

SPECIFICATION FOR
CARBON STEEL CASTINGS FOR
TRACTION MOTOR TYPE:HS15250A

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CHKD.

SPECIFICATION FOR
CARBON STEEL CASTINGS
FOR TRACTION MOTOR
TYPE: HS15250A

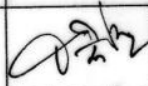
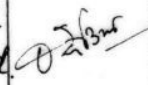
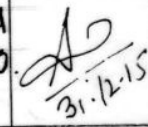
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CHITTARANJAN LOCOMOTIVE WORKS
WEST BENGAL
NO. 4TMS.095.003,REV.1
DATE - 15.07.2010

Signature Not
Verified

Digitally signed by
Ravindra Kumar
Date: 2021.04.09
16:45:25 +05'30'

Reason: IREPS-CRIS
Location: New Delhi

ALT. No.	AUTHY.	DESCRIPTION	INITIAL	DATE
1.	DY.CEE/TMD	SPECIFICATION MODIFIED AND RETYPED REF.L.NO.CLW/TM/7229, Dt.09.07.2010		15.07.2010
2.	DY.CEE/TMD	Static balancing Clause Para-7 and Inspection clause Para-12.3 modified. Ref. EL/TM/2013. dt. 07.06.2011.		09.06.2011
3.	DY.CEE/TMD.	RADIOGRAPHIC TEST CLAUSE PARA 3b IS MODIFIED VIDE RDSO's L.NO. EL/1.3.10/3, dt. 14.07.2015	 31.12.15	31.12.15

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**CLW GENERAL SPECIFICATION FOR CARBON STEEL CASTING FOR
COMPONENTS OF HITACHI TRACTION MOTYOR TYPE HS:15250A**

0. FOREWORD

0.1 This specification is for fully machined components made out of carbon steel castings intended for use in HTM type HS:15250A. The machined components namely (a) Bearing Bracket assly./CE & PE, (b) Outer/Inner Bearing Cover/CE & PE, (C) Commutator Spider, (d) Rotor Clamp are covered by this specification.

1. SCOPE

1.1 This specification covers the manufacture, testing, inspection, packing and supply of fully machined carbon steel cast components of HTM Type HS:15250A manufactured at CLW before their application in the motor.

2. SPECIFICATION

2.1 The material shall conform to IS:1030'1998 Gr.230-450W (or Latest Version), unless otherwise covered in this specification.

2.2 The carbon steel casting shall be made in accordance with IS:8800'1986(Technical Library addition for steel casting) and shall be made from electric arc or electric induction only. In case, any other process is employed prior approval from CLW should be obtained.

2.3 CHEMICAL COMPOSITION:

The chemical composition of steel casting when tested in accordance with IS:228'59 shall conform to IS:1030'1998 Gr.230-450W or (Latest version).

2.4 FREEDOM FROM DEFECT:

All the castings shall be free from defects that shall adversely effect machining and utility of castings. To remove risers or gates by flame/arc care shall be taken to make the cut at a sufficient distance from the body of the casting. The casting shall have a crystalline structure.

3. TEST & TEST METHOD:

As per the above standard, the following test is to be carried out in presence of inspecting authority and values to be recorded.

- i) Dimension (finished) : Minimum 20% of the offered quantity (supplier should check themselves 100%)
- ii) Chemical Analysis : Per melt heat - 1 Sample
- iii) Tensile, Yield, Elongation and impact test. : Per melt heat & per heat treatment batch - 3 Samples
- iv) Bend test : - do -
- v) Radiographic test
 - a) Radiographic examination & acceptance limit shall be done as per ASTM E-446 and ASTM E-186 as per TABLE-1

TABLE - 1

Shrinkage	upto level 3
Inclusion	upto level 3
Gas Porosity	upto level 3
Crack	Not Allowed
Hot tears	Not Allowed
Chaplets	Not Allowed

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The casting having defects exceeding the above radiographic quality limits, shall not be accepted.

3b) 5% of the offered quantity selected at random are to be placed for radiography test. If any ^{ALT. 3}
~~L BUT RADIOGRAPHY TEST TO BE DONE ON 20% OF OFFERED QTY. OF MSU TUBES.~~
 of the casting for radiography test does not conform to the radiographic acceptance limit
 the whole lot offered stands rejected & no reclamation will be permitted.

c) Traceability must be ensured/available from Melt Heat and Heat treatment batch.

vi) Magnetic particale or Liquid : 100% for the offered quantity.
 panetrant test(after finished).

4. RECOMMENDED VALUES FOR VARIOUS MECHANICAL TEST:

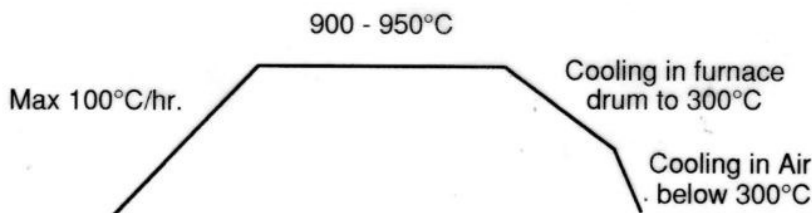
Dimensional : As per relevant drawing enclosed to CLW.tender enquiry for the casting after finished machining and not the dimension of moulded casting .Tolerances on all the important dimension after machining shall be in accordance with Annex-II of this specification .Where no tolerances is specified on machined surfaces the following general classes of tolerances shall be maintained as per IS: 919'93 Pt.I for Liner dimension and part-II for holes and Shaft.

5. HEAT TREATMENT:

All the castings shall be supplied suitably heat treated.The method of heat treatment and the relevant records of heat treatment shall be furnished to CLW if so specified at the time of enquiry or order. Any flame or arc cutting which may be necessary shall be carried out before heat treatment.

6. ANNEALING:

The cast parts shall be annealed by the following heat cycles.



Soaking time : Max. thickness of product/25 mm hours.

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7. STATIC BALANCING: (SEE CLAUSE 7 MODIFIED AT SHEET NO 12 OF 12.)

~~Some castings covered in this specification are components of rotating mass viz Rotor clamp, Commutator Spider. These shall be required to be checked for static unbalance as fully machined components. This specific rotating components shall be checked 100% by the supplier and records of unbalance mass and location of balancing weight removed if any shall be kept and shall be submitted in details to CLW inspector at the time of inspection. The unbalance if any shall be corrected by milling of some material and mass at a pre-determine location. The inspector will carry out the unbalance check on 25% of the casting under reference offered in the lot at random before its acceptance. The maximum unbalance in distribution of the mass in fully machined components shall be limited to 25 ± 5 grams for Rotor Clamp and 45 ± 5 grams for commutator spider. Maximum 100 grams unbalance of Rotor Clamp is acceptable before any deletion of material.~~

8. TEST

8.1 As the test values obtained on the test bar do not necessary represent the properties of the casting themselves the additional tests prescribes as follows shall be carried out to prove the soundness of the castings for the various types of components. Inspector may carry out the following tests (except SN-4) on the offered material which are not subjected to radiography.

Sl. No.	Test	Requirements	Method of Test
i)	Drop test	shall show no sign of fracture.	IS: 5518'1996
ii)	Falling weight test.	shall not fracture	IS:11240'1985
iii)	Ringing Test	shall pass the test.	
iv)	Static Balancing	- do -	

9. REPAIR TO CASTING

No repair to casting shall be acceptable without prior approval of purchaser. The casting selected for repair after approval shall be done by welding in accordance with procedure laid down in IS:5530'86. Welding shall not be allowed/permitted in positions which are deciding fits and clearances.

10. MARKING

Each components shall be legibly marked with the following information.

- Grade of casting.
- Number or identification mark by which batch can be traced.
- Manufacturer's initial or trade mark.

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11. INFORMATION TO BE FURNISHED BY THE TENDERERS:(FOR NEW SOURCES)

While submitting the offer, the tenderers shall furnish the following information.

- a) Facilities available for manufacture and machining and heat treatment, testing according to this specification.
- b) Clause wise comments have to be furnished by the tenderer. Vague comments like noted and understood are not acceptable. Compliance have to be clearly stated otherwise CLW reserves the right to reject the offer.
- c) QAP must be product specific as per annexure-III. General ISO documents need not be submitted.
- d) M&P and testing facilities available.
- e) Latest ISO certification from NABCB approved body.
- f) Source and grade of raw material.

12. INSPECTION:

12.1 The successful tenderer shall have to submit prototype in one or more than one stage to the competent authority of CLW/CRJ. before undertaking the bulk production/supply.

12.2 The supplier shall offer the prototype for inspection and test at his works with prior intimation to Dy.CEE/TMD, Dy.C.C&M and Dy.CMM/CLW/CRJ, W.Bengal(713331). The supplier shall provide all necessary facilities for inspection and testing. After the tests, if it is considered necessary by the authorised representative of Dy.CEE/TMD. to carry out further additional test or trial of the prototype samples at chittaranjan, the supplier shall arrange the same by quickest means at his cost.

(SEE CLAUSE 12.3 MODIFIED AT SHEET NO 12 OF 12.)

12.3 Bulk inspection of all the items shall be carried out at the manufacturers premises by inspection wing of CLW. Metallurgical test shall be carried out by the authorised representative of a) Dy.C.C&M/CLW or b) NABL or RDSO approved laboratory. In case of b) It should be in presence of representative of zonal CLW inspection cell. The cost of material consumed in testing shall be borne by the supplier.

12.4 Splitting of the tendered quantity between minimum two tenderers is likely to be restored to (tenderer may however indicate their minimum acceptable quantity).

13. PACKING.

13.1 The component shall be quoted with antirust varnished/compound after inspection & passed.

13.2 varnished component shall be wrapped in polythene paper followed by corrugated paper.

13.3 The wrapped equipment shall be finally sealed in thick polythene bag.

13.4 The sealed components shall be finally packed in wooden crates/boxes filled with saw dust to prevent transit damage of machined surface.

14. "(i) Firm's own foundry (class-A) is desirable for carbon steel casting 'or' they should have tie up with other RDSO approved class A foundry for getting raw material of specified grade.
- (ii) Firm should have own facility for checking of static balancing of finished product."

ANNEXURE 'I' Tolerance on casting dimensions.

ANNEXURE 'II' Tolerance and machining specifications.

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ANNEXURE "I" OF CLW SPECIFICATION NO. 4TMS.095.003TOLERANCE ON CASTING STRUCTURE (CARBON STEEL CASTINGS)OF HITACHI TRACTION MOTOR.

LENGTH		THICKNESS	
NOM LENGTH	TOLERANCE	NOM THICKNESS	TOLERANCE
100	± 1.8	10	± 1.8
101 200	± 2.4	11 20	± 2.4
201 400	± 3.6	21 30	± 3.6
401 800	± 4.8	31 50	± 4.8
801 1600	± 6.0	50 80	± 6.0
1601 3150	± 8.4	80 125	± 7.2
3150 6300	± 13.2	125 200	± 9.6

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ANNEXURE-II OF CLW SPECN. NO. 4TMS.095.003

Sheet 8 of 12

ISSUE DATE

PART 2 : MECHANICAL DRAWING

PAGE

1977.3

2.1 General Dimensional Tolerance
of Machined Parts

2.1 - 1

No.

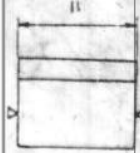
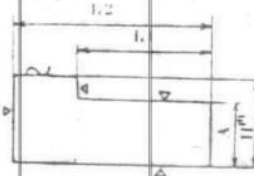
Item

Description

1 Dimensions
between both
faces of
machined
products.

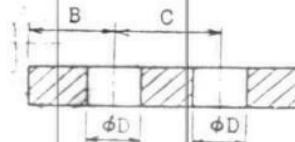
Unit: mm

Dimension	Tolerance
≤ 20	± 0.3
$21 \leq 100$	± 0.5
$101 \leq 500$	± 1
$501 \leq 1000$	± 1.5
$1001 \leq 2500$	± 2
$2501 \leq 5000$	± 2.5
$5001 \leq 8000$	± 3
$8001 \leq$	± 3.5

NOTE (1) : The tolerance
should not be applied
to the dimension H.2 Distance
between
center lines
and distance
between
datum lines
of machined
shaft or holes

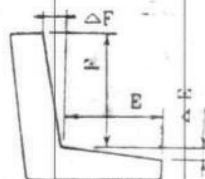
Unit: mm

		Unit: mm	
Diameter (øD)	Tolerance		
	B, C ≤ 100	101 ≤ B, C ≤ 500	501 ≤ B, C
≤ 5	±0.25		±0.5
6 ≤ 10	±0.5	±0.5	±1
11 ≤ 25	±0.75	±0.75	±1.5
26 ≤	±1	±1	±2

3 Deviation in
parallelism
and perpendi-
cularity of
machined
parts

Unit: mm

Dimension	Deviation
≤ 20	0.3
$21 \leq 100$	0.5
$101 \leq 500$	1
$501 \leq 1000$	1.5

Parallelism : $\Delta E/E$ Perpendicularity : $\Delta F/F$

Datum plane

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CHKD.	WATAHIKI	87.10.30
APPD.	AKAIHASHI	87.10.30

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ANNEXURE - 2 OF C/W SPECN. NO. 4TMS 095.003

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PAGE

PART 2 : MECHANICAL DRAWING

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2.1 - 2

2.1

General Dimensional Tolerance
of Machined Parts

1977.3

No.	Item	Description																																														
4	Drilled holes	<p>Tolerance of diameter (Q)</p> <p>Unit:mm</p> <table border="1"> <thead> <tr> <th>Diameter (Q)</th> <th colspan="2">Tolerance</th> </tr> <tr> <th></th> <th>Max.</th> <th>Min.</th> </tr> </thead> <tbody> <tr><td>≤ 10</td><td>+0.3</td><td rowspan="11">0</td></tr> <tr><td>$11 \leq 20$</td><td>+0.4</td></tr> <tr><td>$21 \leq 30$</td><td>+0.5</td></tr> <tr><td>$31 \leq 40$</td><td>+0.6</td></tr> <tr><td>$41 \leq 50$</td><td>+0.7</td></tr> <tr><td>$51 \leq 60$</td><td>+0.8</td></tr> <tr><td>$61 \leq 70$</td><td>+0.9</td></tr> <tr><td>$71 \leq 80$</td><td>+1.0</td></tr> <tr><td>$81 \leq 90$</td><td>+1.1</td></tr> <tr><td>$91 \leq 100$</td><td>+1.2</td></tr> <tr><td>$101 \leq 110$</td><td>+1.3</td></tr> <tr><td>$111 \leq 120$</td><td>+1.4</td></tr> </tbody> </table> <p>Tolerance of depth (S)</p> <p>Unit:mm</p> <table border="1"> <thead> <tr> <th>Diameter (Q)</th> <th colspan="2">Tolerance</th> </tr> <tr> <th></th> <th>Max.</th> <th>Min.</th> </tr> </thead> <tbody> <tr><td>≤ 16</td><td>+2</td><td rowspan="4">0</td></tr> <tr><td>$17 \leq 30$</td><td>+4</td></tr> <tr><td>$31 \leq 50$</td><td>+5</td></tr> <tr><td>$51 \leq$</td><td>+6</td></tr> </tbody> </table> <p>Deviation of angle (θ)</p> <p>$\theta \leq 1^\circ$</p> 	Diameter (Q)	Tolerance			Max.	Min.	≤ 10	+0.3	0	$11 \leq 20$	+0.4	$21 \leq 30$	+0.5	$31 \leq 40$	+0.6	$41 \leq 50$	+0.7	$51 \leq 60$	+0.8	$61 \leq 70$	+0.9	$71 \leq 80$	+1.0	$81 \leq 90$	+1.1	$91 \leq 100$	+1.2	$101 \leq 110$	+1.3	$111 \leq 120$	+1.4	Diameter (Q)	Tolerance			Max.	Min.	≤ 16	+2	0	$17 \leq 30$	+4	$31 \leq 50$	+5	$51 \leq$	+6
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Tolerance of diameter (Q)

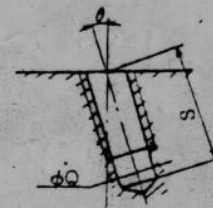
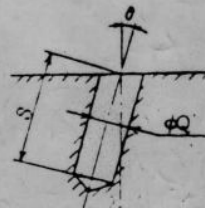
Unit:mm

Diameter (Q)	Tolerance	
	Max.	Min.
≤ 10	+0.3	0
$11 \leq 20$	+0.4	
$21 \leq 30$	+0.5	
$31 \leq 40$	+0.6	
$41 \leq 50$	+0.7	
$51 \leq 60$	+0.8	
$61 \leq 70$	+0.9	
$71 \leq 80$	+1.0	
$81 \leq 90$	+1.1	
$91 \leq 100$	+1.2	
$101 \leq 110$	+1.3	
$111 \leq 120$	+1.4	

Tolerance of depth (S)

Unit:mm

Diameter (Q)	Tolerance	
	Max.	Min.
≤ 16	+2	0
$17 \leq 30$	+4	
$31 \leq 50$	+5	
$51 \leq$	+6	

Deviation of angle (θ) $\theta \leq 1^\circ$ 

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PAGE

PART 2 : MECHANICAL DRAWING

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2.4 - 1

2.4

Dimensional Deviations in Parallelism, Perpendicularity and Concentricity of Machined Products.

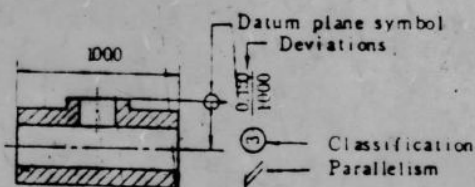
1977.3

The allowable deviation in Parallelism, Perpendicularity and Concentricity are as tabulated below. However, those parts where no deviation is specified in the drawing should conform to the General Deviation in Parallelism and Perpendicularity of Machined Parts (Page 3.1 - 1)

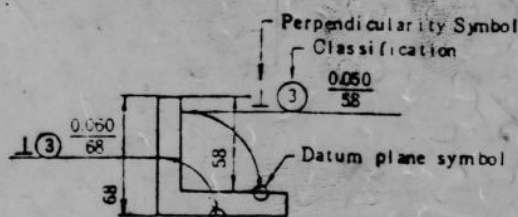
Classification Dimension (mm)	Symbol	Deviations (Unit: 0.001mm)				
		Class 0	Class 1	Class 2	Class 3	Class 4
4		1.5	3	7	15	40
6		2	4	10	20	50
10		2.5	5	12	25	60
16		2.5	6	14	30	70
25		3	7	16	35	80
40		3.5	8	18	40	90
63		4	10	20	50	100
100		5	12	25	60	120
160		6	15	30	70	150
250		7	18	35	80	175
400		8	20	40	100	200
630		10	25	50	120	250
1000		12	30	60	150	300
1600		15	40	80	200	400
2500		20	50	100	250	500
4000		25	60	140	300	600
6300		30	80	200	400	800

Typical drawing examples

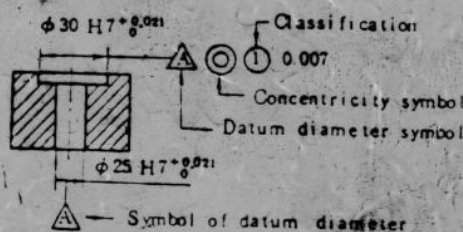
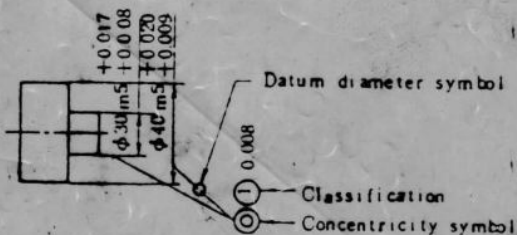
(a) Parallelism



(b) Perpendicularity



(c) Concentricity



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ANNEXURE-IIIQAP TO BE SUBMITTED BY THE VENDER SHALL COVER THE FOLLOWING ASPECTS:-

1. Index page.....
2. Copy of ISO 9001 certificate from NABCB registered body.
3. Organisation chart clearly bringing out the quality control set up.
4. Qualification of peresonal manning only the quality control set up.
5. List of M&P and testing facilities.
6. Process flow chart indicating step-by-step process of manufacture of an item or a family of items for which the process is same.
7. Details of sub-vendors:-

Name of item	Sub venders	ISO status	Inspection plan of sub venders

The sub-vendors should have all the requisite infrastructure of manufacturing and testing facilities, preferably under one roof.

8.0 Quality Assurance System-Inspection and testing plan with formats to be filled up for:-

- Incoming material.
- Process control
- Product control

This must be furnished in the following format.

Subject/ Products/ Process	Sample size & its frequency of inspection	Parameters of inspection	Mode of Inspection/ Equipment used	Acceptance limit/Criteria/ Specified value as per Drg./Specn.	Format No. Where records will be kept.

NOTE:-

- 1) SAMPLE FORMATS USED FOR RECORDING MUST BE SUBMITTED.
- 2) GENERAL ISO 9001 DOCUMENTS NOT TO BE SUBMITTED IN QAP.
- 3) FIRM MUST NOT DEPEND ONLY ON TC FOR INCOMING MATERIAL.
- 4) RECORD OF SN 8 ABOVE SHALL BE CHECKED DURING INSPECTIONS AT FIRM'S PREMISES.
- 5) QAP HAS TO BE SPECIFIC FOR EACH PRODUCT BASED ON RELEVANT SPECIFICATION/ DRAWING.

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CHKD.
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SPECIFICATION FOR
CARBON STEEL CASTINGS
FOR TRACTION MOTOR
TYPE: HS15250A


DY.CEE/TMD.

CHITTARANJAN LOCOMOTIVE WORKS
WEST BENGAL

NO. 4TMS.095.003,REV.1
DATE - 15.07.2010

SHEET NO 12/12

ALT 1


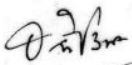
7. STATIC BALANCING

Some castings covered in this specification are components of rotating mass viz: Rotor Clamp, Commutator Spider. These shall be required to be checked for static unbalance as per machined components. This specific rotating components shall be checked 100% by the supplier and records of unbalance mass and location of balancing weight removed if any shall be kept and shall be submitted in details to CLW Inspector at the time of inspection. The unbalance if any shall be corrected by removing excess material at a pre-determined location and no addition of material is allowable. The inspector will carry out the unbalance check on 25% of the casting under reference offered in the lot at random before its acceptance. The maximum unbalance in distribution of the mass in fully machined components shall be limited to 35 ± 5 grams for Rotor clamp and 45 ± 5 grams for Commutator Spider, maximum 100 gram unbalance of Rotor clamp is acceptable before any deletion of material.

ALT 2

12. INSPECTION:

Inspection of all castings shall be carried out at the manufacturers premises by the inspection viz. of CLW. Metallurgical testing for prototype supplies shall be carried out by Dy. CCE/CLW/CLJ or NABL approved laboratory for which sample to be drawn, stamped and sealed by authorized representative of Dy. CCE/TMD/CLW/CRJ and for Bulk supplies metallurgical test shall be done by Dy. CCE/CLW/CRJ or NABL approved Laboratory, to be witnessed by authorized representative of CLW Const. Inspector cell. The cost of material consumed in testing shall be borne by the supplier.

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