

**GOVERNMENT OF INDIA  
(Ministry of Railways)**

**Revised SPECIFICATION FOR  
GRAPHITE MOULD BLANKS**

**TYPE A: 1097 Dia x 575 Height  
TYPE B: 1224 Dia x 575 Height  
TYPE C: 1325 Dia x 575 Height  
TYPE D: 1021 Dia x 575 Height**

**Issued by**

**MECHANICAL DRAWING OFFICE  
RAIL WHEEL FACTORY  
YELAHANKA, BANGALORE-560 064  
INDIA**

PCME	CWE/W	AED M&C	Dy. CME/Mfg.	SME/D	SSE/D
APPROVED	REVIEWED	VERIFIED		PREPARED	

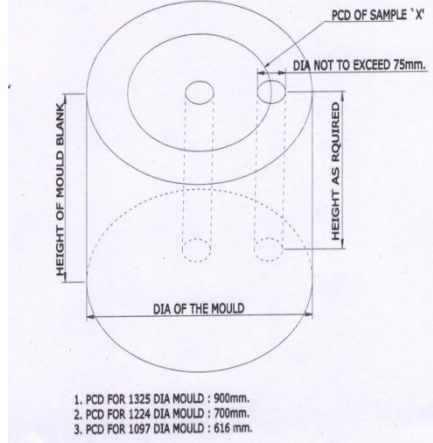
## AMENDMENT SHEET

Alt 'o'		Alt 'p'		Job No.	Sign.												
Clause No.	Description	Clause No.	Description														
3.2	The manufacturer shall take extreme care to meet the product requirement and job requirement and have optimum erosion and oxidation resistance so that the consumption rate shall be the minimum. The blanks shall be adequately pitch impregnated to achieve the bulk density specified. The particle size and their size distribution in the raw material shall be selected in such a manner to obtain the optimum performance. The manufacturer shall submit their QAP along with their bid for approval by RWF, which will be followed in the manufacturing of Graphite Mould Blanks to satisfy the technical requirement as required under this specification. Manufacturer shall get their QAP approved from RWF in advance, i.e., before starting manufacturing of graphite mould blanks, unless a waiver is given to this effect.	3.2	The supplier shall take extreme care to meet the product requirement and job requirement and have optimum erosion and oxidation resistance so that the consumption rate shall be minimum. <b>The supplier shall have all the required facilities like vibration-moulding/extrusion, baking, pitch impregnation, graphitisation, machining etc. to manufacture the product. The supplier shall adopt the required methodology of manufacturing to achieve the properties specified in the specification. The particle size and their size distribution in the raw material shall be ensured by the manufacturer in such a manner so as to obtain the desired performance and the technical requirements as per the specification. The Manufacturer shall have an established QAP to meet technical requirements and the desired performance, as specified in this specification. Manufacturer shall submit the process details and QAP along with their offer for RWF's verification.</b>														
4.1.1	Surface finish of the Graphite Mould Blank:N8 all over.	4.1.1	Surface finish of the Graphite Mould Blank should be smoother than N12 (<N12) all over														
4.3.1	Bulk Density: 1.60 – 1.70 gm/cm <sup>3</sup>	4.3.1	Bulk Density: 1.60 – 1.80 gm/cm <sup>3</sup>														
4.3.3	Permeability (parallel to axis): 0.16 – 0.80 AFS units	4.3.3	Permeability (parallel to axis): Desired 0.16 – 0.80 max. permitted up to 0.9														
4.3.4	Flexural strength (parallel to axis) (min): Not less than 100 kg/cm <sup>2</sup> -4 pointloading Or Equivalent in 3 point loading	4.3.4	Flexural strength (parallel to axis) (min): Not less than 100 kg/cm <sup>2</sup> -4 pointloading Or not less than 150 kg/cm <sup>2</sup> in 3 point loading														
4.5	The permeability range in a lot shall be uniformly distributed. The manufacturer shall aim to achieve the permeability range distribution of the lot in such a way that the following shall be met. <table border="1" data-bbox="292 1133 687 1234"> <thead> <tr> <th>Permeability Range</th> <th>Percentage of mould in a lot</th> </tr> </thead> <tbody> <tr> <td>0.16 – 0.40 AFS</td> <td>80%</td> </tr> <tr> <td>0.41 – 0.80 AFS</td> <td>20%</td> </tr> </tbody> </table>	Permeability Range	Percentage of mould in a lot	0.16 – 0.40 AFS	80%	0.41 – 0.80 AFS	20%	4.5	The permeability range in a lot shall be uniformly distributed. The manufacturer shall aim to achieve the permeability range distribution of the lot in such a way that the following shall be met. <table border="1" data-bbox="815 1088 1211 1189"> <thead> <tr> <th>Permeability Range</th> <th>Percentage of mould in a lot</th> </tr> </thead> <tbody> <tr> <td>0.16 – 0.40 AFS</td> <td>80%</td> </tr> <tr> <td>0.41 – 0.90 AFS</td> <td>20%</td> </tr> </tbody> </table>	Permeability Range	Percentage of mould in a lot	0.16 – 0.40 AFS	80%	0.41 – 0.90 AFS	20%		
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6.0	For the under mentioned conditions, the shop operating parameters & practices are considered common for all manufacturer/suppliers: i) If after removing the mould coating and oxidised surface, an area with unsatisfactory structure becomes visible and requires machining, the contractor shall offer incremental credit whenever void/flaws greater than 6 mm in depth are noticed. ii) RWF will proceed with machining of all such moulds until the void/flaw disappears. The extra machining (in excess of 6 mm) necessitated by the said void/flaw in the structure will have to be compensated by the contractor (without insisting on joint inspection). The rate of such compensation should also be stated at the time of making the offer.	6.0	For the under mentioned conditions, the shop operating parameters & practices are considered common for all manufacturer/suppliers: Same RWF will proceed with machining of all such moulds until the void/flaw disappears. The extra machining (in excess of 6 mm) necessitated by the said void/flaw in the structure will have to be compensated by the contractor (without insisting on joint inspection). <b>The rate of such compensation will be charged on proportionate basis based upon the material which require to be removed vis-a- vis total available useable material in a new mould (considering that condemning height of Cope is 230 mm and that of drag is 160 mm).</b> Same														

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	<p>iii) However, if the void/ flaw does not get eliminated even after machining to a depth of 36 mm, the mould will be kept aside and offered for joint inspection with the supplier and further disposal will be decided during such joint inspection.</p> <p>iv) The contractor shall, if required, replace the Stores or such portion thereof as is rejected by the purchaser free of cost at the ultimate destination, or at the option of the purchaser and the contractor shall pay the purchaser value thereof at the contract price, and to such other expenditure and damages as may arise by reason of the breach of conditions herein specific.</p> <p>v) If the contractor so desires, the replaced parts can be taken by him or his representatives in India for disposal as he deems fit within a period of 3 months, from the date of replacement of the Stores. At the expiry of this period, no claim whatsoever shall lie on the purchaser.</p> <p>vi) If any defective Stores is not replaced within the above mentioned 3 months, the purchaser may proceed to do the replacement at contractor's risk and cost and also without prejudice to any other rights of the purchaser under this contract.</p> <p>vii) If a cope produces more than 5 wheel rejections attributable to mould quality, duly discounting for process variation, the mould will be rejected and warranty claim will be raised.</p> <p>Note: The Wheel defects (XC set) likely to be caused due to poor graphite mould quality is based on RWF's 35 years of experience with different make/type of moulds and process variation. List of defects in XC set: XC46-Pocker, XC56-Hollowface Hub, XC626-Graphite Inclusion, XC15-Pinhole, XC33-hole in bore.</p> <p>Process related defects to be discounted are defined as Defects arising just after machining i.e., at Cope Life 1, will be taken on process account.</p> <p>In case more than 2 of above defects are arising in a particular heat these defects also will be taken as on process account</p>		<p>Same</p> <p>Same</p> <p>If any defective Stores is not replaced within the above mentioned 3 months, the purchaser may proceed to recover the cost of the material not replaced by the contractor from their pending bills without prejudice to any other rights of the purchaser under this contract.</p> <p>(a) If a cope produces more than 5 defects (XC 46 and XC 56) duly discounting for process variation, penalty will be charged as follows: Penalty = (No. of defects – 5) x (5% cost of GMB) Defects occurring after casting 435 wheels (in case of BOXN or similar such wheels) and 323 wheels (in case of ICF Coach/BLC/EMU wheels or similar such wheels) will not be taken into account. The figures of 435 and 323 are based upon RWF's experience of getting average number of wheels per cope.</p> <p>(b) If the defects (XC 46 and XC 56) becomes more than 7, the Mould will be set aside, and penalty will be charged. However defects after casting 'Y' wheels, [where Y is equal to 435 wheels (in case of BOXN wheels/similar products) and 323 wheels (in case of ICF Coach/BLC/EMU wheels/similar product)] will not be taken into account for this purpose. Penalty will be calculated by one of the following two method, whichever is higher: (i) Penalty = Cost of GMB [ 1- (No. of wheels cast/Y) ] (ii) Penalty = (No. of defects – 5) x (5% cost of GMB)</p> <p><b>Note:</b> i If the average defect (XC 46 &amp; 56) per cope in the period of use comes out to be 4 or more than 4, then no penalty as mentioned in para 1 and 2 will be charged. If during the observation period, GMBs of other regular suppliers are in very insignificant number (less than 40 percentage of the population of the copes in service), comparison will be done based upon average corresponding figures of other suppliers in the preceding period, duly accounting for any major process variation, if any.</p> <p>ii Further to above, the following process related defects will also be discounted: Defects arising just after machining i.e., at Cope Life 1, and on the first three shifts just after a non working day will be taken on process account.</p>		
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			In case more than 2 of above defects are arising in a particular heat these defects also will be taken as on process account.		
7.0	The performance of the firm will be adjudged based on % Warranty replacements with respect to the supplied quantity against the particular purchase order.	7.0	The performance of the GMBs of a particular make and type will be adjudged based on the following The cope life per thousand wheels worked out over a minimum no. of 20 copes of a particular make # (b) Average percentage wheel rejection on account of XC 46 and XC 56 per cope (Average number of wheels rejected per 100 wheels cast from 1 cope) # (c) Response of the firm with regard to warranty replacements against warranty claims of previous purchase orders may also be considered as a performance parameter # Note1: Performance, as mentioned at 7(a) and 7(b) above, will be judged by comparison with average corresponding figures of GMBs of other regular suppliers for the same use during the observation period. If during the observation period, GMBs of that firm only are in service, or GMBs of other regular suppliers are in very insignificant number (less than 40 percentage of the population of the copes in service), comparison will be done based upon average corresponding figures of other suppliers in the preceding period, duly taking into account any major process change etc, which may have a bearing on the performance parameters stated above. *Note 2: For the purpose of 7(a) above, GMBs taken off line, because of quality issues or for some process related issues, will not be considered. Also loss of life span of mould due to any major machining done on account of any process issue, will be discounted for, while working out cope life per thousand for comparison.		
8.1	The manufacturer will submit their Internal Test Certificate along with the supply as specified in clause 3.3. Acceptance will be based on manufacturer's internal test certificate indicating compliance to technical parameters and other features detailed under main clauses 4.0 and 5.0 respectively.	8.1	The manufacturer will submit their Internal Test Certificate along with the supply as specified in clause 3.3. Acceptance will be done after scrutiny of manufacturer's internal test certificate regarding compliance to technical parameters and other features detailed under main clauses 4.0 and 5.0 respectively.		
8.2	If laid down in the purchase order, RWF or its authorised representative may carry out inspection at the manufacturer's premises. The manufacturer shall offer the Graphite Mould Blank after the internal inspection and compliance of specified requirements along with Manufacturer's Test Certificate. The RWF's authorised representative shall have access to verify the manufacturing process, records, and witness the testing of the offered Graphite Mould Blanks either at their own laboratory or at the authorised outside laboratory. It is the responsibility of the manufacturer to offer him free access to carry out the inspection.	8.2	As per the provision in Purchase Order, RWF or its authorised representative shall carry out inspection at the manufacturer's premises. The manufacturer shall offer the Graphite Mould Blank after the internal inspection and compliance of specified requirements along with Manufacturer's Test Certificate. The RWF's authorised representative shall have access to verify the manufacturing process, records, and witness the testing of the offered Graphite Mould Blanks either at their own laboratory or at the authorised outside laboratory. It is the responsibility of the manufacturer to offer him free access to carry out the inspection. RWF or its authorised representative shall verify the manufacturing process from the Manufacturers Test Certificate covering clause 4.0, including the sub-clauses and clause 5.0 for all the mould blanks offered in the inspection lot. If required examination of internal documents as per QAP may be done. A lot, for the purpose of inspection, will consist of same type of mould blanks as defined in clause 4.1.		
8.3	This Sub clause not there in Alt-'O'	8.3	(a) RWF or its authorised representative shall follow IS:2500-2000 Part-1, AQL 2.5, GIL-II sampling procedure for visual and dimensional check-up for each lot offered for inspection, for inspection of the parameters as given in clauses 4.1 and 4.3.5.		
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			<p>(b) One number of Mould Blank shall be selected randomly from each of the offered lot for confirmatory testing to check for the parameters specified in the clauses 4.3, 4.4 and 4.5. Sample shall be taken from one location at P.C.D. as mentioned in sketch 'B'. This will allow the sampled mould to be used at RWF</p> <p>c) The tested mould should be dispatched to the consignee.</p>  <p>1. PCD FOR 1325 DIA MOULD : 900mm. 2. PCD FOR 1224 DIA MOULD : 700mm. 3. PCD FOR 1097 DIA MOULD : 616 mm.</p> <p>SKETCH SHOWING THE SAMPLING LOCATION FOR MOULD, SELECTED FOR CONFIRMATORY TESTING SKETCH-B</p> <p>Note: While taking confirmatory sample as above, it should be ensured that the axis of sample shall be parallel to the vertical axis of the mould. In case of any rejection during confirmatory testing, a replacement of mould shall be done by the supplier free of cost.</p>		
9.0	The graphite mould blanks shall be suitably packed in wooden cases to avoid transportation damage. Cases must be amenable to handle by forklift trucks.	9.0	The graphite mould blanks shall be suitably packed in wooden or suitable cases to avoid transportation damage. All solid wood, used for packing, should be treated (heat treatment or fumigation) according to the international standard ISPM 15 (IPPC), latest version or equivalent. Cases must be amenable to be handled by forklift trucks.		
10	The material for trial shall necessarily meet all the requirements mentioned elsewhere in this specification prior to shop floor trial. Only after this, the material will be taken up for shop floor trial by RWF as per Trial Scheme at Annexure-1 and the corresponding Trial Report shall be prepared as per Annexure-2.	10	For development of new suppliers, RWF places developmental and extended developmental order. The material is subjected to rigorous test and trial. This includes, but is not limited to, pre-dispatch inspection, inspection at RWF before putting the material into trial on shop floor and shop floor trial. The material for trial shall necessarily meet all the requirements mentioned elsewhere in this specification prior to shop floor trial. Only after this, the material will be taken up for shop floor trial by RWF as per trial scheme at Annexure - 1. The trial report shall be prepared as per Annexure -2		
			Shop Floor Trial Performance will be assessed as per Para 7 above.		

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## SPECIFICATION FOR GRAPHITE MOULD BLANKS

### 1.0 SCOPE

The Specification covers the design, manufacture and supply of Graphite Mould Blanks at Rail Wheel Factory, Bangalore - 560 064, Karnataka State, India as per instructions and conditions of contract.

### 2.0 GENERAL DESCRIPTION

Graphite Mould Blanks of dimensions and sizes specified in technical data of the specification.

### 3.0 JOB REQUIREMENTS

**3.1** The Graphite Blanks shall be used as permanent graphite moulds (Cope and Drag), after machining, for manufacture of Cast steel wheels by the pressure pouring method, i.e., forcing up molten metal into mould cavity through the in-gate made up of clay graphite. The temperature of molten metal is in the range of 1600-1620°C. Moulds are pre heated to 350°C before using and the surface is protected using fused silica spray coating. Cast moulds are recycled after cleaning the surface by sand blasting using fine sand. The graphite Mould shall withstand the operating condition and shall have good wear/ erosion and oxidation resistance under the operating condition.

### 3.2 MANUFACTURE AND QUALITY ASSURANCE PLAN (QAP)

The supplier shall take extreme care to meet the product requirement and job requirement and have optimum erosion and oxidation resistance so that the consumption rate shall be minimum. The supplier shall have all the required facilities like vibration-moulding/extrusion, baking, pitch impregnation, graphitisation, machining etc. to manufacture the product. The supplier shall adopt the required methodology of manufacturing to achieve the properties specified in the specification. The particle size and their size distribution in the raw material shall be ensured by the manufacturer in such a manner so as to obtain the desired performance and the technical requirements as per the specification. The Manufacturer shall have an established QAP to meet technical requirements and the desired performance, as specified in this specification. Manufacturer shall submit the process details and QAP along with their offer for RWF's verification.

### 3.3 MANUFACTURERS TEST CERTIFICATE (MTC)

The manufacturer shall submit the MTC containing the test results of the

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Graphite Mould Blanks for all parameters specified under Clauses 4.1, 4.3, 4.4 & 4.5 and ensure the compliance of the specified parameters under Clause 5.0

**3.4 TESTING FACILITY**

The manufacturer shall have testing facility for characteristics specified in clause 4.3.1 to 4.3.7. In case any facility is not available in-house, the manufacturer shall carry out the test through a reputed laboratory at their own expense. Testing from any out-side agency shall be clearly brought out in the offer.

**4.0 TECHNICAL DATA**

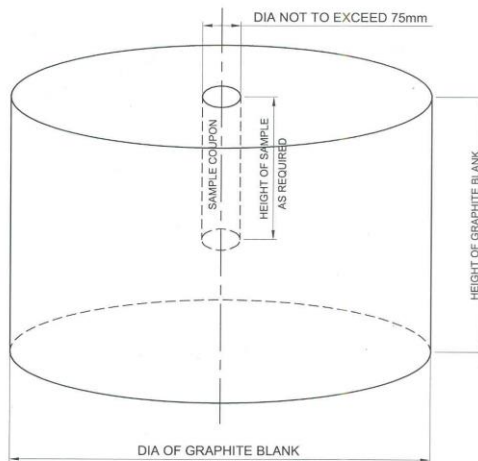
4.1 Sizes of Graphite Mould Blanks shall be as follows:

Blank dia for

- a) Type A {1097 dia} : 1097<sup>+3</sup>/<sub>-0</sub> mm dia x 575<sup>+3</sup>/<sub>-0</sub> mm height.
- b) Type B {1224 dia} : 1224<sup>+3</sup>/<sub>-0</sub> mm dia x 575<sup>+3</sup>/<sub>-0</sub> mm height.
- c) Type C {1325 dia} : 1325<sup>+3</sup>/<sub>-0</sub> mm dia x 575<sup>+3</sup>/<sub>-0</sub> mm height.
- d) Type D {1021 dia} : 1021<sup>+3</sup>/<sub>-0</sub> mm dia x 575<sup>+3</sup>/<sub>-0</sub> mm height.

4.1.1 Surface finish of the Graphite Mould Blank should be smoother than N12 (< N12) all over

4.2 A cylindrical coupon for sample preparation for testing shall be drawn from Graphite Mould Blank (GMB) as shown in the sketch below. The sample shall be drawn in such a manner that it shall not damage or make the blank unsuitable for the intended purpose.



SKETCH SHOWING THE SAMPLING LOCATION SKETCH - 'A'

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## 4.3 Other technical parameters shall be as follows:

Clause No	Characteristic	Unit	Specified value	Test Method	Sample frequency	Sampling location
4.3.1	Bulk Density	gm/cm <sup>3</sup>	1.60 -1.80	ASTM C-559	All Blanks	As per the sketch at clause 4.2
4.3.2	Electric resistivity (measured parallel to axis) (max)	Ohm-cm	15X10 <sup>-4</sup>	ASTM C-611	All Blanks	As per the sketch at clause 4.2
4.3.3	Permeability (parallel to axis)	AFS unit	Desired 0.16 - 0.80 max Permitted upto 0.9	Air Flow Method AFS	All Blanks	As per the sketch at clause 4.2
4.3.4	Flexural strength (parallel to axis) (min)	kg/cm <sup>2</sup>	Not less than 100 - 4 point loading  Or not less than 150 in 3 point loading*	ASTM C 651- Latest, 4-point loading Or ASTM D-7972- Latest for 3 point loading	All Blanks	As per the sketch at clause 4.2
4.3.5	Structure and surface	Shall not show any extraneous material		Visual inspection	All Blanks	Full mould surface
4.3.6	Ash content (max)	% by weight	0.20	Loss on Ignition ASTM C-561	Batch wise	As per the sketch at clause 4.2
4.3.7	Maximum grain size used	mm	0.8	Verification of manufacture records	Batch wise	Sample from processed raw material mix

\* In case of any dispute, four point loading method would be considered referee method.

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4.4 Apparent porosity preferred is less than 24% but shall not be more than 29% when tested as per ASTM C-1039 or by calculation as:

$$\{(True\ density - App.\ density) / True\ density\} \times 100$$

4.5 The permeability range in a lot shall be uniformly distributed. The manufacturer shall aim to achieve the permeability range distribution of the lot in such a way that the following shall be met.

Permeability Range	Percentage of mould in a lot
0.16 – 0.40 AFS	80% Min
0.41 – 0.90 AFS	20% Max

**5.0 OTHER FEATURES**

- i) The graphite mould blanks shall have sufficient thermal shock resistance to withstand high temperature of molten steel without cracking.
- ii) The graphite mould blanks shall have low co-efficient of thermal expansion.
- iii) The Graphite mould blanks shall be easily machinable; contour of the wheel shall be machined by form tools on cope and drag.
- iv) The supplier shall legibly print the permeability values and ash content on the mould blank.

**6.0 WARRANTY**

For the under mentioned conditions, the shop operating parameters & practices are considered common for all manufacturer/suppliers:

- i) If after removing the mould coating and oxidised surface, an area with unsatisfactory structure becomes visible and requires machining, the contractor shall offer incremental credit whenever void/flaws greater than 6 mm in depth are noticed.
- ii) RWF will proceed with machining of all such moulds until the void/ flaw disappears. The extra machining (in excess of 6 mm) necessitated by the said void/ flaw in the structure will have to be compensated by the contractor (without insisting on joint inspection). The rate of such compensation will be charged on proportionate basis based upon the material which require to be removed vis-a- vis total available useable material in a new mould (considering that condemning height of Cope is 230 mm and that of drag is 160 mm).

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- iii) However, if the void/ flaw does not get eliminated even after machining to a depth of 36 mm, the mould will be kept aside and offered for joint inspection with the supplier and further disposal will be decided during such joint inspection.
- iv) The contractor shall, if required, replace the Stores or such portion thereof as is rejected by the purchaser free of cost at the ultimate destination, or at the option of the purchaser, the contractor shall pay the purchaser value thereof at the contract price, and to such other expenditure and damages as may arise by reason of the breach of conditions herein specific.
- v) If the contractor so desires, the replaced parts can be taken by him or his representatives in India for disposal as he deems fit within a period of 3 months, from the date of replacement of the Stores. At the expiry of this period, no claim whatsoever shall lie on the purchaser.
- vi) If any defective Stores is not replaced within the above mentioned 3 months, the purchaser may proceed to recover the cost of the material not replaced by the contractor from their pending bills without prejudice to any other rights of the purchaser under this contract.

vii)(a) If a cope produces more than 5 defects (XC 46 and XC 56) duly discounting for process variation, penalty will be charged as follows:

$$\text{Penalty} = (\text{No. of defects} - 5) \times (5\% \text{ cost of GMB})$$

Defects occurring after casting 435 wheels (in case of BOXN or similar such wheels) and 323 wheels (in case of ICF Coach/BLC/EMU wheels or similar such wheels) will not be taken into account. The figures of 435 and 323 are based upon RWF's experience of getting average number of wheels per cope.

(b) If the defects (XC 46 and XC 56) becomes more than 7, the Mould will be set aside, and penalty will be charged. However defects after casting 'Y' wheels, [where Y is equal to 435 wheels (in case of BOXN wheels/similar products) and 323 wheels (in case of ICF Coach/BLC/EMU wheels/similar product)] will not be taken into account for this purpose. Penalty will be calculated by one of the following two methods, whichever is higher:

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(i) Penalty = Cost of GMB [ 1- (No. of wheels cast/Y)]

(ii) Penalty = (No. of defects – 5) x (5% cost of GMB)

**Note:**

- i. If the average defect (XC 46 & 56 ) per cope in the period of use comes out to be 4 or more than 4, then no penalty as mentioned in para 1 and 2 will be charged. If during the observation period, GMBs of other regular suppliers are in very insignificant number (less than 40 percentage of the population of the copes in service), comparison will be done based upon average corresponding figures of other regular suppliers in the preceding period, duly accounting for any major process variation, if any.
- ii. Further to above, the following process related defects will also be discounted :
  - a. Defects arising just after machining i.e., at Cope Life 1, and also on the first three shifts after a non working day will be taken on process account.
  - b. In case more than 2 of above defects are arising in a particular heat these defects also will be taken as on process account.

**7.0 PERFORMANCE**

The performance of the GMBs of a particular make and type will be adjudged based on the following

- (a) The cope life per thousand wheels worked out over a minimum no. of 20 copes of a particular make # \*
- (b) Average percentage wheel rejection on account of XC 46 and XC 56 per cope (Average number of wheels rejected per 100 wheels cast from 1 cope) #
- (c) Response of the firm with regard to warranty replacements against warranty claims of previous purchase orders may also be considered as a performance parameter .

# Note1 : Performance, as mentioned at 7(a) and 7(b) above, will be judged by comparison with average corresponding figures of GMBs of other regular suppliers for the same use during the observation period. If during the observation period, GMBs of that firm only are in service, or GMBs of other regular suppliers are in very insignificant number (less

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than 40 percentage of the population of the copes in service), comparison will be done based upon average corresponding figures of other suppliers in the preceding period, duly taking into account any major process change etc, which may have a bearing on the performance parameters stated above.

\*Note 2: For the purpose of 7(a) above, GMBs taken off line, because of quality issues or for some process related issues, will not be considered. Also loss of life span of mould due to any major machining done on account of any process issue, will be discounted for, while working out cope life per thousand for comparison.

**8.0 INSPECTIONS, TEST CERTIFICATE AND ACCEPTANCE**

8.1 The manufacturer will submit their Internal Test Certificate along with the supply as specified in clause 3.3. Acceptance will be done after scrutiny of manufacturer’s internal test certificate regarding compliance to technical parameters and other features detailed under main clauses 4.0 and 5.0 respectively.

8.2 As per the provision in Purchase Order, RWF or its authorised representative shall carry out inspection at the manufacturer’s premises. The manufacturer shall offer the Graphite Mould Blank after the internal inspection and compliance of specified requirements along with Manufacturer’s Test Certificate. The RWF’s authorised representative shall have access to verify the manufacturing process, records, and witness the testing of the offered Graphite Mould Blanks either at their own laboratory or at the authorised outside laboratory. It is the responsibility of the manufacturer to offer him free access to carry out the inspection. RWF or its authorised representative shall verify the manufacturing process from the Manufacturers Test Certificate covering clause 4.0, including the sub-clauses and clause 5.0 for all the mould blanks offered in the inspection lot. If required examination of internal documents as per QAP may be done. A lot, for the purpose of inspection, will consist of same type of mould blanks as defined in clause 4.1.

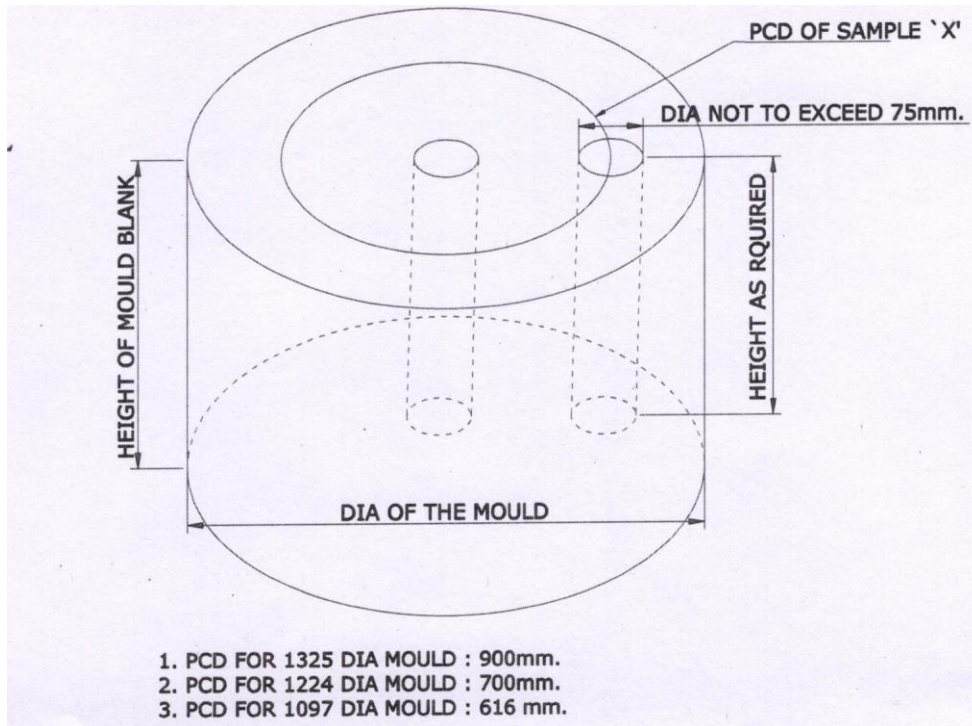
8.3 (a) RWF or its authorised representative shall follow IS:2500-2000 Part-1, AQL 2.5, GIL-II sampling procedure for visual and dimensional check-up for each lot offered for inspection, for inspection of the parameters as given in clauses 4.1 and 4.3.5.

(b) One number of Mould Blank shall be selected randomly from each of the offered lot for confirmatory testing to check for the parameters specified

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	

in the clauses 4.3, 4.4 and 4.5. Sample shall be taken from one location at P.C.D. as mentioned in sketch 'B'. This will allow the sampled mould to be used at RWF

c) The tested mould should be dispatched to the consignee.



SKETCH SHOWING THE SAMPLING LOCATION FOR MOULD, SELECTED FOR CONFIRMATORY TESTING SKETCH-B

Note: While taking confirmatory sample as above, it should be ensured that the axis of sample shall be parallel to the vertical axis of the mould. In case of any rejection during confirmatory testing, a replacement of mould shall be done by the supplier free of cost.

**9.0 PACKING & HANDLING**

The graphite mould blanks shall be suitably packed in wooden or suitable cases to avoid transportation damage. All solid wood, used for packing, should be treated (heat treatment or fumigation) according to the international standard ISPM 15

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	

(IPPC), latest version or equivalent. Cases must be amenable to be handled by forklift trucks.

## 10.0 TRIAL OF THE SUPPLY

For development of new suppliers, RWF places developmental and extended developmental order. The material is subjected to rigorous test and trial. This includes, but is not limited to, pre-dispatch inspection, inspection at RWF before putting the material into trial on shop floor and shop floor trial. The material for trial shall necessarily meet all the requirements mentioned elsewhere in this specification prior to shop floor trial. Only after this, the material will be taken up for shop floor trial by RWF as per trial scheme at Annexure – 1. The trial report shall be prepared as per Annexure -2

Shop Floor Trial Performance will be assessed as per Para 7 above.

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	

**Annexure -1**

**TRIAL SCHEME OF GRAPHITE MOULD BLANK**

1	Trial Scheme No.	RWF/M/SPECN-1/016/1987 alt .../ Trial Scheme PL NO.....
2	Objective of Trial	To establish the suitability of graphite mould blank as per Specn No. RWF/M/SPECN-1/016/1987 alt ...
3	Description of Material PO Number & PO date PO Qty. Supplier	GRAPHITE MOULD BLANK ..... ..... .....
4	IDN Number & Date IDN Qty.	..... .....
5	Authority for conducting Trial	Dy. CME/ Mfg
6	Earlier trial details	First Time Supply/ Second time/ Third time ...../...../.....
7	Trial Parameters	As mentioned in Trial Scheme
8	Specification	RWF/M/SPECN-1/016/1987 alt .....
9	Pre-trial Testing details	Met. Lab Report & MTC
10	Trial qty	Full IDN Qty/ 5% of the tendered quantity
11	Equipment / Station process	Mould Room

( ..... to be filled by Team Members)

Trial Parameters:

1. Total quantity graphite mould blank to be drawn and trial conducted on the entire quantity under the purchase order/5% of the tendered quantity, whichever is less.
2. Inspection & testing by shop and whenever required by laboratory completely in line (not in part) with the specification. Sampling for inspection as per RWF specification.
3. Examination of MTC (Manufacturer's Test Certificate) and comments on its suitability.

**Specific Requirements:**

1. Study the trend of XC set (XC46-Pocker, XC56-Hollowface Hub) wheel rejections in the trial moulds and find out number of GMBs producing more than 5 rejections duly discounting process variations and compare with that of other makes by ensuring same process parameter during use and in the same period (or just preceding/succeeding period).

2. Mould consumption per thousand wheels

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	

**TRIAL REPORT OF GRAPHITE MOULD BLANK**

1	Trial No.	RWF/M/SPECN-1/016/1987 alt .../ Trial Scheme PL NO.....
2	Objective of Trial	To establish the suitability of graphite mould blank as per Specn No. RWF/M/SPECN-1/016/1987 alt .../
3	Description of Material PO Number & PO date PO Qty. Supplier	GRAPHITE MOULD BLANK ..... ..... .....
4	IDN Number & Date IDN Qty.	..... .....
5	Authority for conducting Trial	Dy. CME/ Mfg
6	Earlier trial details	Fist Time Supply/ Second time/ Third time ...../...../.....
7	Trial Parameters	As mentioned in Trial Scheme
8	Specification	RWF/M/SPECN-1/016/1987 alt ...
9	Pre-trial Testing details	Met. Lab Report & MTC
10	Trial qty	Full IDN Qty/ 5% of the tendered quantity
11	Equipment / Station process	Mould Room
12	Nominated Officers	ACMT/W & AWM/MR

( ..... to be filled by Team Members)

**Application Test:** Shop Floor test conducted from date \_\_\_\_\_ to date \_\_\_\_\_ & H. No. \_\_\_\_\_

Trial Parameters:

- Total quantity of graphite mould blank to be drawn and trial conducted on the entire quantity under the purchase order/5% of the tendered quantity, whichever is less.

Comments:

- Inspection & testing by shop and whenever required by laboratory completely in line (not in part) with the specification. Sampling for inspection as per RWF specification.

Enclosure Details:

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	



Comments with documents:

4

**Specific Requirements:**

1. Study the trend of XC set (XC46-Pocker, XC56-Hollowface Hub, XC626-Graphite Inclusion, XC15-Pinhole, XC33-hole in bore) wheel rejections in the trial moulds and find out number of GMBs producing more than 5 rejections duly discounting process variations and compare with that of other makes by ensuring same process parameter during use and in the same period (or just preceding/succeeding period).

**Observations:**

AWM/WM

ACMT/W

SSE/MR

WM/W

Remarks of Dy CME/Mfg.

Remarks of AED/M&C

CWE/W

AED M&C	Dy CME/Mfg	SME/D	SSE/D
VERIFIED		PREPARED	