melting by vacuum degassing and continuous casting of steel
Hydrogen contents	not more than **2 ppm**

Chemical composition of steel in finished product, %

C	Si	Mn	P	S	Cr	Cu	Ni	Mo	V	Cr+Ni+Mo
					max					
0,56	0,40	0,80	0,020	0,015	0,30			0,080	0,06	0,50

Mechanical properties	*As per Specification*			
Rim			**Web**	
Re ~~N~~ **H/мм²**	**Rm** ~~N~~ **H/мм²**	**A, %**	**Rm decrease 1), H/мм²**	**A,%**
		Not less than		
540	860-980	13	120	16

1) Decrease in web tensile strength as compared with actual rim tensile strength values in the same wheel.

KU (J) at +20°C		**KV(J) at -20°C**	
Average value not less than	**Minimum value**	**Average value not less than**	**Average value not less than**
17	12	10	5

Hardness test	**100 %** wheels as per Clause **F.4.2. EN 13262**
Hardness distribution over surface	**30 HB** in a batch
Hardness over rim profile	P. «B»: not less than 245 HB at 35 mm depth from wheel nominal diameter of Ø860 mm. Heat hardening should not have any significant effect on hardness in point «A». Hardness in point «A» has to be lower by not less than 10 HB as compared with actual hardness values in point «B».
Residual stress	According to Clause **F.4.3. of EN 13262** decrease in distance between the marks has to be not less than 1 mm.
Ultrasonic test	100 % of wheel rims in axial and radial directions, defect of 3 mm according to Clause. **3.4.2. EN 13262.**
Macrostructure	Deep etching method: flakes, laminations, turned-in and buried skins, nonmetallic inclusions, sink hole residues and other discontinuities of steel are not permitted.
Macrography	According to Clause **7.7.3.5 UIC 812 – 3**
Microstructure	According to **ISO 643**. Grain size has shall be not bigger than 6.
Nonmetallic inclusions	As per p. **3.4.1. EN 13262**. Nonmetallic inclusion grain size shall be as provided by ISO 4967, Method A

Inclusion types	**Thick/thin (max)**	**Inclusion types**	**Thick/thin (max)**
A *(sulfides)*	1,5/2	**D** *(globular oxides)*	1,5/2
B *(aluminates)*	1,5/2	**B+C+D**	3/4
C *(silicates)*	1,5/2		

Reheat treatment	Not more than one additional heat treatment and two additional tempering operations.
Residual unbalance	Not more than **125 gm**
Quality of surface	Defects on wheel's machined elements are not allowed
Appearance and dimensions	**100%** of wheels shall undergo dimensional check in accordance with drawing **№ TRP09106AB/RS3** taking into account the deviations

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Switzerland

21/2/15

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Marking on the face of the hub[1]	Not performed
Marking on the face of the rim	Marking is applied to the outer face surface of the rim by cold stamping at distance 2^{+2} mm from inner diameter of the rim to ground marking signs at height 6^{+2} mm and 0,2-0,4 mm in depth. Marking shall be clear and positioned from wheel center. Sharp-edged die-stamps are prohibited. Minimum distance between characters – 3mm, between groups of characters – 20mm.
Marking order on the face of the rim[2]	1. Serial number of the wheel: cast No (6 symbols) and No of wheel in the cast (3 symbols). 2. Manufacturer's abbreviated name: KLW 3. Two last numbers of the year of production. 4. Contract No (last 6 numbers) 5. Client abbreviation: DMRC 6. Drawing No: TRP09106 7. Heat treatment R 8. Space for inspector's stamp 9. UT testing: UT
Additional Marking	Residual imbalance E3 shall be marked on the hub on the outer side of the wheel opposite to the place of imbalance. Other requirements for symbol E3 are same as for primary marking.
Coating and packing	The wheels are supplied with the temporary preservation coating E-Tek 510. The coating is applied to all the wheel all over but hub bore and holes in the web. The coating of the wheels from the corrosion is ensured for the time of the transportation.
Warranty	Manufacturer shall guarantee compliance of the wheels with requirements of this technical specification provided that operating, storage, transportation and assembly conditions are observed. Quality warrant period is **60 months** of the date of commissioning of transport vehicles wherein the goods are used, but not more than **72 months** of the date of delivery.

21/2/15

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शास्त्री पार्क ट्रेन डिपो/Shastri Park Train Depot
दिल्ली-110053/ Delhi-110053

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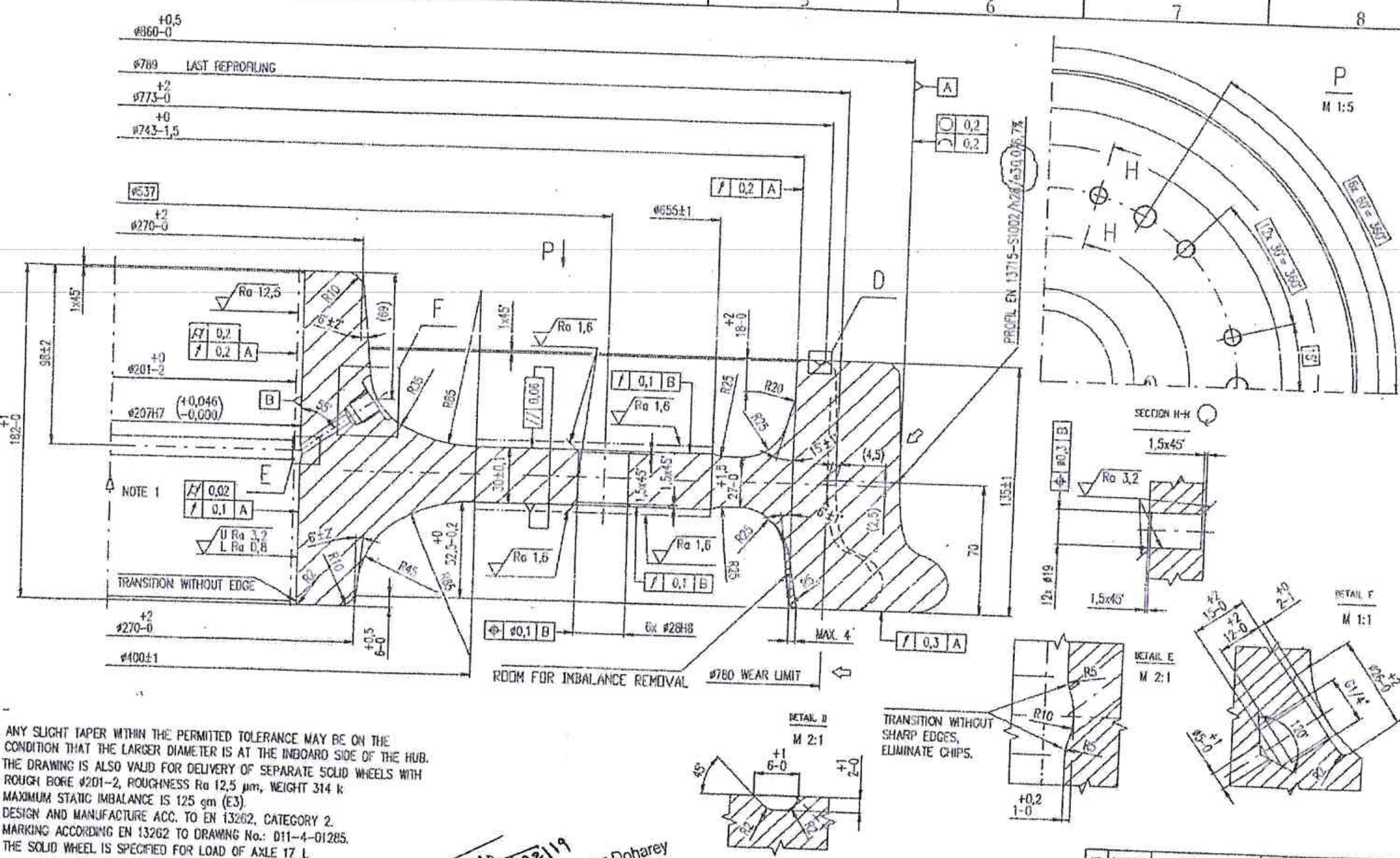
[1] Considering that the wheels are supplied with rough hub bore Ø201-2 мм, place of the marking is determined from outer diameter of the hub (instead of 6±1 mm from inner diameter, as shown on the drawing TRP09106AB/RS3).

[2] As there is not enough space for marking between groove of the last turning and inner diameter, it is suggested to perform marking on the inner side of the wheel.



NOTE –

1. ANY SLIGHT TAPER WITHIN THE PERMITTED TOLERANCE MAY BE ON THE CONDITION THAT THE LARGER DIAMETER IS AT THE INBOARD SIDE OF THE HUB.
2. THE DRAWING IS ALSO VALID FOR DELIVERY OF SEPARATE SOLID WHEELS WITH ROUGH BORE ø201-2, ROUGHNESS Ra 12,5 μm, WEIGHT 314 k
3. MAXIMUM STATIC IMBALANCE IS 125 gm (E3).
4. DESIGN AND MANUFACTURE ACC. TO EN 13262, CATEGORY 2.
5. MARKING ACCORDING EN 13262 TO DRAWING No.: D11-4-01285.
6. THE SOLID WHEEL IS SPECIFIED FOR LOAD OF AXLE 17 L.

21/2/19

21/02/19
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REV.	DATE	DETAILS OF REVISION	EC NO	HGH	CHK	APP
2	05.01.2016	Flange thickness has been changed from 32.5 to 30 in view of CEE/RS-II note no - DMRC/TS/14/RS3/Wheel Ueur/002 /03 dt. 31.07.2014.				
1		Drawing has been changed in reference to Advisor Mechanical DMRC letter dated 04.05.2010.				

NO.	PART NO.	DESCRIPTION		MATERIAL	QTY.	V.T	REMARKS
TOLERANCES ON SURFACE NO ISO	TOLERANCES OTHER THAN SPECIFIED ISO 2768	TITLE	WHEEL, FORGED STEEL				
DRW	SJ Prakash	05.01.2016					
CHK	S Kumar	05.01.2016	DRG. NO.	NS	TRP09106AB/RS3	VER. / REV. 2	
APP							
SIZE A1	MAT'L	EN 13262 CATEGORY 2	SCALE		SHEET 1 OF 1		
		DEN DRAWING NO.	DELHI METRO RAIL CORPORATION				